Exploring the Dynamic Nature of Suicidal Ideation and Its Associated Factors

Yawen Zheng

MSc Developmental Psychopathology

BSc Applied Psychology

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School of Health and Wellbeing, College of Medicine, Veterinary, and Life Sciences, University of Glasgow

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Abstract

Background: Suicide is a major global public health concern, resulting in over 720,000 deaths annually, with an estimated 20 suicide attempts for every suicide death worldwide. In the UK, approximately one in five adults report experiencing suicidal ideation at some point in their lives, with a significant proportion reporting past suicide attempts. The high prevalence of suicidal ideation has positioned it as a primary focus of research and clinical intervention, aiming to prevent its progression to suicidal attempts and eventual death. Suicide is widely recognised as a complex phenomenon arising from the interplay of biological, psychological, social, and environmental factors. To advance our understanding of suicidal behaviour, it is essential to investigate the psychological processes underlying suicidal ideation and suicide attempts. Despite extensive research that incorporates both theoretical frameworks and empirical investigations, our ability to predict and prevent suicide remains limited. Key shortcomings in current research include a lack of insight into the short-term fluctuations in suicide risk and insufficient attention to the multidimensional nature of suicidal ideation. Furthermore, while qualitative approaches can provide rich and complementary insights into the lived experience of suicide risk, the field remains predominantly focused on quantitative methodologies.

Aims: The current thesis aimed to investigate suicide risk by examining psychological factors within the overarching framework of the Integrated Motivational-Volitional model, supplemented by insights from the self-regulation perspective, with a central focus on fluctuations in suicidal ideation. Specifically, it addressed three overarching aims: (1) To what extent is suicidal ideation a dynamic process? (2) What factors are associated with different patterns of suicidal ideation? (3) With a particular focus on cognitive reactivity and ego depletion, what psychological factors are associated with suicidal ideation and suicide attempts?

Methods: To develop a comprehensive understanding of suicide risk, this thesis comprised three distinct studies employing diverse methodologies. First, a systematic review was conducted using a narrative synthesis approach to examine dynamic indicators of suicidal ideation and their associated factors, across different pattens of dynamic association and assessment frequencies (Chapter 2; 112 studies from 109 articles included in the synthesis). Next, a cross-sectional online survey was administered to a general population sample of adults living in the UK, recruited through opportunity sampling. This study explored

psychological factors (e.g., entrapment, impulsivity, depression, resilience, and mindfulness) in relation to suicidal ideation and suicide attempts, as well as parameters of suicidal ideation (i.e., frequency, duration, and intensity), with a particular focus on the effects of cognitive reactivity and ego depletion (Chapter 3; N = 312; M_{age} = 28.44, SD = 10.0; 80.4% White; 64.7% Female). Furthermore, a subsample of survey participants with a history of suicidal ideation and suicide attempts was drawn to examine the role of cognitive reactivity and ego depletion in the relationship between entrapment and suicidal ideation through mediation analyses (Chapter 4; N = 269; M_{age} = 28.50, SD = 10.06; 82.9% White; 66.5% Female). Building on insights from the preceding chapters, the final study used Interpretative Phenomenological Analysis to explore individuals' lived experiences of fluctuations in suicidal ideation in the context of their daily lives (Chapter 5; N = 10; 6 females, 4 males; M_{age} = 28; age range = 20 to 36 years).

Results: The systematic review (Chapter 2) indicated that suicidal ideation fluctuates significantly over periods ranging from hours to days. On average, suicidal ideation exhibited substantial within-person variability, alongside small to moderate instability (i.e., changes in suicidal ideation between consecutive time points) and temporal dependency (i.e., the carryover effect where prior levels of suicidal ideation influenced subsequent time points). The complex nature of suicidal ideation was further emphasised by its associations with a range of psychological and contextual factors, which varied based on the dynamic pattern examined (i.e., concurrent, prospective, and time-invariant associations) and the frequency of assessment (i.e., multiple times per day, once per day, and every few days per week). These findings were supported and extended by the qualitative investigation from a lived experience perspective (Chapter 5). Four group themes were identified, with 'Fluctuating Suicidal Ideation' as the overarching theme, reflecting a shared recognition of the dynamic nature of suicidal ideation. Three additional group themes captured the experiential features and individuals' interpretations of these fluctuations: 'From Whisper to Scream' described variations in intensity and duration; 'Whole vs. Part: Timescale and Perspective' highlighted how shifts in timescale and perspective influenced individuals' interpretations; and 'Breaking the Balance' depicted circumstances that disturbed psychological stability, resulting in heightened emotional distress and increased vulnerability to suicidal ideation. Results from the cross-sectional online survey indicated that, while most psychological factors under investigation significantly distinguished between individuals with different suicidal histories (i.e., no history, ideation only, suicide attempts) in univariate models, only impulsivity (SI vs. SA) and depression (NH vs. SA, SI

vs. SA) remained significant predictors in multivariate models. Additionally, most psychological factors were individually associated with all three parameters of suicidal ideation; however, only a few predicted its frequency and duration after controlling for depression. In contrast, intensity was independently predicted by most factors, except for impulsivity and some subcomponents of cognitive reactivity (Chapter 3). Results from the mediation analyses (Chapter 4) showed that entrapment fully mediated the relationship between cognitive reactivity and suicidal ideation. The relationship between entrapment and suicidal ideation was partially mediated by ego depletion, as measured by self-regulatory fatigue, but not by depletion sensitivity.

Conclusion: This thesis contributes to the existing literature by demonstrating that suicidal ideation is not a static state, but rather a fluctuating process shaped by dynamic interactions between internal and external factors in daily life. Both quantitative and qualitative evidence support these findings, with the latter emphasising the role of distraction and a key aspect of personal construct in living with suicidal ideation (i.e., the tendency to integrate experiences to foster meaning-making). Additionally, the thesis findings also highlight the challenges of predicting more dynamic aspects of suicidal ideation, such as frequency and duration, within a cross-sectional online survey. This underscores the need for further research that examines the multidimensional nature of suicidal ideation in greater depth. The findings also demonstrated the effect of cognitive reactivity and ego depletion on the suicide risk, with a particular emphasis on how incorporating a self-regulation perspective can improve our understanding of the process of suicide risk. In light of the thesis findings, clinical treatments and interventions are encouraged to adopt a dynamic perspective that is flexible, tailored to the individual, and sensitive to fluctuations in suicide risk, while also incorporating effective coping strategies. Treatment could benefit from targeting specific aspects of suicidal ideation while also focusing on long-term goals across cognitive, emotional, physiological, and behavioural domains to reduce individuals' baseline vulnerability, in addition to addressing acute suicidal crisis. Replication of these findings is needed to strengthen their generalisability. A deeper understanding of suicide risk may be achieved through meta-analytic research on factors associated with dynamic patterns of suicidal ideation, as well as fine-grained investigations into the various dimensions of suicidal ideation.

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Acknowledgements

These four and a half years in Glasgow have been among the most enriching and fulfilling times of my life – years spent pursuing what was once a dream, but what I now understand as a journey into *depth and connection*. The exploratory path of this PhD has not only brought me closer to all the tangible goals but has also opened and enlightened my mind to perspectives and inspirations I could not have anticipated. I often envision my research journey as an ever-growing tree: the core pursuit of knowledge and research forms the trunk, supporting every step of this PhD, while the main branches represent the experiences and insights that have grown from it. These branches draw nourishment from the trunk and roots, and in turn, sprout twigs that eagerly reach outward for connections. Some of these twigs grow into new experiences, while others circle back, breathing new life into the past. Here, I would like to acknowledge two essential elements of this metaphorical three, the trunk and the roots, as they are most relevant to this PhD.

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The Roots

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This marks not an ending, but the beginning of a new journey.

Yawen Zheng, October 2025.

Author’s declaration

“I hereby declare that I am the sole author of this thesis, except where the assistance of others has been acknowledged. It has not been submitted in any form for another degree or professional qualification.”

Yawen Zheng, October 2025.

List of abbreviations

AR:	Autoregressive effect
CI:	Confidence intervals
CR:	Cognitive reactivity
DAH:	Differential Activation Hypothesis
DSS:	Depletion Sensitivity Scale
EMA:	Ecological Momentary Assessment
FVT:	Fluid Vulnerability Theory
HOP:	Hopelessness/Suicidality subscale
ICC:	Intraclass correlation coefficient
IMV:	Integrated Motivational-Volitional Model of Suicidal Behaviour
IPA:	Interpretative Phenomenological Analysis
LEIDS-RR:	Revision of the Leiden Index of Depression Sensitivity-Revised
M:	Mean
MSSD:	Mean squared successive differences
N:	Total number
NH:	No history of suicide
OR:	Odds ratio
RMSSD:	Root mean squared successive differences
S-UPPS-P:	Short UPPS-P Impulsive Behavioural Scale
SA:	Suicide attempt or history of suicidal attempt
SD:	Standard deviation
SI:	Suicidal ideation or history of suicidal ideation only
SRF:	Self-Regulatory Fatigue Scale
WHO:	World Health Organisation

Chapter 1: General Introduction

Suicide is a major global public health challenge that has driven extensive research into its causes, interventions, and prevention strategies. Nevertheless, contemporary suicide research faces the ongoing challenge that our ability to accurately predict suicidal behaviour remains only slightly better than chance and has shown little improvement over recent decades (Franklin et al., 2017). It is well-recognised that suicide is a complex phenomenon arising from the interplay of biological, psychological, social, and environmental factors, which further complicates efforts to predict suicide risk (Turecki et al., 2019). While evidence has demonstrated associations between suicide risk and various sociodemographic and individual differences factors, many of these variables are static and non-modifiable in nature. As such, increasing attention has been directed towards understanding psychological mechanisms that underlie the development of suicide risk, particularly those that confer vulnerability to suicidal ideation and suicide attempts (O'Connor & Nock, 2014). Consistent with this focus, the current thesis set out to investigate suicide risk through the lens of psychological science.

A notable gap in the existing literature is the limited attention paid to the temporal dynamics of psychological constructs associated with suicide risk (Davidson, Anestis, & Gutierrez, 2017). Only in recent years has suicide research begun to benefit from technological advancements that enable real-time monitoring and assessment of risk (Hallensleben et al., 2019; Kleiman et al., 2017), marking the beginning of a new era in understanding the moment-to-moment nature of suicidal ideation. The novelty of this area within suicidology highlights the need for further investigation into many fundamental questions concerning the short-term dynamics of suicidal risk, as well as for the systematic synthesis of existing evidence. In response, the overarching aim of this thesis is to explore the dynamic nature of suicidal ideation and its associated factors. This aim is addressed through three distinct studies, each employing a different methodological approach to examine specific facets of suicide risk.

This chapter provides the background context for the thesis by outlining the key areas of investigation. It begins with an epidemiological overview of global suicide risk and a clarification of terminology relevant to the study of suicide-related phenomena. This is followed by a review of common risk factors, including sociodemographics, individual differences, and psychological factors. Prominent theoretical frameworks of suicide are then

introduced. The chapter concludes with an overview of the rationale, aims, and structure of this thesis.

1.1 The global burden of suicide

Suicide is a critical global public health issue that necessitates early intervention and coordinated prevention efforts across all levels of society, including healthcare systems, communities, and policy-making departments. According to the most recent global data, more than 720,000 people died by suicide each year, with an estimated 20 suicide attempts for every suicide death (WHO, 2025). Despite a 36% decline in global suicide rates between 2000 and 2019, as reported in the World Health Organisation's Global Health Estimates (2021), suicide remains a significant global health issue. The absolute number of suicide deaths remains alarmingly high, and considerable regional disparities persist, highlighting the continued need for targeted prevention efforts. In 2019, suicide rates exceeding the global average were recorded in Africa, Europe, and South-East Asia, whereas the lowest rates were observed in the Eastern Mediterranean region. Additionally, 77% of the world's suicides occurred in low-and-middle-income countries, with 58% of these deaths involving individuals under the age of 50 years (WHO, 2021).

In the UK, suicide continues to pose a serious public health concern. In 2023, over 6000 suicide deaths (11.4 per 100,000) were registered in England and Wales, representing the highest annual total in more than two decades (Office for National Statistics, 2024). In Scotland, 792 probable suicide deaths (14.6 per 100,000), defined as intentional self-harm and events of undetermined intent, were registered in the same year (National Records of Scotland, 2024). Regarding prevalence, a nationally representative study of young adults aged 18 to 34 in Scotland found that over 20% had experienced lifetime suicidal ideation and 11.3% had made a suicide attempt at some point in their lives (O'Connor et al., 2018a). Comparable rates were reported in England's most recent Adult Psychiatric Morbidity Survey (2023/4), where 25.2 % of adults reported lifetime suicidal ideation and 7.8% reported suicide attempts across the lifetime (Butt et al., 2025).

Taken together, these statistics highlight the substantial burden suicide places on public mental health, both in the UK and globally. As illustrated by UK prevalence data, approximately one in five adults report having experienced suicidal ideation at some point in their lives (O'Connor et al., 2018a). Suicidal ideation is often the starting point on a continuum that may escalate toward suicide attempts and the final tragedy of death. Research

indicates that more than one in four individuals with lifetime suicidal ideation (26.8%) eventually make a suicide attempt, with the majority (76.5%) of suicide attempts occurring within the first year of ideation onset (Ten Have, Van Dorsselaer, & de Graaf, 2013). In addition, the impact of suicide extends beyond the individual, exerting a significant knock-on effect on their immediate social environment, including family, friends, co-workers, and other close contacts, by imposing a substantial psychological and emotional toll, as well as having broader implications for wider society. Evidence shows that bereavement by suicide is associated with a range of negative outcomes, depending on the relationship with the deceased. These generally include heightened guilt and responsibility, societal stigma, mental disorders, physical health problems, and increased risk of suicide among the bereaved (Cerel, Jordan, & Duberstein, 2008; Cvinar, 2005; Pitman et al., 2014; Tal Young et al., 2012). Given the widespread and multifaceted consequences of suicide, it is imperative to identify and understand the factors associated with suicidal ideation and suicide attempts. Such investigations are essential for advancing our knowledge of *how* suicide risk develops, *who* may be most vulnerable, and *what* coping strategies may reduce risk and enhance resilience. The next sections of this chapter provide an overview of these factors and their relationship with suicidal ideation and attempts. Before moving forward, however, it is important to define key terms and clarify the terminology used throughout this thesis to ensure clear communication and consistent interpretation.

1.2 Suicide terminology

Suicide is a multidisciplinary phenomenon that spans various fields, including sociology, psychology, philosophy, social work, psychiatry, public health, law, and criminology. Each discipline offers a different perspective, contributing to varying definitions of suicide. Researchers have suggested that consistent use of terminology is essential for facilitating communications across disciplines and enabling meaningful cross-study comparisons (O'Carroll et al, 1996; Klonsky, May, & Saffer, 2016); however, this goal has not yet been fully achieved. Despite the diversity of definitions, there are four common characteristics that emerge in most conceptualisations of suicide: death as the behavioural outcome, self-inflicted nature, intention to die for a change in status, and a conscious act (De Leo et al., 2006). Among the frequently used definitions of suicide outlined by Silverman (2006), two of the fifteen embraced a psychological focus of suicide, where the desire to attain another outcome outweighs the intentional death.

> "Suicide is a conscious act of self-induced annihilation, best understood as a multi-dimensional malaise in a needful individual who defines an issue for which suicide is perceived as the best solution." (Shneidman, 1985)

> "Suicide is an act with a fatal outcome which the deceased, knowing or expecting a potentially fatal outcome, has initiated and carried out with the purpose of bringing about wanted changes." (De Leo et al., 2006)

The psychological motivation for suicide was described as "the best solution" (Shneidman, 1985) and as a way to "bring about wanted changes" (De Leo et al., 2006), both serving as an end to the suffering when no other alternatives are perceived. This thesis adopts a psychological perspective on suicide, focusing on the psychological processes or characteristics that shape individuals' cognitive, emotional, and behavioural responses, thereby influencing their vulnerability to suicide. Several theoretical frameworks conceptualise suicide as a phenomenon rooted in psychic distress and internal suffering (see Section 1.4 Psychological modes of suicide for further details). Taken together, the definitions provided above, with their emphasis on psychological underpinnings, align with the core theoretical foundations of this thesis. Building on this well-defined starting point of suicide, the definitions of its relevant concepts, suicidal ideation and suicide attempts are derived accordingly in this thesis, each representing the cognitive and behavioural components of suicide, rooted in underlying psychological causes. Following the work of Klonsky et al. (2016), who identified suicidal ideation as "thinking about, considering, or planning suicide", this thesis conceptualises suicidal ideation as a continuum encompassing a spectrum of suicide-related thoughts, regardless of their intensity, specificity, or perceived lethality. Consistent with the key components of definitions of suicide attempts outlined by Silverman (2006), in this thesis a suicide attempt is characterised as a nonfatal outcome, whether or not injury occurs, resulting from a true intentional act aimed at engaging in behaviours with a high likelihood of resulting in death.

While this thesis attempted to maintain consistency in terminology, several variations in usage warrant clarification. First, although the term 'suicidal ideation' is predominantly used throughout to refer to any level of suicidal thoughts, the phrase 'thinking about suicide' was occasionally employed as an alternative. This was to introduce variation in expression and to reduce reading fatigue (e.g., individuals with suicidal ideation vs. individuals who thought about suicide). Furthermore, the term 'suicidal thoughts and feelings' was used interchangeably with 'suicidal ideation' in Chapter 5, which presents a qualitative

investigation. This choice aimed to enhance accessibility and relatability for the reader. The term 'suicidality' also appears in this thesis, particularly in Chapter 3 and 4, which involve quantitative analyses addressing both suicidal ideation and attempts. The definition of suicidality has been notably incongruent in the literature, often encompassing a broad range of suicide-related concepts without clear specificity (Silverman, 2006). For instance, the American Psychological Association Dictionary of Psychology (updated in 2018) defines suicidality as "the risk of suicide, usually indicated by suicidal ideation or intent, especially as evident in the presence of a well-elaborated suicidal plan", a definition which excludes the behavioural component of suicide (i.e., suicide attempt). Acknowledging this lack of definitional consensus, this thesis adopts an inclusive interpretation of suicidality, referring to the continuum of suicide risk encompassing ideation, planning, and attempts (Silverman, 2006). To provide a broader context for the investigations undertaken, the following sections offer an overview of key factors associated with suicidal ideation and attempts. This begins with an introduction of basic sociodemographics, followed by individual characteristics and psychological factors.

1.3 Sociodemographic characteristics and suicide risk

It is well-acknowledged that certain sociodemographic characteristics are associated with elevated risk of suicide. Commonly examined sociodemographic variables include age, gender, sexuality, marital status, ethnicity, and socio-economic status (Berkelmans, van der Mei, Bhulai, & Gilissen, 2021; Qin, Agerbo, & Mortensen, 2003).

1.3.1 Age

According to the latest Global Health Estimates by the WHO (2021), more than half of global suicide deaths (58%) occur before the midlife (i.e., the age of 50). Converging evidence from three large-scale, nationally representative studies supports the observation that individuals within the working-age population are at increased risk of suicide. For example, in Scotland, the highest rate of suicide attempts among 18–34-year-olds was reported in the 30-34 age group (O'Connor et al., 2018a). Similarly, in England, a history of suicide attempts was more commonly reported by people aged 16 to 24 than by those aged 75 and older (Butt et al., 2025). In the Netherlands, suicide mortality was elevated in mid-age group, especially for individuals aged between 40-59 years, compared to those aged 10-19 (Berkelmans et al., 2021). Despite this overall trend, growing concerns have emerged over the increasing

prevalence of suicide risk among adolescents and young adults (Bachmann, 2018). Indeed, suicide is now the third leading cause of death among individuals aged 15-29 years globally (WHO, 2025). This heightened vulnerability in youth populations has been attributed to a range of factors, including substance use, familial dysfunction, firearm accessibility (Johnson, Krug, & Potter, 2000), and exposure to interpersonal violence (Castellví et al., 2017).

1.3.2 Gender

Gender plays a significant role in suicide risk, with global suicide rates being 2.3 times higher per 100,000 population among males than females (WHO, 2021). Conversely, females are more likely to report non-fatal suicidal behaviours, such as suicidal ideation and suicide attempts, across the lifespan compared to males (Brezo et al., 2007; Schrijvers, Bollen, & Sabbe, 2012). One proposed explanation for this disparity in suicidal outcomes is likely due to the tendency that males often use more immediately lethal means (e.g., hanging), whereas females are more likely to use less lethal methods (e.g., overdose) (Henderson, Mellin, & Patel, 2005). Further, males have been found to report greater suicidal intent even when using the same method of attempt as females, suggesting potentially more serious motivation behind their suicidal behaviour (Freeman et al., 2017). This gender difference in non-fatal suicidal behaviours vs completed suicide has long been documented in the literature, commonly referred to as the "gender paradox of suicidal behaviour" (Canetto & Sakinofsky, 1998). Although this gender difference has remained consistent over recent decades (Butt et al., 2025; O'Connor et al., 2018a), researchers have underscored the importance of examining contextual and sociocultural factors (in addition to method selection) that may contribute to gender discrepancies in suicide deaths and attempts. Influences such as social norms and stigma (e.g., gender roles and expectations), cultural values, and religious beliefs may all play a role in shaping the gender differences and expressions of suicidal behaviours (Schrijvers et al., 2012).

Notably, existing research on suicide is largely limited to binary gender comparisons, with gender minority populations remaining underrepresented. Evidence from a large-scale clinical study in the Netherlands showed that the risk of suicide death did not increase over time for trans people, with a median follow-up of 7.5 years (range: 0.0 to 45.5 years); however, suicide death risk remained higher among trans people compared to the general population (Wiepjes et al., 2020). In addition, there is substantial variability in findings

related to suicide risk among trans populations across studies, highlighting the need for further research effort (see McNeil, Ellis, & Eccles, 2017, for a systematic review).

1.3.3 Sexuality

The relationship between sexual orientation and suicide risk has been well-documented in suicide research (Russell & Joyner, 2001). A meta-analysis of 35 studies examining suicide attempts among sexual minority adolescents found that these individuals were at significantly higher risk of attempting suicide compared to their heterosexual counterparts (OR = 3.50, 95% CI 2.98 to 4.12) (Di Giacomo, Krausz, Colmegna, Aspesi, & Clerici, 2018). A gender-specific pattern in suicide risk among sexual minority youth has also emerged in two studies with representative samples conducted in different geographical regions of the USA. Results consistently showed that sexual minority males were significantly more likely to report suicide attempts than heterosexual males, whereas this elevated risk was not observed among sexual minority females (Garofalo, Wolf, Wissow, Woods, & Goodman, 1999; Remafedi, French, Story, Resnick, & Blum, 1998). This pattern was further supported by a meta-analysis of population-based studies involving non-clinical samples aged 12 to 26 years (Miranda-Mendizábal et al., 2017), which revealed that bisexual and homosexual males had significantly higher odds of reporting suicide attempts compared to heterosexual males (OR = 2.21, 95% CI 1.21 to 4.04), whereas no significant differences were found among bisexual and homosexual females.

1.3.4 Other sociodemographics

The U.S. Centres for Disease Control and Prevention (CDC, 2024) reported that suicide risk is closely associated with socio-economic factors. Specifically, suicide rates were found to be 26%, 44%, and 50% lower in regions with widespread health insurance coverage, reliable home internet access, and high household income, respectively. In most western European countries, a positive relationship between socio-economic inequalities and suicide rates has also been observed, with stronger associations reported for indicators of economic status (e.g., house ownership) than for educational levels (Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005). A related socio-economic factor is marital status, which has also been identified as relevant to suicide risk (Kposowa, 2000). Individuals who had never married or were divorced were found to be at higher risk of suicide compared to those married

couples, with this relationship moderated by both age and gender (Kyung-Sook, SangSoo, Sangjin, Young-Jeon, 2018).

In contrast, the relationship between ethnicity and suicide mortality has been less extensively examined, largely due to limited data availability in suicide death records (Cohen, Katona, & Bhugra, 2020). In England and Wales, individuals from some minority ethnic backgrounds have lower suicide rates than the native White British majority. However, individuals of mixed ethnic heritage demonstrated higher suicide risk compared to the White British majority (Knipe et al., 2024). Moreover, findings on suicide risk among ethnic minority groups have been inconsistent across studies. While some studies indicated an elevated risk of suicide attempts among ethnic minority individuals compared to both native populations and individuals from the same ethnic group residing in their countries of origin, other studies did not observe such differences (Forte et al., 2018). A recent meta-analysis addressed this inconsistency and revealed that the increased risk among ethnic minority groups was significant when only high-quality studies were included, whereas findings from studies of moderate to high quality showed substantial variations (Troya et al., 2022).

1.4 Individual differences and suicide risk

Individual differences encompass a broad range of psychological traits and life experiences that vary across individuals and may significantly influence one's vulnerability to suicide risk. In this context, the current section focuses on two particularly salient factors: mental health conditions and exposure to early life adversities.

1.4.1 Psychiatric disorders

Although the reasons of why people die by suicide remain incompletely understood, it is widely accepted that suicide is associated with the presence of psychiatric disorders. Research has suggested that over 90% of individuals who die by suicide had a diagnosable psychiatric condition at the time of death (Cavanagh, Carson, Sharpe, & Lawrie, 2003). However, the majority of individuals with psychiatric disorders do not become suicidal (O'Connor & Nock, 2014). Notably, the association between mental disorders and suicide tends to be stronger in high-income countries compared to low-and middle-income countries (Phillips et al., 2002; Vijayakumar, 2005). For example, in India and China, an estimated 35-40% of individuals who died by suicide had received a diagnosis of depression prior to death

(Vijayakumar & Phillips, 2016). This distinction suggests that, while psychiatric disorders may have limited predictive value for suicide on their own, they can contextualise suicide risk within specific diagnoses and thereby inform targeted treatment strategies.

Increased suicide risk has been observed in functional psychiatric disorders (e.g., major depression, eating disorders, bipolar disorders etc), substance use disorders, and neuropsychiatric disorders, with varying degree of risk associated with different diagnoses (Harris & Barraclough, 1997). Furthermore, patterns of psychiatric diagnoses were found to differ between individuals in the general population and psychiatric inpatients who die by suicide. Specifically, while mood disorders were the most common diagnosis in both groups, they accounted for a higher proportion of suicide in the general population (35.8%) than among psychiatric inpatients (20.8%). In the general population, the second and third most common psychiatric diagnosis were substance-related disorders (22.4%) and schizophrenia (10.6%). In contrast, among psychiatric inpatients, schizophrenia ranked second (19.9%), followed by similar proportions of personality disorders (15.2%) and organic mental disorders (15.0%) (Bertolote & Fleischmann, 2002). Additionally, a growing body of evidence underscores the importance of the age of onset of psychiatric disorders in shaping long-term suicide risk (Thompson, 2008; Williams et al., 2012). For example, individuals with early-onset major depressive disorders, emerging before adulthood, are more likely to report current suicidal ideation and a history of suicide attempts than those with adulthood-onset depression (Van Noorden et al., 2011). These findings highlight the enduring impact of early mental health conditions on suicidality, reinforcing the need for early detection and intervention as a core strategy in suicide prevention.

1.4.2 Early life trauma and adversities

The relationship between childhood trauma and increased suicide risk during adolescence and adulthood has been consistently supported in the literature (for reviews, see Angelakis, Gillespie, & Panagioti, 2019; Miller, Esposito-Smythers, Weismoore, & Renshaw, 2013). As reflected by the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003), one of the most widely used self-report measures, childhood trauma encompasses five dimensions: emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect. Some studies also examine these dimensions alongside experiences of family dysfunction, such as parental separation or divorce, exposure to alcohol or other substance abuse, or witnessing domestic violence, etc. (Anda et al., 2006; Felitti et al., 1998). A dose-response relationship between childhood adversity and both mental and physical health outcomes has

been documented (Anda et al., 2006). The greater the number of adverse experiences, the higher the risk for engagement in health-risky behaviours (e.g., smoking, substance misuse, early sexual activity) and for developing negative mental health conditions (e.g., depression, anxiety, suicide attempts) and physical illness (e.g., heart disease, cancer) (Bellis et al., 2014; Bruffaerts et al., 2010; Felitti et al., 1998). Notably, individuals who report more than three categories of childhood adversity have been found to exhibit the highest risk for suicide attempts (OR = 48.53, 95% CI 31.98, 76.65), surpassing all other health-harming behaviours, with odds ratios ranging from 1.68 for physical inactivity to 9.74 for problematic alcohol use, compared to those without such experiences (Bellis et al., 2014). In addition, a cross-national study of 21 countries found that sexual or physical abuse were particularly potent predictors of lifetime suicidal behaviours, with these factors strongly predicting both the onset and persistence of suicidal ideation and suicide attempts, even after adjusting for lifetime mental disorders (Bruffaerts et al., 2010).

Early exposure to maltreatment has been shown to exert long-lasting negative effects on the physiology and neural functioning of the developing brain, disrupting systems essential for stress-response, emotion regulation, learning, and memory, which are key domains implicated in the development of psychological disorders (Teicher et al., 2000; Van der Kolk, 2003). Childhood trauma is strongly associated with suicidal behaviour and altered biological stress responses in adulthood (O'Connor, Green, Ferguson, O'Carroll, & O'Connor, 2018b). Specifically, individuals who had attempted suicide reported the highest levels of childhood trauma, followed by individuals with suicidal ideation, and then those with no suicidal history. Among those with a suicidal history, greater trauma exposure was associated with lower cortisol levels. Moreover, the relationship between childhood trauma and suicidality may be mediated by psychosocial variables, including mental pain (Zarrati, Bermas, & Sabet, 2019), personality factors, depressive symptoms, and dysfunctional attitudes (Zhou et al., 2022), anxiety and social support (Bahk, Jang, Choi, & Lee, 2016), and dissociation (Demirkol, Uğur, &Tamam, 2020).

1.5 Psychological factors and suicide risk

Investigating sociodemographic characteristics and individual differences helps identify *who* is at risk of suicide; however, focusing solely on these factors cannot fully explain *why* people die by suicide. Many of these characteristics are fixed and not easily modifiable, which limits their utility for intervention and prevention. To deepen our understanding of the

suicidal mind, it is essential to examine the psychological processes underlying suicidal ideation and suicide attempts. Researchers have emphasised the importance of integrating psychological science into suicide research, arguing that suicide should be viewed as a behaviour stemming from a conscious decision to end one's life, rather than merely a byproduct of mental illness (O'Connor & Nock, 2014). To date, a wide range of psychological factors has been studied in relation to suicide risk, with categorisation criteria varying differently across studies. For example, Franklin et al. (2017) grouped psychological risk factors into categories such as cognitive problems (e.g., problem-solving ability), externalising/internalising psychopathology (e.g., impulsivity/emotion dysregulation), implicit/explicit processes (e.g., attentional bias), personality traits (e.g., extraversion), and social factors (e.g., stressful life events). In contrast, O'Connor and Nock (2014) classified factors according to four clusters: personality and individual differences (e.g., impulsivity), cognitive factors (e.g., rumination), social factors (e.g., social transmission), and negative life events (e.g., physical illness). As such, there is no universal standard for the categorisation of psychological factors associated with suicidal ideation and behaviour.

In this section, an overview of selected psychological factors relevant to this thesis are presented, which are primarily cognitive in nature or are strongly influenced by cognitive processes. These include entrapment, hopelessness, impulsivity, self-regulation, and ego depletion. While each factor is presented individually, many are integrated within broader theoretical frameworks and will be further contextualised in Section 1.6. By investigating psychological factors, this thesis aims to enhance our understanding of the psychological processes that underlie suicidal ideation and attempts, thereby informing more effective strategies for intervention and prevention.

1.5.1 Entrapment

Entrapment is a psychological state in which individuals perceive themselves as being caught in a defeated situation, from which they are strongly motivated to escape but see no viable means of doing so (Gilbert & Allan, 1998). From an evolutionary perspective, this concept is rooted in observations of submissive animal behaviours during competitive interactions over resources. Within the framework of the social rank theory of depression, entrapment is viewed as a "failed struggle" to escape from defeat, a concept grounded in the evolutionary function of social hierarchies and status regulation (Gilbert & Allan, 1998; Price, 1972). This perceived inability to escape can lead to behavioural demobilisation and passivity, a state referred to as "arrested flight" (Dixon, Fisch, Huber, &Walser, 1989).

Furthermore, entrapment is conceptually related to the phenomenon of *learned helplessness* (Seligman, 1972), a theory of depression originally derived from experimental findings showing that animals exposed to uncontrollable stressors (i.e., electric shocks) later exhibited behavioural passivity in the face of escapable threats (Millner & Seligman, 1975). While related, entrapment has been suggested as a more suitable construct for understanding depression and suicidality, as it incorporates a motivational component, the desire to escape, that learned helplessness does not fully account for (Gilbert, 1992). Additionally, there has been a debate regarding the distinction between defeat and entrapment. Some researchers have suggested that defeat (i.e., appraisal of goal attainability or loss of social status) leads to entrapment (i.e., perceived inability to resolve the defeated situation), while others have argued that the boundary between these two constructs is ambiguous (Taylor, Gooding, Wood, & Tarrier, 2011; Taylor, Wood, Gooding, Johnson, &Tarrier, 2009). In line with the theoretical framework adopted in this thesis (see Section 1.6), we shall conceptualise defeat and entrapment as separate but related constructs.

The relationship between entrapment and suicidal ideation and attempt is well-established in the literature (see O'Connor & Portzky, 2018 for a review). Many suicide frameworks have conceptualised suicide as a means of escaping from unbearable situations (Baumeister, 1990; Shneidman, 1998; Williams, 2001), providing a strong theoretical rationale for investigating entrapment in the context of suicide risk. Converging evidence from cross-sectional studies showed that higher levels of entrapment were significantly associated with increased suicidality (average r = 0.58) (Taylor et al., 2011). Additionally, longitudinal studies further support the predictive value of entrapment for future suicidal ideation (Höller et al., 2022; Owen, Dempsey, Jones, & Gooding, 2018) and suicidal attempts (O'Connor, Smyth, Ferguson, Ryan, & Williams, 2013), even after controlling for baseline depression, hopelessness, and suicidal ideation. Moreover, entrapment distinguishes individuals with a history of suicidality from non-suicidal controls. However, its ability to differentiate individuals who have attempted suicide from those who have only experienced suicidal ideation appears more limited (Branley-Bell et al., 2019; Dhingra, Boduszek, & O'Connor, 2015), as predicted by contemporary models of suicide (O'Connor & Kirtley, 2018). This suggests that while entrapment may be central to the emergence of suicidal ideation, it may play a less critical role in the progression to suicide attempts.

1.5.2 Hopelessness

In our current understanding of suicidal behaviour, hopelessness is regarded as a construct equally as significant as entrapment, playing a central role in the development of suicide behaviours. Beck, Kovacs, and Weissman (1975) proposed that hopelessness acts as a catalyst for suicidal behaviour, arising from a form of *"impaired reason"* characterised by a specific cognitive distortion in which individuals irrationally anticipate negative outcomes in relation to any pursuits of life objectives. Accordingly, hopelessness has been conceptualised as a system of cognitive schema defined by pervasive negative expectations about the future. Early empirical findings suggested that hopelessness accounts for the relationship between depression and suicide, serving as a stronger predictor of suicidal intent than depression itself (Beck et al., 1975; Minkoff, Bergman, Beck, & Beck, 1973). In a notable longitudinal study, hopelessness predicted suicide death with 91% accuracy among psychiatric patients with suicidal ideation, over a five-to-ten-year follow-up period (Beck, Steer, Kovacs, & Garrison, 1985). However, subsequent research has been less supportive of its long-term prediction of suicide risk (Ribeiro et al., 2012; Suominen, Isometsä, Ostamo, & Lönnqvist, 2004). For example, findings from O'Connor, Smyth, Ferguson, Ryan, and Williams (2013) showed that while hopelessness predicted suicide attempts four years later in univariate analyses, it did not remain a significant predictor in multivariate models that included entrapment and prior suicide attempts. Similarly, a meta-analysis of longitudinal studies revealed that although hopelessness is significantly associated with future suicide behaviours (ideation, attempts, and death), the strength of these relationships was generally weak, with weighted mean odds ratios below 2.0 across all outcomes (Ribeiro, Huang, Fox, & Franklin, 2018).

1.5.3 Impulsivity

Suicide attempts have often been considered as an impulsive act for some individuals. Over the past decades, considerable research has investigated the relationship between impulsivity and suicide risk, with general support for a positive relationship between higher impulsivity and increased suicidality (Anestis, Soberay, Gutierrez, Hernández, & Joiner, 2014; Gvion & Apter, 2011; Nock et al., 2008a). However, the relationship is far from straightforward, with significant heterogeneity in findings across studies. While some studies report that individuals with a history of suicidal attempt exhibit greater impulsivity than those who never attempted suicide (Corruble, Damy, Guelfi, 1999; Dhingra et al., 2015; Millner et al.,

2020; O'Connor, Rasmussen, & Hawton, 2012), others have failed to replicate these results (Oquendo et al., 2000; Swann et al., 2005). A systematic review examining the influence of personality traits on suicidal behaviours found that impulsivity is more consistently associated with a history of suicide attempts than with suicidal ideation or suicide death, for which evidence remains inconclusive (Brezo, Paris, & Turecki, 2006). Some researchers have argued that impulsivity may not function as an immediate or proximal risk factor for suicide, but rather as a trait-like or distal factor that indirectly contributes by increasing engagement in risky or provocative behaviours, which in turn may foster the acquired capability for suicide (Anestis et al., 2014).

The mixed findings regarding impulsivity in the suicide literature may, in part, be attributed to the varied conceptualisations and measurements of impulsivity (Whiteside & Lynam, 2001). The term 'impulsivity' often serves as an umbrella for a range of behaviours, such as novelty seeking, short attention span, acting without planning, which may impede comparability and interpretation of findings across studies (Gvion & Apter, 2011). To address these inconsistencies, the UPPSP model of impulsivity has been proposed, which conceptualises impulsivity as a multidimensional construct composed of five distinct personality traits, including negative urgency, positive urgency, (lack of) premeditation, (lack of) perseverance, and sensation seeking (Cyders et al., 2007; Whiteside & Lynam, 2001). Among these components, negative urgency, defined as a tendency to act impulsively in response to negative emotions, has been most consistently associated with higher suicidality (Anestis & Joiner, 2011; see Berg, Latzman, Bliwise, Lilienfeld, 2015 for a meta-analysis). Additionally, early research suggested an inverse relationship between impulsivity and the lethality of suicide attempts, indicating that impulsive individuals may engage in less medically serious attempts (Baca-García et al., 2001). Recent evidence from a longitudinal study of adults with late-life depression found that negative and positive urgency, as well as non-planning tendency, were associated with less lethal suicidal behaviours, although these effects were not significant in multivariate analyses (Szanto, Galfalvy, Kenneally, Almasi, & Dombrovski, 2020).

1.5.4 Self-regulation

Up to this point, we have discussed several key factors directly associated with elevated suicide risk. In addition to these, one factor, self-regulation, has a pervasive influence across diverse domains of functioning and may contribute to vulnerability to suicide behaviours. Self-regulation is broadly defined as the ability to control thoughts, emotions, and

behaviours, which is a complex executive process involving the dynamic interaction of competing mental operations across multiple parallel processes (Baumeister, Heatherton, & Tice, 1994). Self-regulation consists of three primary components: *Standards*, which refers to the ideals and goals that define how things should be; *Monitoring,* which involves comparing one's actual state to the standards (i.e., assessing how things are); and *Operating*, which entails exerting control over oneself to override a dominant response or change the current state when standards are not met (i.e., determining what should be done and taking actions) (Baumeister & Heatherton, 1996; Carver & Scheier, 1982). Self-regulation involves a hierarchical process in which higher-order goals guide and override lower-order process. Failures of self-regulation occur when this dynamic is reversed, often showing as *underregulation* (i.e., the inability to exert control) and *misregulation* (i.e., control is exerted in a way that fails to achieve the desired outcome) (Baumeister et al., 1994).

Desire and conflict are omnipresent in everyday life and may be relevant to understanding suicide risk. A study employing the experience sampling method investigated the association between desire, relating to mundane activities such as eating, drinking, smoking, or socialising, and the effort of self-control in daily life (Hofmann, Baumeister, Förster, & Vohs, 2012). The results indicated that individuals reported experiencing at least one current desire at nearly half of the assessment timepoints (49.9%) during their waking hours, with 47% of these desires conflicting with personal goals and motivations. These findings suggest that self-regulation is likely to be frequently engaged in 'operating mode' to resolve such goal conflicts. Indeed, this study demonstrated that, by implementing self-control as a form of resisting desire, the enactment of desire dropped substantially from 70% to 17%, which was not due to the differences in the strength of desire (Hofmann et al., 2012). Before applying the concept of self-regulation to suicidal behaviours, it is essential to briefly introduce the strength model of self-regulation (also see Section 1.6) and its closely related construct, ego depletion.

1.5.4.1 Ego depletion

The strength model of self-regulation (Baumeister & Heatherton, 1996; Baumeister, 2002) postulates that self-regulatory capacity draws upon a limited common resource pool, akin to energy or strength, which can be depleted through excessive use. Consequentially, when this resource is diminished, individuals are less likely to exert self-control, leading to poorer performance or disinhibited behaviour on subsequent tasks, a state referring to as ego depletion. A substantial body of experimental research in social psychology, using the 'dual-

task paradigm' (also known as the 'sequential-task paradigm'), has supported the strength model and the ego depletion effect. This is evidenced by diminished performance on a second task following a self-control-demanding prior task (Baumeister, 2002; see Hagger, Wood, Stiff, & Chatzisarantis, 2010 for a meta-analysis). Despite this, ongoing debate surrounds the robustness of laboratory-measured ego depletion effects, with some critiques pointing to potential publication bias (see Carter, Kofler, Forster, & McCullough, 2015 for a meta-analysis). However, this does not necessarily imply that ego depletion is an illusory effect (Baumeister & Vohs, 2018); rather, it highlights the imperative need for more rigorous methodology and real-world investigation. Ego depletion is not merely a laboratory phenomenon; its tangible impact in everyday life underscores its practical significance, (Friese, Loschelder, Gieseler, Frankenbach, & Inzlicht, 2019).

Ego depletion can result in behavioural disinhibition due to reduced self-control resources and increased susceptibility to urges (Baumeister, 2014). Research has linked ego depletion to a range of behaviours, including increase in frequency of impulsive behaviours (DeWall et al., 2007; Vohs & Faber, 2007), problematic alcohol consumption (Muraven, Collins, & Neinhaus, 2002), and passive decision-making (Levav, Heitmann, Herrmann, Iyengar, 2010). This tendency toward passivity is characterised by avoidance of effortful activities in favour of less demanding alternative behaviours (Baumeister & Vohs, 2018). The resulting "mental passivity" reflects a state in which depleted individuals become either passive or impulsive in their responses, depending on their habitual tendencies in specific contexts (Vonasch, Vohs, Pocheptsova Ghosh, Baumeister, 2017). Despite its relevance, ego depletion has rarely received research attention in mental health or suicide research.

The relevance of ego depletion to suicidal behaviours lies primarily in its two central components: exhaustion and disinhibition. Theoretical support for this application is elaborated in Section 1.6. As highlighted by Hofmann and colleagues (2012), desire and conflict pervasively present in daily life. Arguably, it makes logical sense to suggest that suicidal individuals may experience stronger desires and inner conflict, usually unresolved, than those who are not suicidal, due to accumulating emotional distress and the significant discrepancy between their reality and personal standards (see Section 1.6.2.1 for more details). This heightened conflict demands greater self-regulatory effort, increasing the likelihood of ego-depletion (i.e., a sense of exhaustion and diminished control over thoughts and behaviours). In fact, motivational conflicts, such as the clash between inner drives and external constraints, or between the id and ego (Freud, 1923), or nature and culture (Baumeister, 2005), necessitate self-regulation and can result in ego-depletion (Baumeister

& Vohs, 2007). Taken together, these findings have prompted the investigation of the role of self-regulation in suicidal behaviour in this thesis. Specifically, the following questions are addressed: Are suicidal ideation and actions attempts to manage overwhelming emotions and life stressors through negative reinforcement, or are they simply consequences of self-regulation failure? To our knowledge, this thesis represents the first attempt to explore the influence of ego depletion on suicide risk.

1.6 Psychological models of suicide

As previously highlighted, investigating the psychological factors associated with suicidal behaviours is vital for understanding the psychological mechanisms underlying suicidal ideation and attempts. In the preceding section, we reviewed several of these factors; it is now important to situate them within theoretical frameworks that capture the complex interactions between these factors, thereby deepening our understanding of the suicidal mind. Over the past four decades, many suicide models have been described as "diathesis-stress in origin and cognitive in focus" (O'Connor & Nock, 2014, p.74). In brief, the Diathesis-Stress Model of Suicidal Behaviour (Mann, Waternaux, Haas, & Malone, 1999; Schotte & Clum, 1987) posits that individuals may be predisposed to a heightened risk of suicide due to inherent vulnerabilities (e.g., personality traits), which are exacerbated when they are confronted with environmental stressors. Furthermore, many contemporary suicide models adopt the view of suicide as an escape, a perspective that is illustrated by the Escape Model of Suicide (Baumeister, 1990), which conceptualises suicide as a means of escaping aversive self-awareness. Many of these models have been the focus of extensive empirical research, significantly advancing our understanding of suicide risk (e.g., Joiner, 2005; O'Connor & Kirtley, 2018; Shneidman, 1993; Williams, 2001). The following section provides a concise overview of several contemporary models; thereafter, only those most relevant to this thesis are individually summarised, due to the space limitations.

1.6.1 Contemporary suicide models: An overview

Shneidman (1993) introduced the concept of suicide as psychache, encapsulated in his assertion "no psychache, no suicide" (p.147). This perspective suggests that suicide emerges as an attempt to end the unbearable psychological pain commonly experienced by suicidal individuals. More recently, Williams' (2001) Cry of Pain (CoP) Model of Suicide draws upon the evolutionary concept of 'arrested flight' (Dixon et al., 1989), discussed earlier in Section

1.5.1, and the Escape Model of Suicide (Baumeister, 1990). The CoP proposes that suicide is a response to situations perceived as involving defeat, entrapment, and the absence of rescue (i.e., social support). Extending the notion of cognitive vulnerability for depressive relapse, the Differential Activation Hypothesis (DAH) of Suicidality (Teasdale, 1988; Williams, Van der Does, Barnhofer, Crane, & Segal, 2008) proposes that suicide-related cognitive patterns present during previous depressive episodes increase the likelihood of re-emerging suicidal ideation and attempts during periods of mood deterioration.

Moreover, several models focus on the transition from ideation to action, emphasising that these are distinct processes driven by different risk factors. First, the Interpersonal Theory of Suicide (IPTS; Joiner, 2005; Van Orden et al., 2010) posits that the co-existence of perceived burdensomeness and thwarted belongingness, alongside a sense of hopelessness to change, contributes to the development of suicidal desire. Further, suicide attempts become more likely when the suicidal desire is accompanied by the acquired capability for suicide (e.g., fearless about death, high pain tolerance, etc). Building on this, Klonsky and May's (2015) Three-Step Theory outlines four key components within the ideation-to-action framework. Suicidal ideation arises from the combination of pain and hopelessness, which is moderated by connectedness. The progression from ideation into action occurs only when the individual possesses the capacity for suicide through dispositional, acquired, and practical factors. Finally, the Integrated Motivational-Volitional (IMV) Model of Suicidal Behaviour (O'Connor, 2011; O'Connor & Kirtley, 2018) provides a comprehensive account of how biopsychosocial factors interact to give rise to suicidal ideation and govern the transition from ideation to attempts. As the principal theoretical framework guiding the present thesis, the IMV model is summarised in detail subsequentially, alongside the Escape Model (Baumeister, 1990) and the Fluid Vulnerability Theory of Suicide (Rudd, 2006), the latter of which represents a key early attempt to conceptualise suicide as a dynamic process.

1.6.2 Escape Model of Suicide

The conceptualisation of suicide as a means of escaping pain is not new and in fact can be traced back to early research (Bromberg & Schilder, 1936). One of the earliest theoretical contributions was Baechler's (1980) escape theory, which framed suicide as a form of problem-solving. Building on and extending this rationalist perspective, Baumeister (1990) developed a more comprehensive social psychological account known as the Escape Model of Suicide. According to Baumeister (1990), suicide results from a series of internal processes triggered in response to external circumstances. To initiate this sequential process

leading to suicide as an escape, it is necessary for individuals to (a) recognise a salient discrepancy between their current state and ideal state (i.e., personal standards), which can be triggered by unrealistically high expectations and/or negative life events; (b) make internal negative attributions that induce self-blame and a negative view of the self; (c) engage in unfavourable self-comparisons to the standards, where the self is perceived as inadequate, incompetent, and unlovable, thus evoking a state of heightened (usually aversive) self-awareness accompanied by negative affect; (d) respond to the heightened self-awareness with a relatively passive and numb state of cognitive deconstruction, in which meaningful thoughts and emotions are avoided, an ultimately ineffective strategy that may motivate individuals to seek a stronger form of escape; and (e) experience disinhibition as a result of the deconstructed cognitive state, leading to the perception of suicide as the only way to escape the current life situation and aversive self-awareness.

1.6.2.1 Escaping the self depletes self-regulation resources: the Self-Regulatory Model of Suicide

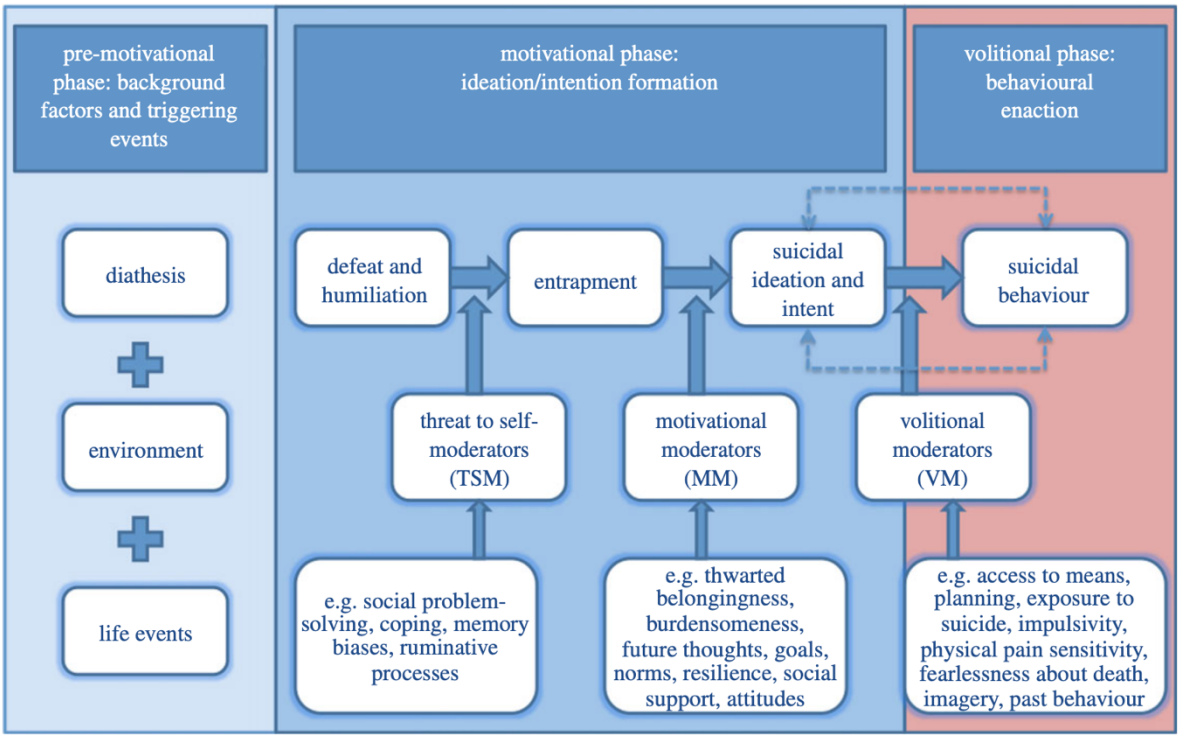
Recalling a previously discussed social psychological theory, the strength model of self-regulation (Baumeister & Heatherton, 1996; Baumeister, 2002) posits that human behaviours requiring self-control draw upon a limited pool of cognitive and energetic resources. When demands on self-regulation accumulate, this finite resource can become depleted, resulting in a disinhibited state due to diminished internal restraints (i.e., the ego depletion effect). Integrating the strength model into the escape model of suicide, Vohs and Baumeister (2002) proposed the self-regulatory model of suicide, which argues that the discrepancy between reality and personal standards signals a self-regulatory failure. The emotional and cognitive consequences of this perceived failure further deplete individuals' ability to engage in successful self-regulation. According to Vohs and Baumeister (2002), the experience of self-regulation failure prompts individuals to devote more effort toward managing negative emotions and attention focus. However, these regulation efforts are typically ineffective, otherwise the downward spiral into suicide would likely be averted. Common but maladaptive strategies such as thought suppression (Wenzlaff, Wegner, & Roper, 1988) and rumination (Morrison & O'Connor, 2008) exacerbate this process. Early empirical evidence has demonstrated that both emotional regulation and thought suppression deplete self-regulatory resources, as reflected by impaired performance on subsequent tasks (Muraven, Tice, & Baumeister, 1998). Taken together, the sequence from the recognition of a discrepancy between the self's reality and standards, to self-comparisons that heighten aversive self-awareness, to failed emotion regulation and eventual cognitive deconstruction,

involves the progressive depletion of self-regulatory resources, ultimately leading to suicide as a perceived means of escape.

1.6.3 Integrated Motivational-Volitional Model

The Integrated Motivational-Volitional Model (IMV; O'Connor, 2011; O'Connor & Kirtley, 2018) offers one of the most comprehensive frameworks for understanding the development of suicidal behaviour, encompassing the full trajectory from background vulnerability and triggering events, through ideation formation, to behavioural enactment. The three partitions each correspond to the pre-motivational phase, motivational phase, and volitional phase of the IMV model (Figure 1). Accordingly, to construct these key pillars, the IMV model integrates insights from four key theoretical perspectives, including the Diathesis-Stress Model (Schotte & Clum, 1987), Cry of Pain Model (Williams, 2001), Differential Activation Hypothesis (Teasdale, 1988), and Theory of Planned Behaviour (Ajzen, 1991). The pre-motivational phase outlines background factors that may render individuals more vulnerable to experiencing suicide risk. This phase comprises three domains: (a) *diathesis*, which includes individual differences in biological, genetic, cognitive, and personality traits associated with suicide risk; (b) *social and environment context*, including social determinants such as socio-economic inequality (Platt, 2016), financial stressors (Stuckler, Basu, Suhrcke, Coutts, & McKee, 2009), and large-scale stressors such as the coronavirus – 2019 pandemic (Gunnell et al., 2020); and (c) *life events*, encompassing early life adversity and negative life experiences occurring at any stage of life. The key premise of the pre-motivational phase is that the interaction of vulnerability factors and negative social and life events increases suicide risk by influencing processes outlined in the motivational phase, which delineates the process giving rise to suicidal ideation.

Figure 1.1 *The IMV model of suicidal behaviour (O'Connor & Kirtley, 2018)*



The motivational phase represents a psychological pathway leading to the emergence of suicidal ideation, with a focus on how the interplay of various factors render an individual at more or less risk of ideation formation. At the core of this phase is the pathway from defeat/humiliation to entrapment to suicidal ideation. That is, suicidal ideation arises when an individual perceives themselves as defeated and/or humiliated in a situation where they feel trapped, with no perceived way of escape. Notably, the psychological pathway from Defeat/Humiliation – Entrapment – Ideation can be affected by the presence or absence of the two groups of higher-order factors, namely threat to self-moderators (TSM) and motivational moderators (MM). The relationship between defeat/humiliation and entrapment is largely shaped by threat to self-moderators (TSM), including problem solving, rumination, coping, and memory biases. Defeated individuals are more likely to feel trapped, for example, if they have a negative disposition or a tendency to ruminate or struggle with ineffective coping, which can further contribute to the emergence of suicidal ideation when perceived alternatives or support are unattainable. On the other hand, motivational moderators (MM) influence the pathway from entrapment to ideation formation by either buffering or strengthening this transition. Factors such as perceived burdensomeness, belongingness, future thinking, resilience, and social support play a crucial role in this process. When feelings of burden, isolation, and no hope for the future are compounded by

the experience of entrapment, the transition to suicidal ideation becomes significantly more likely.

Not all individuals who think about suicide will act on their thoughts. The volitional phase of the IMV model outlines the factors that determine the critical transition from ideation to behavioural enactment. These factors are referred to as volitional moderators (VM), which include a range of factors across environmental, psychosocial, and physiological elements that increase the likelihood of acting on suicidal ideation, such as access to means, exposure to suicide, impulsivity, pain sensitivity, and past behaviour, etc. Importantly, the factors are positioned within the IMV framework as exerting their most significant influence during that specific phase of suicide risk development. For example, while entrapment has been found to be associated with suicide attempt (O'Connor et al., 2013), the IMV model contends that entrapment plays a central role in suicide risk primarily as a catalyst for the formation of suicidal ideation. This is supported by studies examining factors that differentiate suicide history groups, as described previously in Section 1.5.1 (Branley-Bell et al., 2019; Dhingra, Boduszek, & O'Connor, 2015). Similarly, while impulsivity has been shown to increase suicide risk, its effect is most salient in the transition to suicide attempts, rather than in the ideation formation phase, despite evidence suggesting that some individuals with suicidal ideation exhibit higher levels of impulsivity (Brezo et al., 2006). Lastly, the IMV model highlights the cyclical relationship between ideation and attempts (represented by dotted arrows in Figure 1), suggesting that individuals with a history of suicide attempts are at higher risk of re-engaging in such behaviours, even when fewer triggers are present. This increased vulnerability is attributed to cognitive reactivity, which refers to the tendency for suicide-related cognitions from previous episodes to be reactivated by similar situations, even when current levels of distress are relatively low (Lau, Segal, & Williams, 2004).

1.6.4 Fluid Vulnerability Theory

So far, we have reviewed several psychological models of suicide, each contributing significantly to our current understanding of suicide risk. While these models vary in focus and theoretical perspective, none of them explicitly address the dynamic process of suicide risk, a critical aspect of suicidal ideation that has sparked extensive research in recent years (Ernst, Gemke, Olivi, & O'Connor, 2024; Hallensleben et al., 2019; Kleiman et al., 2017). Drawing on cognitive theory (Alford & Beck, 1998) and clinical therapy, Rudd (2006) proposed a dynamic framework for understanding the suicidal process, entitled Fluid Vulnerability Theory (FVT). The FVT aims to explain both acute and chronic states of

suicide risk, with a focus on the duration and intensity of suicidal crisis. The central premise of the FVT is that suicidal episodes are time-limited and persist only until the suicide mode subsides, with chronic suicidality conceptualised as recurrent episodes of acute suicide risk. The concept of 'mode' was originally proposed by Beck (1996), who defined it as specific structural units of schemas across cognitive, affective, behavioural, and physiological systems. Extending this idea to suicide research, Rudd (2000) elaborated on the characteristics of suicide mode within these systems. *Cognitive system* is represented by the suicidal belief system, including dysfunctional cognitive beliefs about the self, others, and the future; *Affective system* is characterised by a mixture of negative emotions, such as sadness, anger, anxiety, guilt, loneliness, humiliations, etc; *Behavioural system* includes any relevant behaviours to suicide, such as planning, rehearsal, and attempts, and; *Physiological system* arouses the body for fight or flight actions through automatic, motor, and sensory activation.

A general principle of FVT is that improvements in any one of these four systems would reduce vulnerability to subsequent suicide episodes; however, a lower threshold for activation in any domain can negatively impact recovery in the other domains. This threshold at which the suicide mode is activated is referred to as the *baseline risk level*, which is subjective and shaped by individuals' historical and developmental factors, thus varying from person to person. Moreover, the interaction between baseline risk and precipitating internal or external stressors (referring to as aggravating factors) determines the severity of suicide episodes. FVT suggests that individuals with a low threshold for activation of the suicide mode (due to vulnerability relating to the four systems mentioned above) along with a broad range of triggers that map onto core beliefs (e.g., unlovability, helplessness, worthlessness, etc; Beck & Beck, 2011) tend to engage in repeated suicide attempts, resulting in chronic suicidality. Taken together, FVT proposes that suicide risk consists of both baseline risk level and acute crisis. Therefore, the resolution of an acute crisis does not necessarily imply a low risk of suicide, especially for individuals with a low baseline threshold for activation of the suicide mode. Furthermore, aggravating factors that affect all four systems of the suicide mode elevate suicide risk only for a limited time (e.g., hours, days, weeks) as the body is unable to sustain a high level of arousal for an extended period. Once the aggravating factors are effectively addressed, the acute risk of suicide settles accordingly.

While FVT provides critical and unique insight into the dynamic nature of suicide risk, it has not sparked substantial investigation in suicide research since its introduction in 2006.

This is likely due to the technical and methodological limitations in measuring and monitoring the short-term changes in psychological constructs. However, recent advancements in technology have improved the methodologies underpinning psychological science, enabling the incorporation of ecological assessment and real-time monitoring into research practice (e.g., ecological momentary assessment; Shiffman, Stone, & Hufford, 2008). Therefore, future research holds promise for testing the fundamental principles of FVT, thereby grounding the exploration of the short-term dynamics of suicidal ideation (Davidson, Anestis, & Gutierrez, 2017)

1.7 The current thesis

The preceding sections of this chapter have provided a general overview of contemporary suicide research, laying the groundwork for guiding further investigation. This thesis aims to investigate suicide risk by examining psychological factors through the overarching framework of the Integrated Motivational-Volitional Model, while also drawing on insights from the Escape Model/Self-Regulatory Model of Suicide and the Differential Activation Hypothesis. Central to this thesis is a focus on the dynamics of suicidal ideation, with the Fluid Vulnerability Theory offering a fundamental theoretical base. The following sections identify key gaps in the existing literature that have informed the direction of this thesis. This is followed by an outline of the overarching aims and research questions, concluding with a brief overview of the thesis structure.

1.7.1 Research gaps

Although the global suicide rate has declined in recent decades across many countries in the world (WHO, 2021), the number of suicide deaths remains substantial, posing a global health crisis and placing a significant burden on families, communities, and healthcare systems. One key limitation of contemporary suicide research is that most prospective studies have employed long intervals between assessments, typically five to ten years, resulting in limited understanding of short-term suicide risk (Franklin et al., 2017). While recent years have witnessed a growing interest in examining the momentary dynamics of suicidal ideation through real-time assessments (Kleiman & Nock, 2018), this area of investigation remains in its infancy. There is a pressing need to systematically synthesise findings in this emerging field to better understand the extent to which suicidal ideation operates as a dynamic process, and to identify avenues for future research. Moreover, given that the development of suicide

risk involves the complex interplay between factors across the biopsychosocial domains (O'Connor & Nock, 2014; Turecki et al., 2019), investigating its short-term dynamics presents particular challenges from a quantitative point of view. In this context, qualitative approaches, focusing on individuals' lived experiences and interpretations of suicidal ideation, may offer valuable insights that complement quantitative findings.

Equally important to bridging the gaps in our understanding of suicidal ideation's short-term dynamics is the investigation of factors associated with its distinct parameters, such as frequency, duration, and intensity. Exploring the patterns of suicidal ideation are critical for capturing its multifaceted nature and enhancing predictive accuracy. Short-term longitudinal studies have shown that suicidal ideation varies significantly both within and between individuals in terms of frequency, duration, variability, and intensity (Czyz et al., 2019; Czyz et al., 2022; Witte et al., 2005). Despite the clear phenomenological features of suicidal ideation, there is a dearth of research directly examining these individual parameters (Reeves et al., 2022). Additionally, while the concept of entrapment has emerged as a crucial factor in the development of suicidal ideation, further research is needed to clarify the mechanisms through which entrapment arises and contributes to suicidal ideation (O'Connor & Portzky, 2018).

1.7.2 Overarching aims

In light of the gaps identified in the current literature, this thesis addresses three overarching aims. First, it explores the dynamic nature of suicidal ideation and its associated factors. To achieve this, three studies, employing different methodologies, were conducted: a systematic review with narrative synthesis, a quantitative cross-sectional analysis, and a qualitative investigation, each addressing this aim from a distinct perspective. These studies seek to examine the extent to which suicidal ideation functions as a dynamic process and to identify the factors associated with its different patterns. Furthermore, this thesis incorporates novel constructs such as ego depletion and cognitive reactivity to investigate their potential contributions to suicide risk and to deepen our understanding of the well-established relationship between entrapment and suicidal ideation. Accordingly, the third overarching aim is to investigate psychological factors associated with suicidal ideation and suicide attempts, with a particular focus on cognitive reactivity and ego depletion. In pursuing these aims, this thesis represents the first known attempt to examine whether self-regulation can be integrated within the context of the IMV model, as well as how adopting a self-regulatory perspective may offer new insights into the understanding of suicide risk.

1.7.3 Research questions

The current thesis aims to address the following research questions:

1. A systematic review (Chapter 2)

1.1 To what extent is suicidal ideation a dynamic process?

1.2 What factors are associated with different dynamic patterns of suicidal ideation?

2. Quantitative analyses (Chapter 3 & 4)

2.1 To what extent do cognitive reactivity, ego depletion, and other psychological factors (i.e., entrapment, impulsivity, resilience, mindfulness, depression, and stress) differentiate between individuals with a history of suicidal ideation, suicidal attempt, and no history of suicide? What are the most important risk factors for differentiating individuals by their suicide history?

2.2 To what extent are cognitive reactivity, ego depletion, and other psychological factors (i.e., entrapment, impulsivity, resilience, mindfulness, depression, and stress) associated with the frequency, duration, and intensity of suicidal ideation? Which risk factors remain significant predictors over and above depression?

2.3 Does entrapment mediate the relationship between cognitive reactivity and suicidal ideation?

2.4 Does mindfulness moderate the mediation model examined by 2.3?

2.5 Does ego depletion mediate the relationship between entrapment and suicidal ideation?

3. Qualitative analysis (Chapter 5)

3.1 How do individuals make sense of their suicidal ideation in the context of daily life?

3.2 To what extent are people aware of the dynamic nature of suicidal ideation?

3.3 Do people have a sense of what influences the frequency, duration, and intensity of suicidal thoughts?

1.7.4 Thesis structure

This thesis comprises two narrative chapters (i.e., Chapter 1 and 6) and four research chapters (i.e., Chapter 2 to 5), presenting the methodologies and findings of three studies.

Chapter 1 (the present chapter) provides a general introduction to the research background relevant to this thesis. It includes a global epidemiological overview of suicide risk, clarifies

suicide-related terminology, reviews key risk factors (e.g., sociodemographic characteristics, individual differences, and psychological factors), introduces major psychological models of suicide, and outlines the rationale for the investigation that follow.

Chapter 2 presents a systematic review of the temporal dynamics of suicidal ideation. This chapter focuses on the persistence, variability, and instability of suicidal ideation through dynamic metrics. It also synthesises findings regarding the dynamic associations (concurrent, prospective, and time-invariant) between suicidal ideation and a range of factors.

Chapter 3 and 4 report findings from different analyses of data collected through an online cross-sectional survey.

Chapter 3 investigates the extent to which cognitive reactivity, ego depletion, and other psychological factors are associated suicidality and different patterns of suicidal ideation, within the context of the IMV model.

Chapter 4 presents a subgroup analysis focusing on participants with a history of suicidal ideation or suicide attempts. It explores the roles of cognitive reactivity, mindfulness, and ego depletion within the motivational phase of the IMV model, using mediation analyses.

Chapter 5 builds upon insights from Chapter 2 (on the dynamic nature of suicidal ideation) and Chapter 3 (on factors associated with different parameters of suicidal ideation) by presenting a qualitative investigation into the lived experiences of suicidal ideation. This chapter explores how individuals experience fluctuations in suicidal ideation in daily life, offering an in-depth, experiential perspective.

Chapter 6 provides a general discussion that synthesises the findings from all research chapters. It evaluates how these findings collectively contribute to the overarching aim of this thesis, discusses the strength and limitations of the work, and outlines implications for future research and clinical practice, particularly regarding the short-term dynamics of suicidal ideation and suicide risk more broadly.

Chapter 2: The Dynamic Nature of Suicidal Ideation: A Systematic Review

2.1 Abstract

Background: Recent research interest in the short-term dynamics of suicidal ideation has led to a growing body of fine-grained investigations using intensive longitudinal designs. These studies demonstrate that suicidal ideation can fluctuate considerably within very short timeframes, ranging from minutes or hours. As the field continues to expand rapidly, there is a pressing need to systematically synthesise existing research on the temporal dynamic patterns of suicidal ideation. Such a synthesis would offer a more comprehensive understanding of the dynamic nature of suicidal ideation.

Aim: This study aims to provide a systematic review, employing a narrative synthesis approach, to investigate the temporal dynamic patterns of suicidal ideation and their associated factors.

Methods: Following the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines, a key word search was conducted in relevant major electronic databases (i.e., Web of Science Core Collection, PubMed, PsycINFO, Psychology and Behavioural Sciences Collection, CINAHL, and Embase) on June 22nd, 2021, and on updated on August 15th, 2024. Studies were eligible for inclusion if they examined the dynamic change process of suicidal ideation within hours to a few days, with an assessment frequency of at least once per week. Eligible studies were limited to peer-reviewed empirical publications written in English. Additionally, a manual screening of the reference lists of identified articles was conducted to ensure comprehensive coverage.

Results: A total of 112 studies across 109 articles were included in the review, dawning on data from at least 8476 participants across 68 unique samples. Of these, 94 studies examined short-term fluctuations in suicidal ideation using four types of dynamic indicators: persistence (n = 50), variability (n = 47), instability (n = 29), and others related indicators (n = 35). Results indicated that suicidal ideation exhibited significant within-person variability, small to moderate instability from one time point to the next, and a small to moderate degree of temporal dependency. From observation, these results did not appear to vary substantially

by sample characteristics and sampling strategies, apart from assessment frequency. Emerging evidence also suggested that certain constructs of suicidal ideation may exhibit distinct temporal dynamics. Furthermore, the complex dynamics of suicidal ideation were reinforced by its associations with various psychological and contextual factors. These associations varied depending on the dynamic patterns examined (i.e., concurrent, prospective, and time-invariant associations) and the assessment timeframes (i.e., multiple times per day, once per day, and every few days per week).

Limitations: The underrepresentation of studies using daily and weekly assessments schedules, along with the limited number of studies using independent samples, reduced the reliability of cross-study comparisons and limited the generalisability of the review's findings.

Conclusions: This study contributes to the existing literature by highlighting the complexity of the temporal dynamics of suicidal ideation, revealing substantial heterogeneity both within and between individuals. Future theoretical and empirical work would benefit from incorporating temporal dynamics and individual variability into in the study of suicidal ideation. The use of consistent and precise terminology to describe dynamic patterns is encouraged to improve comparability across studies.

2.2 Introduction

Suicide, as a paradoxical contradiction to the evolutionary human drive for self-preservation, has long sparked significant interest and effort in striving to understand why individuals choose suicide and how it can be prevented. Existing psychological models of suicide have conceptualised the motivation behind suicidal ideation and behaviours from various perspectives, identifying key risk factors for suicide across multiple domains, including cognitive factors, personality traits, social influences, and negative life events (O'Connor & Nock, 2014). Contemporary theories suggest that suicidal ideation and behaviours might be considered an attempt to escape distressing self-awareness and intolerant mental pain arising from unmet or frustrated psychological needs deemed to be vital for survival (Baumeister, 1990; Shneidman, 1993; Williams, 2001). Nevertheless, the vast majority of theoretical accounts do not define a specific time frame in which these risk and protective factors operate.

Human thoughts, emotions, and cognitive processes are rarely static; they are in a constant state of flux, shaped by ongoing interactions with the external environment. However, the temporal dynamics of psychological constructs have been largely overlooked in psychological research, particularly in suicide research (Davidson et al., 2017; Trull & Ebner-Priemer, 2014). Neglecting these dynamics potentially hinders our ability to accurately capture the rapidly evolving nature of suicidal ideation and related factors in daily life, thereby limiting the effectiveness of prediction and intervention efforts (Byran & Rudd; 2016; Davidson et al., 2017; Ebner-Priemer & Trull, 2011). Advances in technology and statistical methodologies over the past decade have made it increasingly feasible to incorporate high ecologically valid observations into research practice, utilising methods such as ecological momentary assessment (EMA) or experience sampling methods (ESM), and daily diaries (Allen, Nelson, Brent, & Auerbach, 2019; Davidson et al., 2017). As a result, recent studies have increasingly focused on examining suicidal ideation in real time, with findings revealing significant momentary fluctuations, further underscoring the importance of adopting a dynamic perspective in suicide research (see Gee et al., 2020; Kleiman & Nock, 2018 for reviews).

2.2.1 A Dynamic Perspective on Suicidal Ideation

2.2.1.1 Suicide framework through a dynamic lens

While accumulating research evidence has documented short-term fluctuations in suicidal ideation, the temporal dynamics have rarely been explicitly incorporated into suicide theories. The Fluid Vulnerability Theory (FVT; Rudd, 2006) was the first framework in suicidology to integrate temporal dynamics as a core hypothesis, providing insight into both short-term and long-term processes of suicide risk. The fundamental premise of the FVT is that suicidal episodes are time-limited, persisting only as long as the suicidal mode remains activated, with chronic suicidality conceptualised as recurrent episodes of acute suicide risk. The suicidal mode comprised four key components, each containing distinct sets of schemas. First, the suicidal belief system (i.e., cognitive component) encompasses dysfunctional cognitive beliefs, aligning with Beck's cognitive theory (Alford & Beck, 1998); second, the affective system generates intense emotional experiences in response to specific circumstances, heightening affective sensitisation to negative triggers; third, the physiological system involves dysregulated biological responses associated with symptomatology; and fourth, the behavioural system governs the automatic activation of

behavioural responses. According to Rudd (2006), the suicidal mode can be triggered by either internal or external stimuli that are fluid in nature. Therefore, heightened suicide risk is typically short-lived, lasting for hours, days, or weeks until the impact of the precipitating factor subsides. Additionally, the FVT emphasises that individuals vary in their baseline vulnerability to suicidal mode activation due to historical and developmental factors. The intensity of a suicidal episode is determined by the interaction between triggering factors and baseline risk. In summary, the FVT has made distinct contributions to our understanding of the suicide risk from a dynamic perspective, elucidating the factors that influence the frequency and duration of suicidal episodes and how individual differences shape these processes.

A related theoretical framework, nonlinear dynamic system theory (Mishara, 1996; Butner et al., 2015), has been suggested as offering valuable insights into suicidality by explaining the nonlinear change process underlying sudden shifts in suicidal ideation and behaviours (Byran & Rudd, 2016; De Beurs et al., 2021; Schiepek et al., 2011). Within this perspective, individuals are theorised to have at least two risk states (i.e., low or high). For the most part, the change process in suicidal ideation remains stable in response to internal and external disturbances, allowing the system to return to a homeostasis or a stable set point (i.e., low-risk state) through engaging in self-regulation. However, the failure of self-regulation (Baumeister, Heatherton, & Tice, 1994) and its associated overwhelming negative emotion and cognitive disinhibition (Baumeister, 1990), destabilises the homeostatic balance and then increases the likelihood of transitioning from a low-risk state to a high-risk state (Bryan et al., 2020). In comparison with the FVT (Rudd, 2006), an individual's baseline risk corresponds to the homeostasis in the dynamic system theory, while the suicidal mode is prone to be activated in the destabilised state which enables a shift toward a higher risk state.

Taken together, from the perspective of nonlinear dynamic system theory, a system of stability is characterised by minor and gradual fluctuations in suicidal ideation that tend to return to an individual's baseline. Conversely, a system of instability exhibits rapid and large fluctuations in suicide ideation that deviate significantly from one's baseline. Beyond these change processes, a significant triggering event may provoke an abrupt transition to a high-risk state, seemingly incongruent with prior patterns of change (Bryan et al., 2020; De Beurs et al., 2021). This aligns with Bernanke, Stanley, and Oquendo (2017), who proposed that suicidal ideation can be categorised into at least two subtypes, each differing in stress responsivity and associated with distinct risk factors and pathologies. The stress-responsive suicidal ideation, rooted in early life adversity, is characterised by sudden but short-lived

increases in suicidal ideation in response to stressful life events. In contrast, the non-stress-responsive subtype is more closely associated with depressive diathesis and affect, predisposing individuals to persistent suicidal ideation. Furthermore, individuals exhibiting the stress-responsive pattern are thought to have poorer cognitive control compared to those with non-stress-responsive suicidal ideation.

2.2.1.2 Toward a comprehensive synthesis

Decades of research effort have provided a foundational understanding of the suicidal mind, identifying key risk and protective factors, akin to defining the main characters in a story. With the advancement of research methodologies, it is now possible to zoom in and explore how these factors interact and unfold in daily life, uncovering the detailed storyline behind suicidal ideation. The examination of the temporal dynamics of suicidal ideation has expanded exponentially over the past decade, evolving from a sparsely explored topic into an area of significant research interest and effort. Furthermore, beyond the growth in research volume, methodologies have also evolved accordingly, from early approaches using pen-and-paper (e.g., Crowe et al., 2019), personal digital assistants (PDAs; e.g., Rizk et al., 2019), to smartphone-based real-time data collection (e.g., Hallensleben et al., 2019), and more recently, the integration of idiographic approaches into real-time data collection (e.g., Kraiss et al., 2024). The rapid evolution of this research field highlights the growing recognition of the importance of revealing the temporal dynamics of suicidal ideation in both scientific and clinical contexts.

Through a fine-grained examination on suicidal ideation in daily life, researchers can gain a deeper understanding of its dynamic patterns, for example, the extent of its fluctuations, individual variations in these dynamic patterns, and the factors influencing its temporal dynamics. Such investigations are particularly insightful for depicting the short-term change process in suicidal ideation and identifying warning signs of its onset or worsening severity. In turn, this enables the development of effective prevention and early intervention strategies by targeting identifiable triggers within a specific time window. While some published review studies in this field have synthesised certain aspects of the suicidal ideation dynamics, many have focused on narrower themes. For example, the majority of existing reviews have focused solely on intensive longitudinal studies (Gee et al., 2020; Kleiman & Nock, 2018; Winstone et al., 2024). Among these, some have examined methodological aspects such as feasibility and validity (Ammerman & Law, 2022; Kivelä et al., 2022; Rabasco & Sheehan,

2022; Sedano-Capdevila et al., 2021), while others have focused on specific age ranges in the sample (Casini et al., 2023).

Furthermore, while research on temporal dynamics in the field of suicide has not flourished until recently, since the early 2000s, it been a focus in the broader field of psychological wellbeing, particularly in affective dynamics (Ebner-Priemer & Sawitzki, 2007; Ebner-Priemer et al., 2009; Eid & Diener, 1999; Koval et al., 2013; Mroczek, Spiro, & Almeida, 2003; Trull, Lane, Koval, & Ebner-Priemer, 2015; Wichers, Wigman, &Myin-Germeys, 2015; Wright & Simms, 2016). A comprehensive meta-analysis by Houben, Van Den Noortgate, and Kuppens (2015) examined the relationship between emotion dynamic patterns and psychological wellbeing outcomes, identifying three key forms of emotion dynamics often analysed in time-series data, including variability, instability, and inertia. Specifically, *variability* refers to the general dispersion of a construct over time, typically measured by within-person standard deviation or variance, which does not account for the temporal sequence of changes. *Inertia* reflects temporal dependency, capturing the magnitude of persistence of a construct between consecutive time points. It is commonly examined using autoregressive effects or autocorrelations, which assess how much a construct can be predicted by its previous value. *Instability* combines both variability and temporal dependency and is often quantified using mean squared successive differences (MSSD), which represents the average squared difference between consecutive observations. To enhance interpretability, some studies report the square root of MSSD (i.e., root mean squared successive differences; RMSSD), which reflects instability on the same scale as the original data, similar to how standard deviation relates to variance (Houben et al., 2015; Jahng, Wood, & Trull, 2008). Despite extensive research on emotion dynamics, no existing reviews have synthesised findings on these specific forms of temporal dynamics in the suicide literature. Taken together, these gaps highlight a pressing need for a comprehensive synthesis of suicide research to provide a holistic understanding in terms of the short-term dynamics of suicidal ideation.

2.2.2 The current study

This study aims to present a comprehensive systematic review using a narrative synthesis approach to address the following research questions: (i) To what extent is suicidal ideation a dynamic process? (ii) What factors are associated with different dynamic patterns of suicidal ideation? In this review, the temporal dynamics of suicidal ideation are conceptually

defined as the inherent short-term fluctuations in suicidal ideation, reflecting its adaptive nature in response to complex interactions between environmental, biological, and psychological factors. Operationally, temporal dynamics are defined as short-term changes in parameters of suicidal ideation such as intensity, frequency, and duration, with a maximum time interval of one week between assessments. The decision to use one-week interval as a critical threshold is intended to exclude studies examining long-term trajectories, such as developmental trends, while maintaining a reasonable timeframe for capturing short-term fluctuations. This approach enables an exploration of the extent to which short-term dynamics in suicidal ideation can be detected across timescales ranging from hours to days to a week.

2.3 Methods

This review adhered to the PRISMA Guideline (Page et al., 2021) to facilitate transparency and completeness in conducting and reporting research, and a pre-planned protocol was registered with PROSPERO (CRD42021250301).

2.3.1 Search strategies

The literature search was conducted in relevant major electronic bibliographic databases (i.e., Web of Science Core Collection, PubMed, PsycINFO, Psychology and Behavioural Sciences Collection, CINAHL, and Embase), with no publishing date restriction. An MVLS college librarian was consulted in the development of the search strategy to ensure the comprehensiveness and accuracy of the search results for the purpose of this review. The search was originally conducted on June 22nd 2021, and on August 15th 2024, by the first author using the following key terms: (suicid*) AND (ideat* OR thought* OR think*) AND (fluctuat* OR instab* OR trajector* OR pattern* OR variabilit* OR variation* OR dynamic*). Relevant subject headings were added to each database, where available, to increase relevance and precision of the retrieved results. Additionally, the reference lists of identified articles were manually screened as a complementary search to ensure potentially relevant articles were located and checked.

Reference management software (EndNote 21.4) was used to organise search results and execute subsequent screening procedures. Duplicates were removed by the built-in deduplication tool within EndNote, and any remaining duplicates were checked and removed

manually by the first author. Next, the remaining records were selected against the inclusion and exclusion criteria (see the section below). Specifically, the titles and abstracts screening took place first, which narrowed down the number of records being entered into the full-text screening phase (see Figure 2.1). The study screening process was conducted by the first author, and the inter-rater reliability was assessed by a co-author, who screened the titles and abstracts of 10% of the records and 20% of the full text articles. The research team was consulted when uncertainty arose, resulting in 100% concordance after discussion.

2.3.2 Eligibility

2.3.2.1 The inclusion and exclusion criteria

The inclusion criteria included articles that (i) treated suicidal ideation as a dynamic process and examined how suicidal ideation changes within a short period of time (e.g., hours and days), (ii) assessed suicidal ideation at the frequency of at least weekly, (iii) were empirical studies published in peer-reviewed academic journals, (iv) were written in English. Additionally, articles were excluded if the trajectory or changes of suicidal ideation were investigated from (a) the developmental perspective, e.g., exploring how suicidal ideation changes from adolescence to adulthood, (b) the lenses of biological rhythm and seasonal effects.

2.3.2.2 Borderline studies

Given the inherent complexity and dynamic nature of most psychological phenomena, this review acknowledges the breadth of relevant literature on this topic. However, in order to ensure a focused synthesis of findings, only studies directly aligned with our research questions were included in the review. This decision was made following thorough discussions within the research team. Accordingly, this review excluded studies that (i) primarily aimed to demonstrate the methodological feasibility and validity of an ecological momentary assessment, (ii) focused on short-term fluctuations of risk and protective factors of suicidal ideation or examined their relationship with the average intensity of suicidal ideation over the study period, or (iii) were sub-studies of larger projects in which the dynamics of suicidal ideation received the least emphasis compared to other research objectives.

2.3.3 Methodological completeness and quality

The assessment of methodological quality was intended for all eligible studies based on analyses relevant to this review. Given the varying assessment frequencies for suicidal ideation across studies, with intervals up to one week between assessments, implied the inclusion of different methodologies, two tailored assessment tools were utilised to accommodate these methodological heterogeneities. For studies employing ecological momentary assessment or the experience sampling method, which enable multiple assessments per day, no validated and widely accepted quality assessment tool was available at the time of this review. Therefore, these studies were evaluated for methodological completeness and transparency using the recommended reporting guidelines for ambulatory assessment by Trull and Ebner-Priemer (2020). A response scale (i.e., absent report = 0, partial report = 1, complete report = 2), adapted from a systematic review in a related field (Gee et al., 2020), was used to rate the adequacy of reporting for each criterion. Methodological completeness ranged from 0 to 24, with scores of 0-8, 9-17, and 18-24 indicating inadequate, moderate, and adequate reporting, respectively.

Additionally, a six-item assessment tool was developed by integrating the quality assessment tool from McClelland et al. (2020) with a modified version of the reporting checklist for observational longitudinal research by Tooth et al. (2005), tailored to account for both daily diaries and other short-term longitudinal studies. Each study was scored between 0 and 10, with 0-3, 4-7, and 8-10 reflecting low, moderate, and high quality, respectively. To ensure reliability, the first author conducted the primary methodological completeness and quality assessments, while a co-author independently cross-assessed 20% of the included studies, achieving 100% concordance after discussion (see Appendix 1 for tools used in assessing methodological completeness and quality).

2.3.4 Data extraction

To address the review questions, selected studies needed to investigate either the dynamics of suicidal ideation, the factors associated with different dynamic patterns of suicidal ideation, or both. Regarding the first research question, findings on short-term fluctuations in suicidal ideation were extracted, encompassing both statistical metrics and descriptive approaches that assessed persistence, variability, and instability. To determine which factors were linked to the dynamics of suicidal ideation and how these associations manifested, the

temporal relationships were identified and categorised into three types: (a) *concurrent relationships*, which explored whether factors were associated with or co-occurred alongside suicidal ideation within the same time frame; (b) *prospective or time-lagged relationships*, which examined the delayed associations between factors at a prior measurement time point and suicidal ideation at a subsequent measurement time point; and (c) *time-invariant relationships*, which relied on either aggregated dynamic measures (e.g., average variability during the study period) or distinct suicidal ideation trajectories (e.g., subtypes) and their associations with risk and protective factors. Notably, in studies examining cross-lagged (i.e., reciprocal or bi-directional) associations between the factors and suicidal ideation, only findings where suicidal ideation served as the dependent variables were extracted. This approach allows for a direct examination of the factors that influence suicidal ideation over short periods, while balancing the need to adhere to space limitation.

Additional study components were extracted and summarised in Table 2.1, including study identifiers (e.g., authors, countries, publication year), sample characteristics (e.g., sample size, age, gender), and methodological details (e.g., sampling method and frequency, study duration). Given that a single study could generate multiple reports addressing different research objectives, characteristics such as study locations, sample characteristics, and details of sampling methods were used to identify linked reports (Li, Higgins, & Deeks, 2024). These linked reports were listed in Appendix 2 Table A2.1 and only findings unique to each report were extracted to prevent double counting of results. To enhance clarity in terminology, this review referred to each individual linked report as a "study" rather than as a "report" to improve the readability of the synthesised findings. The first author conducted data extraction, and study authors were contacted when necessary to clarify any remaining uncertainties.

2.3.5 Data synthesis

Considering the methodological and statistical heterogeneity among the included studies, undertaking a meta-analysis was not feasible. Instead, a narrative synthesis approach was employed. First, all eligible studies were categorised into one of three groups based on the frequency of suicidal ideation assessments (i.e., multiple times per day, once per day, or once every few days per week). This classification was determined by the level at which the data were analysed rather than the research design. For instance, an EMA study was not assigned into the "multiple times per day" group by default. Some EMA studies did not assess suicidal

ideation at every momentary prompt (e.g., only at the nighttime before sleep), while others aggregated momentary suicidal ideation data to a higher level (e.g., daily mean) for the purpose of analysis. The synthesis was structured to present findings progressively, beginning with studies featuring the most frequent assessments and moving to those with less frequent assessments. This approach allowed for a stepwise understanding of the extent to which suicidal ideation functions as a dynamic process.

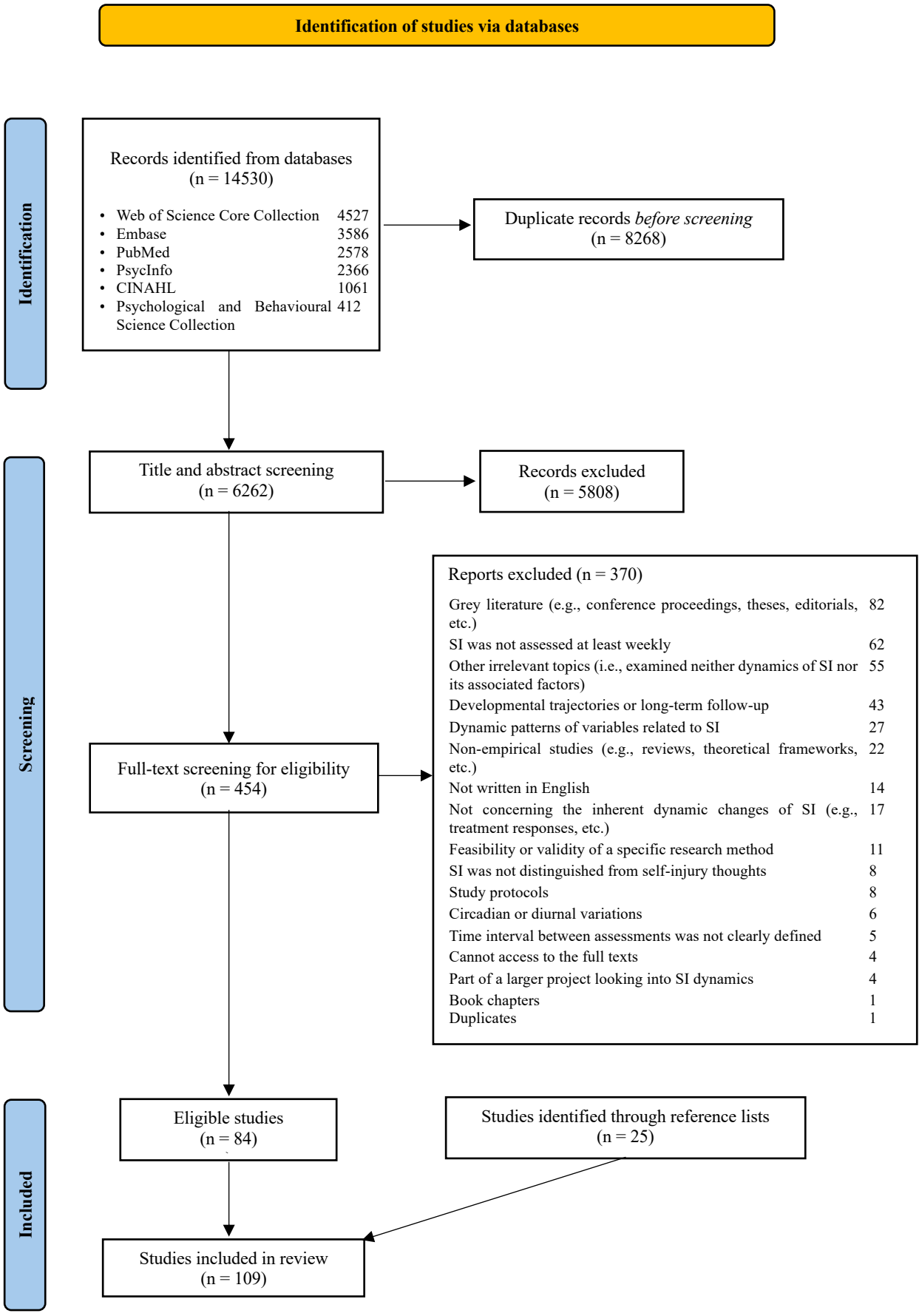
To what extent is suicidal ideation a dynamic process?

To address this research question, studies examining short-term fluctuations of suicidal ideation were identified and grouped into different dynamic indicators (i.e., persistence, variability, instability, and other related indicators), starting from the statistical indicator supported by the largest number of studies, followed by descriptive findings. For *persistence*, findings were synthesised primarily based on the direction and statistical significance of autoregressive effects or autocorrelations of suicidal ideation, alongside the strength of these effects. The strength of the autoregressive regression coefficients was interpretated using Cohen's (1988) conventional guidelines, with values of 0.1, 0.3, and 0.5 indicating small, moderate, and large effects respectively. *Variability* was synthesised by comparing the extent to which the variability in suicidal ideation was attributed to within-person (1-ICC) as opposed to between-person (ICC) variances. The range and median ICC values across studies were reported to provide an overall estimate of the degree of variability. Additional indicators, such as within-person standard deviation (WPSD) and the proportion of time suicidal ideation changes from one time to the next exceeding one within-person standard deviation, were summarised descriptively. For *instability*, findings related to root mean square of successive differences (RMSSD) and mean square of successive differences (MSSD) were synthesised. Due to the scale-dependent nature of these measures, two steps were taken to ensure comparability across studies. First, MSSD values of suicidal ideation were converted to RMSSD by taking the square root, restoring them to their original meaningful scale to facilitate interpretability. Second, RMSSD values were standardised by calculating the proportional change relative to the range of the scale score (i.e., dividing the RMSSD by the scale range). This represents the percentage change in suicidal ideation between consecutive assessments relative to the total scale range, thereby allowing for direct comparisons across studies. Other dynamic indicators, including visualisation-based approaches and basic descriptive analyses, were summarised using visual inspection and narrative description.

What factors are associated with different dynamic patterns of suicidal ideation?

Factors associated with different dynamic patterns of suicidal ideation were classified into four domains: cognitive, affective, social-interpersonal, and clinical/sociodemographic. Notably, the cognitive domain included factors grounded in cognitive processes, but with differing focuses, either on emotional aspects (e.g., perceived burdensomeness) or behavioural components (e.g., impulsivity). This domain was further divided into cognitive-emotional and cognitive-behavioural factors to provide a more nuanced understanding of how different cognitive processes influence the dynamics of suicidal ideation. A hierarchical structure was applied to facilitate synthesis. At the highest level, studies were grouped according to the nature of dynamic associations (i.e., concurrent, prospective, and time-invariant relationships). Within each form of dynamic associations, studies were further grouped by factor type, starting with the category containing the largest number of studies. Finally, within each factor category, findings were organised based on the assessment frequency of suicidal ideation, with studies involving multiple assessments per day being presented at first, followed by those with daily and weekly assessments. Given that this research question primarily concerned whether there is an association between factors and each dynamic pattern, the synthesis focused on the direction and statistical significance of these effects.

Figure 2.1 *PRISMA flow diagram of the study selection process*



2.4 Results

2.4.1 Study Summary

2.4.1.1 Study characteristics

The database searches retrieved 14530 articles, of which 6262 unique articles remained for further screening after the removal of duplicates. Following the screening process, 84 eligible articles were selected for inclusion, with an additional 25 articles identified through reviewing reference lists. This resulted in a final inclusion of 109 articles in the review (Figure 2.1). Of note, four articles, each containing two sub-studies with different samples, yielded a total of eight potential studies (Czyz et al., 2022; Kleiman et al., 2017; Kleiman et al., 2018a; Spangenberg et al., 2022). However, one sub-study from Spangenberg et al. (2022) was excluded due to ineligibility, resulting in seven studies being included (Czyz et al., 2022, sample 1 and 2; Kleiman et al., 2017, sample 1 and 2; Kleiman et al., 2018a, sample 1 and 2; Spangenberg et al., 2022, sample 1). As a result, data were extracted from a total of 112 studies across 109 articles. 102 studies (91%) were published after 2017, while only ten studies (9%) were published between 1984 and 2015. Furthermore, over half of the articles were retrieved from the United States (n = 76, 68%), followed by twenty-six studies (23%) from nine European countries including Germany (n = 10), United Kingdom (n = 6), Finland (n = 2), Netherlands (n = 2), Spain (n = 2), Denmark (n = 1), France (n = 1), Ireland (n = 1), and Switzerland (n = 1). The remaining 9% of articles (n = 10) were retrieved from Australia (n = 5), Canada (n = 2), China (n = 1), Israel (n = 1), and South Korea (n = 1).

Across the 112 studies, more than half of the studies (n = 67) conducting different analyses were derived from 23 unique samples, while only 45 studies reported using independent samples (see Appendix 2, Table A2.1). To avoid double-counting participants in studies with overlapping samples, the total sample size was determined based on the study with the largest sample, resulting in 2893 participants examined among the 67 studies. Overall, this review synthesised data from at least 8476 participants across 68 unique samples, with ages ranging from 12 to 87 years. Participants were recruited from various sources, with the majority drawn from clinical settings (57%), followed by mixed settings (15%), online sources (10%), community settings (9%), universities (7%), and penitentiary facilities (1%). The eligible studies employed a variety of research designs, including ecological momentary assessment (EMA)/experience sampling method (ESM) or intensive longitudinal designs

with at least twice-daily assessments (n = 71, 63%), daily diary or once-daily assessment methods (n = 24, 21%), and other short-term longitudinal designs that examined suicidal ideation on a weekly basis (n = 14, 13%). Additionally, a small number of studies (n = 3, 3%) utilised the timeline followback method, collecting retrospective self-reports of suicidal ideation over a specified timeframe.

There was considerable variability in sampling schemes, characterised by various sampling frequencies, durations, and timeframes (see Table 2.1). Regarding the level at which suicidal ideation was analysed, 62 studies examined it at the momentary level, typically using a sampling frequency of two to ten times per day, with two exceptions. Bagge et al. (2014) employed the timeline followback method to retrospectively gather hourly suicidal ideation over the 24 hours preceding a suicidal attempt, while Coppersmith et al. (2023a) incorporated additional burst surveys (six times per hour) intermittently within a standard momentary sampling schedule of five surveys per day. Among the 31 studies analysing suicidal ideation at the daily level, eight were EMA studies that aggregated momentary assessments to the daily level (Brudern et al., 2022; Cox et al., 2023 ; Glenn et al., 2021; Kaurin et al., 2022b; Littlewood et al., 2019; Tsypes et al., 2022; Wallace et al., 2024; Zhu et al., 2022), while one study (Hamilton et al., 2024) assessed suicidal ideation only at the night prompt despite administering three prompts per day.

In addition, 16 studies, including one daily diary study that aggregated scores weekly, were classified under weekly-level analysis, with sampling frequencies ranging from one to three times per week. Lastly, three studies employed mixed-frequency designs, either combining daily and multiple daily assessments (Bonilla-Escribano et al., 2023) or integrating daily and weekly-based assessments (Ballard et al., 2022; Porras-Segovia et al., 2021). Furthermore, the eligible 112 studies varied greatly on the length of study, with a median duration of 21 days. The most extensive follow-up period was observed in Oquendo et al. (2020), where suicidal ideation was assessed six times per day for seven days at six timepoints over 24 months. Regarding the constructs of suicidal ideation, over half of the studies examined active suicidal ideation (e.g., “thoughts of killing yourself”; n = 63), while only one-fifth explored passive ideation (e.g., “life is not worth living”; n = 23). Additionally, forty-four percent (n = 49) of the studies assessed overall suicidal ideation, often by either combining active and passive constructs or using terminology that did not clearly distinguish between these constructs, such as “feeling suicidal” or “thoughts of suicide”.

Table 2.1 *Summary of study and sample characteristics of studies included in the review (N = 112)*

Study/Country	Sample Type	Sample Size	Age Range (Years) M (SD)	Gender (%)	Ethnicity (%)	Research Design	SI Assessment Frequency	Sampling Frequency	Study Duration (Day)	Rating Timeframe	Study Quality
Aadahl et al., (2021) UK	Clinical & Community	24	18-63 35.3 (14.3)	67 Female	92 White	ESM (Signal-contingent)	Multiple/day	7/day	6	Right now	Adequate report
Al-Dajani & Czyz (2022) USA	Clinical	78	13-17 15.2 (1.4)	67.9 Famale	83.3 White	Daily diary (Every evening)	Once/day	1/day	28	Past 24 h	Moderate quality
Al-Dajani et al., (2021) Canada	Clinical & Community & University	39	20-59 30.9 (8.9)	66.7 Famale	48.7 White	EMA (Signal & Event contingent)	Multiple/day	4/day	14	Last assessment	Adequate report
Al-Dajani et al., (2024) USA	Clinical	77	13-17 15.2 (1.4)	67.5 Famale	83.1 White	Daily diary (Every evening)	Weekly (Aggregated)	1/day	28	Past 24 h	Moderate quality
Ammerman & Jacobucci (2023) USA	Online	35	Not reported 25.9 (5.8)	62.9 Famale	68.6 White	EMA (Signal-contingent)	Multiple/day	4/day	30	Right now	Adequate report
Andrewes et al., (2024) Australia	Clinical	46	15-25 18.4 (2.8)	87 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	6/day	7	Right now	Adequate report
Armey et al., (2020) USA	Clinical	151	Not reported 40.9 (12.5)	62 Famale	90.6 White	EMA (Signal & Event contingent)	Multiple/day	5/day	21	Last assessment	Adequate report
Auerbach et al., (2023) USA	Clinical & Community	103	13-18 16.4 (1.6)	82 Famale	59 White	Other short-term longitudinal designs	Weekly	1/week	180	Past week	Moderate quality
Bagge et al., (2014) USA	Clinical	166	18-64 36.6 (11.3)	61 Famale	64 White	Timeline followback method	Multiple/day	Hourly	1	At this hour	Moderate quality

Ballard et al., (2017) USA	Clinical	17	Not reported Not reported	Not reported	Not reported	Daily diary (Not reported)	Once/day	Daily	4	Not reported	Moderate quality
Ballard et al., (2022) USA	Clinical	108 (Short-term analysis sample: n = 105; Long-term analysis sample: n =45)	18-65 Short-term analysis sample: 43.1 (12.4) Long-term analysis sample: 48 (12.3)	Short-term analysis: 49.5 Famale Long-term analysis: 42.2 Famale	Short-term analysis: 87.6 White Long-term analysis: 93.3 White	Other short-term longitudinal designs	Varying (Daily & Weekly)	Short-term analysis: data collected at 230 min, day 1, 2, and 3. Long-term analysis: data collected at 230 min, day 3,7, and 11.	Days 1, 2, 3, 7, and 11 post-ketamine infusions (varied by sub-studies)	Not reported	Moderate quality
Baryshnikov et al., (2024a) Finland	Clinical	67	Not reported MDD:43 (15.8) MDD+BPD: 30.3 (8.4)	MDD: 54 Famale MDD+BPD: 80 Famale	Not reported	EMA (Interval-contingent)	Multiple/day	3/day (at 8am, 3pm, 9pm)	Inpatient stay: M = 3.4 days, range = 2 to 8 days	Right now	Moderate report
Baryshnikov et al., (2024b) Finland	Clinical	67	N/A MDD:43 (15.8) MDD+BPD: 30.3 (8.4)	MDD: 54 Famale MDD+BPD: 80 Famale	Not reported	EMA (Interval-contingent)	Multiple/day	3/day (at 8am, 3pm, 9pm)	Inpatient stay: M = 3.4 days, range = 2 to 8 days	Right now	Moderate report
Bayliss et al., (2024) Australia	Online	75	19-76 36.5 (10.8)	64 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	4/day	14	Past 15 min	Adequate report
Bell & Shah (1999) UK	Clinical	13	> = 65, Median = 77 Not reported	61 Famale	N/A	Daily diary (Morning and afternoon)	Multiple/day	2/day	6	In the daytime	Low quality
Ben-Zeev et al., (2012) USA	Clinical	31	Not reported 39.3 (11.0)	76.7 Famale	66.7 Caucasian	ESM (Signal-contingent)	Multiple/day	7/day	7	Last assessment	Moderate report

Bodell et al., (2021) USA	Clinical	97	18-58 26.7 (7.6)	100 Famale	93.8 White	Other short-term longitudinal designs	Weekly	1/week	84	Past week	Moderate quality
Bonilla-Escribano et al., (2023) Spain, France	Clinical	275	Not reported 40 (14)	67.3 Famale	Not reported	EMA (Signal-contingent)	Varying (Multiple & Daily)	1-5/day (4-5 prompts per day in the first month, 3 to 4 prompts in the next 2 months, and 1 to 2 prompts in the last 3 months)	180	Not reported	Adequate report
Brim et al., (1984) USA	Clinical	60	Not reported Not reported	Not reported	Not reported	Daily diary (clinician rating whenever possible)	Once/day	1/day	Inpatient stay: M = 17, range = 7-29 days	Not reported	Moderate quality
Brudern et al., (2022) Germany	Clinical	73	18-85 37.8 (14.3)	71.2 Famale	Not reported	EMA (Signal & Interval contingent)	Once/day (Aggregated)	10/day	6	Right now	Adequate report
Byran & Rudd (2018) USA	Clinical	76	Not reported 27.2 (6.3)	84.2 Male	76.3 Caucasian	Other short-term longitudinal designs	Weekly	1/week	85	Last week	Moderate quality
Byran et al., (2019) USA	Clinical	33	19-44 26.2 (6.0)	87.9 Male	78.8 White	Other short-term longitudinal designs	Weekly	1/week	86	Last week	Moderate quality
Coppersmith et al., (2019) USA	Online	53	18-39 23.5 (4.3)	77.1 Famale	75 White	Daily diary (Every day before 9pm)	Once/day	1/day	28	During the day	Moderate quality
Coppersmith et al., (2023a) USA	Online	105	18-60 29.2 (9.1)	68.6 Famale	57.1 White	EMA (Signal-contingent)	Multiple/day	EMA surveys: 5/day Burst surveys: 6/hour with max 2 episodes/day,4 days/week	42	Right now	Adequate report

Coppersmith et al., (2023b) USA	Online	105	18-61 29.2 (9.1)	68.6 Famale	57.1 White	EMA (Signal & Interval contingent)	Multiple/day	EMA surveys: 5/day Daily surveys: 1/day	42	Right now	Adequate report
Coppersmith et al., (2024) USA	Clinical	256	Not reported Adult: 32.7 (11.7) Adolescent: 15 (1.6)	Adult: 51 Famale Adolescent: 61 Famale	Adult: 71 White Adolescent: 73 White	EMA (Signal & Interval contingent)	Multiple/day	6/day	90	Right now	Moderate report
Cox et al., (2023) USA	Clinical	102	18-35 24.9 (4.7)	74.5 Famale	64.7 White	EMA (Signal & Interval contingent)	Once/day (Aggregated)	7/day	21	Last assessment	Moderate report
Crowe et al., (2019) Ireland	Clinical & Community	64 (MDD group, n = 31; Control group, n = 33)	18-70 MDD group: 44.4 (12.1) Control group: 41.2 (14.4)	MDD group : 42 Famale Control group: 70 Famale	MDD group:100 Caucasian Control group: 97 Caucasian	ESM (Signal-contingent)	Multiple/day	10/day	6	Mixed	Adequate report
Czyz et al., (2019) USA	Clinical	34	13-18 15.5 (1.35)	76.5 Famale	85.3 Caucasian	Daily diary (Every evening)	Once/day	1/day	28	Past 24 h	Moderate quality
Czyz et al., (2022, Sample 1) USA	Clinical	61	13-17 15.2 (1.4)	68.9 Famale	75.4 White	EMA (Interval-contingent)	Multiple/day	5/day (SI excluded from morning surveys)	Inpatient stay: M (SD) = 6.6 (1.8) days	Last assessment	Moderate report
Czyz et al., (2022, Sample 2) USA	Clinical	78	13-17 15.2 (1.4)	67.9 Famale	83.3 White	Daily diary (Every evening between 5-8pm)	Once/day	1/day	28	Past 24 h	Moderate quality
Czyz et al., (2023) USA	Clinical	78	13-17 15.2 (1.4)	67.9 Famale	83.3 White	Daily diary (Every evening)	Once/day	1/day	28	Past 24 h	Moderate quality

De Beurs et al., (2024) Netherlands	Clinical	11	20-50 34.6 (9.9)	55 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	3/day	Outpatient treatment length: M (SD) = 96 (41.5) days, range = 49-193 days (3 to 6 months)	Right now	Moderate report
Depp et al., (2017) USA	Clinical	86	19-64 35.3 (12.8)	63.5 Famale	83.7 Caucasian	Other short-term longitudinal designs	Weekly	1/week	140	Past week	Moderate quality
Ernst et al., (2024) Germany	Clinical	50*	Not reported 37 (13.1)	66 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	10/day	10	Right now	Adequate report
Franz et al., (2021) USA	Online	46	18.11-38.76 23.4 (4.4)	78.2 Famale	Not reported	Daily diary (End of day)	Once/day	1/day	28	During the day	Moderate quality
Gerner et al., (2023) USA	University students	43	Not reported 19.1 (1.3)	69.8 Famale	62.8 White	EMA (Signal-contingent)	Multiple/day	5/day	10	Right now	Adequate report
Glenn et al., (2021) USA	Clinical	48	12-18 15 (1.6)	64.6 Famale	77.1 White	EMA (Signal & Interval contingent)	Once/day (Worst-point)	3-6/day	28	Right now	Adequate report
Glenn et al., (2022) USA	Clinical	48	12-18 15 (1.6)	64.6 Famale	77.1 White	EMA (Signal & Interval contingent)	Multiple/day	3-6/day	28	Right now	Adequate report
Hadzic et al., (2020) Germany	Clinical	74	18-85 37.6 (14.3)	71.6 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	10/day	6	Right now	Moderate report
Hallard et al., (2021) UK	Clinical & Community	24	18-63 35.3 (14.3)	67 Famale	92 White	ESM (Signal-contingent)	Multiple/day	7/day	6	Right now	Adequate report
Hallensleben et al., (2019) Germany	Clinical	74	18-85 37.6 (14.3)	71.6 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	10/day	6	Right now	Adequate report

Hallensleben et al., (2024) Germany	Clinical	21	18-59 38.3 (14.4)	100 Male	Not reported	EMA (Signal-contingent)	Multiple/day	10/day	6	Right now	Adequate report
Hamilton et al., (2023) USA	Clinical	59	13-23 16.6 (2.7)	74.6 Famale	76.3 White	Daily diary (Every evening before bedtime)	Once/day	2/day (SI assessed during night prompts)	Outpatient treatment: up to 3 months, M (SD) = 56 (24.1) days	During the day	Moderate quality
Hamilton et al., (2024) USA	Online	60	14-17 16.2 (1)	49 Famale	41 White	EMA (Signal & Interval contingent)	Once/day (Aggregated)	3/day (SI assessed in evening surveys)	56	During the day	Adequate report
Herzog et al., (2023) USA	Clinical & Community	95	18-57 30.6 (10.7)	65.3 Famale	53.7 White	EMA (Signal-contingent)	Multiple/day	6/day	7	Last assessment	Moderate report
Humber et al., (2013) UK	Inmate sample	21	22-58 36 (Not reported)	100 Male	86 White	EMA (Interval-contingent)	Multiple/day	9/day	6	Right now	Adequate report
Husky et al., (2017) France	Clinical	42	Not reported 37.9 (12.8)	73.8 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	5/day	7	Last assessment	Moderate report
Jacobucci et al., (2022) USA	Online	35	Not reported 25.9 (5.8)	62.9 Famale	68.6 White	EMA (Signal-contingent)	Multiple/day	4/day	30	Right now	Moderate report
Jeong et al., (2021) Korea	Clinical	23	Not reported 40.0 (8.7)	78.3 Male	Not reported	Daily diary (Every day at 8pm)	Once/day	1/day	15	During the day	Low quality
Kaliush et al., (2024) USA	Community (Prenatal sample)	94	18-40 29.2 (4.5)	100 Famale	66 White	Daily diary (Morning and evening)	Multiple/day	2/day	120 (7-day waves at the 3rd trimester, 6 weeks postpartum, and 4 months postpartum)	Mixed	Moderate quality

Kaurin et al., (2022a) USA	Clinical & Community	186	18-45 33.7 (9.4)	80 Famale	76 White	EMA (Signal & Event contingent)	Multiple/day	6/day	21	Since the interaction	Adequate report
Kaurin et al., (2022b) USA	Clinical & Community	201	20-60 33.6 (9.5)	80 Famale	74 Caucasian	EMA (Signal & Interval contingent)	Once/day (Aggregated)	6/day	21	Not reported	Moderate report
Kaurin et al., (2022c) USA	Clinical & Community	95	20-60 33.6 (9.5)	80 Famale	74 Caucasian	EMA (Signal-contingent)	Multiple/day	6/day	21	Not reported	Adequate report
Kaurin et al., (2023) USA	Clinical & Community	153	Not reported 33.6 (9.6)	81 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	6/day	21	Not reported	Moderate report
Kaurin et al., (2024) USA	Clinical	689	12-19 15.5 (1.5)	75 Famale	86 White	Other short-term longitudinal designs	Weekly	1/week	Outpatient clinical care: M (SD) = 9.16 (6.02) weeks, range = 2-39 weeks	Past week	Moderate quality
Kinkel-Ram et al., (2021) USA	Clinical	97	18-68 26.7 (7.6)	100 Famale	93.8 White	Other short-term longitudinal designs	Weekly	1/week	87	Past week	Moderate quality
Kleiman et al., (2017, Sample 1) USA	Online	54	18-44 23.2 (5.3)	79.6 Famale	72 European decent	EMA (Signal-contingent)	Multiple/day	4/day	28	Right now	Adequate report
Kleiman et al., (2017, Sample 2) USA	Clinical	36	23-68 47.7 (13.1)	44.1 Famale	82 European decent	EMA (Signal-contingent)	Multiple/day	4/day	Inpatient stay: M (SD) = 10.3 (6.5), range = 2-46 days	Right now	Adequate report
Kleiman et al., (2018a, Sample 1) USA	Online	51	18-38 23.6 (4.7)	79 Famale	72.5 European decent	EMA (Signal-contingent)	Multiple/day	4/day	28	Right now	Adequate report

Kleiman et al., (2018a, Sample 2) USA	Clinical	32	23-68 42.5 (12.9)	43.3 Famale	81.3 European decent	EMA (Signal-contingent)	Multiple/day	4/day	Inpatient stay: M (SD) = 8.79 (8.23) days, range = 2-46 days	Right now	Adequate report
Kleiman et al., (2018b) USA	Online	43	Not reported 23.28 (4.38)	78 Famale	73 White	EMA (Signal & Event contingent)	Multiple/day	4/day	28	Right now	Adequate report
Kraiss et al., (2024) Germany	Clinical	74	18-85 37.6 (14.3)	71.6 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	10/day	6	Right now	Adequate report
Kuehn et al., (2022) USA	Clinical	3	13-17 Not reported	Not reported	Not reported	Daily diary (Every evening)	Once/day	1/day	28	Past 24 h	Moderate quality
Kuehn et al., (2024) USA	Clinical & Online	29	16-20 18.8 (1.2)	86.2 Famale	51.7 White	EMA (Signal & Event contingent)	Multiple/day	5/day	14	Past 30 min	Adequate report
Kyron et al., (2018) Australia	Clinical	417	Not reported Not reported	Not reported	Not reported	Daily diary (Generally in the morning)	Once/day	1/day	Inpatient stay: M (SD) = 14.2 (12.7) days	Past 24 h	Low quality
Kyron et al., (2022) Australia	Clinical	717	14-82 40.7 (15.2)	69.7 Famale	Not reported	Daily diary (When device opened)	Once/day	1/day	Inpatient stay > = 6 days, M (SD) = 19.88 (12.68)	Past 24 h	Moderate quality
Lewis et al., (2023) USA	Community	184	Not reported 44.1(16.2)	78.3 Famale	78.3 European decent	Other short-term longitudinal designs	Weekly	2/weeks (fixed days, random times)	56	Last assessment	Low quality
Li et al., (2024) China	University students	110	19-23 20.3 (1.0)	100 Famale	Not reported	Daily diary (Every evening before bedtime)	Once/day	1/day	28	Today	Moderate quality

Littlewood et al., (2019) UK	Clinical & Community	51	18-65 35.5 (12.8)	67 Famale	Not reported	EMA (Signal & Interval contingent)	Once/day (Aggregated)	6/day	7	Right now	Adequate report
Lucht et al., (2022a) Germany	Clinical	74	18-85 37.6 (14.3)	72 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	Up to 10/day	6	Right now	Adequate report
Lucht et al., (2022b) Germany	Clinical	74	18-85 37.6 (14.3)	72 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	Up to 10/day	6	Right now	Moderate report
Madsen et al., (2019) Denmark	Clinical	811	Not reported 42.5 (11.8)	63.4 Famale	Not reported	Other short-term longitudinal designs	Weekly	1/week	88	Not reported	Moderate quality
Mandel et al., (2024) USA	University students	55	18-27 19.6 (2.18)	67 Famale	73 White	EMA (Signal-contingent)	Multiple/day	4/day	14	Right now	Adequate report
May et al., (2023) USA	Clinical	78	13-17 15.2 (1.4)	69 Famale	83.3 White	Daily diary (Every evening)	Once/day	1/day	28	Past 24 h	Moderate quality
Mou et al., (2018) USA	Clinical	35	Not reported 44.3 (13.3)	45.7 Famale	82.9 European decent	EMA (Signal-contingent)	Multiple/day	4/day	Inpatient stay: M = 8.8 days, range = 2-46 days	Right now	Moderate report
Nock et al., (2009) USA	Community	30	12-19 17.3 (1.9)	86.7 Famale	86.7 European decent	EMA (Signal & Event contingent)	Multiple/day	2/day	14	Currently or since the last assessment	Adequate report
Oakey-Frost et al., (2023) USA	University students	49	Not reported 19.2 (1.3)	71.4 Famale	67.3 White	EMA (Signal-contingent)	Multiple/day	5/day	10	Right now	Adequate report
Oquendo et al., (2020) USA	Clinical & Community	51	19-61 37.3 (11.2)	59 Famale	75.5 Not Hispanic	EMA (Signal-contingent)	Multiple/day	6/day	720 (7-days waves at baseline, 3, 6, 12, 18, and 24 months)	Last assessment	Moderate report

Ortiz & Smith (2020) USA	Clinical	92	18-62 32.4 (11.4)	96 Famale	93.5 White	Other short-term longitudinal designs	Weekly	1/week	35	Past week	Moderate quality
Peters et al., (2019) USA	Clinical	103	13-18 15.3 (1.4)	64.1 Famale	79.6 White	Timeline followback method	Weekly	1/week	180 (at 2, 4, 6 months post-hospitalisation)	Weekly score	Moderate quality
Peters et al., (2022) Canada	Clinical	39	18-70 36.3 (13)	69.2 Famale	Not reported	EMA (Interval-contingent)	Multiple/day	3/day (at 9 am, 3pm, 8pm)	Inpatient stay: M (SD) = 12 (5.61) days	Right now	Moderate report
Porras-Segovia et al., (2021) Spain	Clinical	110	Not reported 44.3 (15.2)	65.6 Famale	Not reported	Daily diary (Random time between 10 am and 10 pm for 3 months)	Varying (Daily & Weekly)	Assessment frequency varied. No wish to live: at least 2/week in the first month then at least 1/week Wish to die: at least once every 4 days in the first month then at least once every 8 days	90	Not reported	Moderate quality
Rath et al., (2019) Germany	Clinical	74	18-85 37.6 (14.3)	71.6 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	10/day	6	Right now	Adequate report
Ratzon et al., (2024) Israel	Clinical	29	12-18 14.8 (1.6)	100 Famale	Not reported	Daily diary (Every day at 6pm)	Once/day	1/day	10	Not reported	Moderate quality
Restifo et al., (2015) Australia	Clinical	562	16-87 40 (14)	71.2 Famale	Not reported	Daily diary (Not reported)	Once/day	1/day	Inpatient stay: M (SD) = 24 (15.97)	Past 24 h	Moderate quality
Rizk et al., (2019) USA	Clinical	38	18-59 28.6 (9.5)	100 Famale	60.5 White	EMA (Signal-contingent)	Multiple/day	6/day	7	Last assessment	Moderate report

Rogers & Bozzay (2024) USA	Online	237	18-55 27.1 (8.6)	61.6 Famale	86.9 White	EMA (Signal-contingent)	Multiple/day	6/day	14	Right now	Adequate report
Rogers & Joiner (2019) USA	Online	91	18-60 27.0 (8.6)	53.8 Famale	78.0 White	Other short-term longitudinal designs	Weekly	Every 3 days	16 (6 timepoints)	Last assessment	High quality
Rogers et al., (2021) USA	Online	91	18-60 27.0 (8.6)	53.8 Famale	78.0 White	Other short-term longitudinal designs	Weekly	Every 3 days	16 (6 timepoints)	Last assessment	High quality
Rogers et al., (2022b) USA	Online	237	18-55 27.1 (8.6)	61.6 Famale	86.9 White	EMA (Signal-contingent)	Multiple/day	6/day	14	Last assessment	Adequate report
Rogers et al., (2022a) USA	Online	237	18-55 27.1 (8.6)	61.6 Famale	86.9 White	EMA (Signal-contingent)	Multiple/day	6/day	14	Right now	Adequate report
Rogers et al., (2024a) USA	Clinical	235	18-69 40.4 (13.3)	55.1 Famale	91.4 White	EMA (Signal & Event contingent)	Multiple/day	5/day	21	Last assessment	Moderate report
Rogers et al., (2024b) USA	Online	237	18-55 27.1 (8.6)	61.6 Famale	86.9 White	EMA (Signal-contingent)	Multiple/day	6/day	14	Right now	Adequate report
Schatten et al., (2021) USA	Clinical	34	13-17 15.5 (1.35)	76.5 Famale	85.3 Caucasian	Daily diary (Every evening between 5-7pm)	Once/day	1/day	28	Past 24 h	Moderate quality
Selby et al., (2013) USA	Clinical	104	12-18 15.3 (1.4)	68 Famale	78.5 Caucasian	Timeline followback method	Weekly	1/week	182	Weekly score	Moderate quality
Sels et al., (2024) Switzerland	Clinical	57	18-57 35 (12.3)	62 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	5/day	28	Right now	Adequate report
Smith et al., (2024) USA	Clinical & Community	92	18-65 32.2 (8.6)	75.8 Male	81.8 White	EMA (Signal-contingent)	Multiple/day	4/day	30	Since the last assessment	Moderate report

Spangenberg et al., (2022, Sample 1) Germany	Clinical	74	18-85 37.6 (14.3)	71.6 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	10/day	6	Right now	Adequate report
Stanley et al., (2021) USA	Clinical	50	Not reported 30.6 (11.0)	86 Famale	56 Caucasian	EMA (Signal-contingent)	Multiple/day	6/day	7	Last assessment	Moderate report
Tsypes et al., (2022) USA	Clinical & Community	153	Not reported 33.6 (9.6)	81.7 Famale	79 White	EMA (Signal & Interval contingent)	Once/day (Aggregated)	6/day	21	Not reported	Moderate report
van Ballegooijen et al., (2022) UK	Clinical & Community	51	18-65 35.5 (12.8)	67 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	6/day	7	Right now	Adequate report
van den Brink et al., (2024) Netherlands	Clinical	28	19-59 35.7 (11.7)	65 Famale	Not reported	EMA (Signal-contingent)	Multiple/day	10/day	6	Right now	Moderate report
Victor et al., (2019) USA	Community	62	18-24 22 (1.6)	100 Famale	71.0 African American	EMA (Signal & Interval contingent)	Multiple/day	7/day	21	Last assessment	Adequate report
Wallace et al., (2024) USA	Clinical	95	18-65 35.8 (14.4)	65 Famale	81 White	EMA (Signal-contingent)	Once/day (Worst-point)	3/day	65	Last assessment	Adequate report
Wang et al., (2021) USA	Clinical	83	Not reported 38.4 (13.6)	42.2 Famale	83.1 White	EMA (Signal-contingent)	Multiple/day	4-6/day	Inpatient stay: M (SD) = 6.9 (5.4), range = 2-46 days	Right now	Adequate report
Witte et al., (2005) USA	University students	108	Not reported 19.3 (3.1)	60 Famale	Not reported	Daily diary (Not reported)	Once/day	1/day	28	Past 24 h	Moderate quality
Witte et al., (2006) USA	University students	108	Not reported 19.3 (3.1)	60 Famale	Not reported	Daily diary (Not reported)	Once/day	1/day	28	Past 24 h	Moderate quality

Wolford-Clevenger et al., (2020) USA	University students	206	18-46 19.1 (2.4)	73 Famale	82.4 White	Daily diary (Every day at 6am)	Once/day	1/day	90	During the previous day	Moderate quality
Yin et al., (2023) USA	Clinical	81	18-57 28.2 (8.6)	76.5 Famale	75.31 White	Daily diary (Not reported)	Once/day	1/day	165	Not reported	Moderate quality
Zhu et al., (2022) USA	Community	10	Not reported 53.0 (11.6)	70 Male	60 Black	EMA (Signal & Interval contingent)	Once/day (Aggregated)	4/day	28	Not reported	Moderate report
Zuromski et al., (2017) USA	Community	589	Not reported 34 (11.1)	72.3 Famale	85.74 White	Other short-term longitudinal designs	Weekly	Every 3 days	15 (6 timepoints)	Past 3 days	High quality

Note. BPD = Borderline personality disorder; EMA = Ecological momentary assessment; ESM = Experience sampling method; M = Mean; MDD = Major depressive disorder; SD = Standard deviation.

2.4.1.2 Methodological transparency and study quality

The average reporting transparency score for the EMA/ESM studies (n = 69) was 18 ± 2.4, ranging from 12 to 23. The majority of studies (n = 45; 65%) were rated as demonstrating adequate methodological transparency, while 24 studies (35%) exhibited moderate reporting transparency. No study was classified as having inadequate methodological reporting. Notably, although the majority of studies (n = 54, 78%) provided some justification for their sample sizes, only 23% (n = 16) validated their sample size through statistical calculations, such as power analysis. Moreover, the rationale behind the sampling strategies, a critical component of the EMA method, was incompletely reported in many studies, including those that met the criteria for adequate methodological reporting. Specifically, only 22% of studies (n = 15) explained their choice of sampling design (e.g., opting for signal-contingent or interval-contingent sampling), and only one-third of the studies (n = 24, 35%) clarified their rationale for the number and timing of momentary assessments. Additionally, for the remaining 43 studies, which have time intervals ranging from one day to one week, the majority (n = 36, 84%) were rated as having moderate methodological quality. Three studies were rated as demonstrating high methodological quality, while four studies were classified as low quality. The average rating score was 5 ± 1.6, ranging from 1 to 8. Nearly all studies employed opportunity sampling for recruitment, with the exception of two studies. Moreover, none of the studies provided clear evidence regarding the generalisability of their findings to the target population. Due to a potential floor effect, many studies received a score of zero on two related criteria (i.e., sample selection and results generalisability), resulting in restricted overall ratings for these 43 studies.

2.4.2 To What Extent Is Suicidal Ideation A Dynamic Process? (N = 94)

Ninety four of 112 studies investigated the short-term fluctuations in suicidal ideation through different dynamic indicators, including *persistence* (n = 50; multiple/day: 34 studies, daily: 8 studies, weekly: 7 studies, mixed frequency: 1 study), *variability* (n = 47; multiple/day: 28 studies, daily: 12 studies, weekly: 5 studies, varying frequency: 2 studies), and *instability* (n = 29; multiple/day: 23 studies, daily: 4 studies, weekly: 2 studies). Furthermore, nine studies explored the group profiles of suicidal ideation through subtypes, based on the dynamic indicators and descriptive analysis of ratings of suicidal ideation (multiple/day: n = 4, daily: n = 2, weekly: n = 2, mixed frequency: n = 1). Additionally,

visual inspection as a complementary approach for exploring fluctuations in suicidal ideation was incorporated in 33 studies. Box 2.1 summarised the key findings on dynamic indicators of suicidal ideation, while extracted individual study results were detailed in Appendix 3, Table A3.1.

2.4.2.1 The Persistence of Suicidal Ideation (N = 50)

The persistence or stability of suicidal ideation was primarily investigated using autoregressive effects or autocorrelations of suicidal ideation measured across adjacent timepoints (i.e., the effect of suicidal ideation at one time point *t* on its level at the subsequent time point *t*+1; n = 44), followed by examining the change process of suicidal ideation over time from a dynamical system perspective (n = 6) (see Appendix 3, Table A3.1). Among the 44 studies that examined autoregressive effects, all investigated the conditional autoregressive effect of suicidal ideation, meaning that the extent to which prior suicidal ideation predicted its subsequent levels depended on additional covariates included in the model. Of note, three studies with multiple daily assessments also reported unconditional autoregressive effects, which assessed the inherent persistence of suicidal ideation without adjusting for covariates (Baryshnikov et al., 2024a; Hallensleben et al., 2019; Jacobucci, McClure, & Ammerman, 2022). Findings from these unconditional models generally indicated that suicidal ideation exhibited a moderate level of persistence when no additional variables were considered. However, when covariates were introduced, the autoregressive effect was reduced (Baryshnikov et al., 2024a; Hallensleben et al., 2019). A similar trend was observed in a small sample study (Jacobucci et al., 2022; n = 35); however, statistical significance of the unconditional autoregressive effect of suicidal ideation was not reported, and the conditional model was not statistically significant.

Ten of 44 studies did not contribute to the further synthesis of conditional autoregressive effects due to insufficient details. Among these, two studies reported only statistical significance, indicating significant autoregressive effects (Ben-Zeev, Young, & Depp, 2012; Smith et al., 2024), while eight studies did not explicitly provide relevant information (Al-Dajani & Czyz, 2022; Bagge et al., 2014; Hallensleben et al., 2024; Husky et al., 2017; Tsypes et al., 2022; Oquendo et al., 2020; Rogers, Gai, &, Joiner, 2022a; Lucht et al., 2022a). Therefore, the synthesis of conditional autoregressive effects was based on 34/44 studies across 26 unique samples that provided relevant results beyond statistical significance, including effect directions and estimates. Notably, none of the 34 autoregressive models were identical, as each analysis was conditional on the included covariates, spanning

affective, cognitive, interpersonal, social, and clinical domains, which were concurrently and/or prospectively related to suicidal ideation (see Section 2.4.3). However, their diversity posed interpretative challenges in synthesising findings on the degree to which suicidal ideation persists over time, as the observed autoregressive effect varied depending on the specific covariates included in each study.

Among the 34 studies, 29 examined the autoregressive effect of suicidal ideation primarily at the average group level (Ammerman & Jacobucci, 2023; Ballard et al., 2022; Baryshnikov et al., 2024a; Bayliss et al., 2024; Coppersmith et al., 2019; Coppersmith et al., 2023a; Coppersmith et al., 2023b; Cox et al., 2023; Czyz et al., 2019; Ernst et al., 2024; Gerner et al., 2023; Hallensleben et al., 2019; Jacobucci, McClure, & Ammerman, 2022; Kleiman et al., 2017, Sample 1; Kleiman et al., 2017, Sample 2; Kraiss et al., 2024; Kyron et al., 2018; Kyron et al., 2022; Li et al., 2024; Mandel et al., 2024; Oakey-Frost et al., 2023; Ortiz & Smith, 2020; Rath et al., 2019; Rogers et al., 2021; Rogers et al., 2022b; Selby, Yen, & Spirito 2013; van Ballegooijen et al., 2022; Wallace et al., 2024), while five employed idiographic approaches (Kaurin et al., 2022c; Kuehn et al., 2022; Kuehn et al., 2024; Yin et al., 2023; Zhu et al., 2022); one study reported findings using both approaches (Coppersmith et al., 2024). Despite variations in sampling frequencies and covariates, 26/29 studies (90%) reported a significant and positive autoregressive effect of suicidal ideation ($0 < \phi < 1$) at the average group level. Of these, 18 studies assessed the persistence of suicidal ideation across hours within a day (Ammerman & Jacobucci, 2023; Baryshnikov et al., 2024a; Bayliss et al., 2024; Coppersmith et al., 2023a; Coppersmith et al., 2023b; Coppersmith et al., 2024; Ernst et al., 2024; Gerner et al., 2023; Hallensleben et al., 2019; Jacobucci et al., 2022; Kleiman et al., 2017, Sample 1; Kleiman et al., 2017, Sample 2; Kraiss et al., 2024; Mandel et al., 2024; Oakey-Frost et al., 2023; Rath et al., 2019; Rogers et al., 2022b; van Ballegooijen et al., 2022), while seven examined daily patterns of suicidal ideation (Coppersmith et al., 2019; Cox et al., 2023; Czyz et al., 2019; Kyron et al., 2018; Kyron et al., 2022; Li et al., 2024; Wallace et al., 2024) and three investigated weekly trends (Ortiz & Smith, 2020; Rogers et al., 2021; Selby, Yen, & Spirito 2013). Additionally, one study (Ballard et al., 2022) explored the temporal dependencies of suicidal ideation in both short-term (daily) and long-term intervals (every a few days), in which a positive autoregressive effect was found only over a short-term interval of one day (sample size: n = 105) but not when assessments were spaced further apart (sample size: n = 45). Overall, these findings suggest that higher suicidal ideation at one time point significantly predicted higher ideation at the next time point, a pattern that remains consistent across different sampling frequencies, study durations, and

both clinical and non-clinical samples. Notably, while suicidal ideation exhibited a positive carryover effect, its temporal dependency gradually diminished over time ($0 < \phi < 1$), indicating a tendency to stabilise over time.

In the remaining 3/29 studies (10%), two studies based on an identical small sample (n = 35) reported a positive, yet not statistically significant, autoregressive effect of suicidal ideation (Ammerman & Jacobucci; 2023; Jacobucci, McClure, & Ammerman 2022). Another study (Coppersmith et al., 2023a), which utilised both EMA and high-frequency burst surveys, reported a negative autoregressive effect, indicating an oscillatory or self-regulating pattern in which high levels of suicidal ideation at one time point predicted a decrease at the subsequent time point, and vice versa. In contrast to findings from nomothetic approaches, 6/34 (18%) studies investigated the persistence of suicidal ideation multiple times daily or once daily using idiographic approaches, revealing substantial individual variations in the direction (mix of positive and negative) and strength of autoregressive effects. However, two studies employing once-daily assessments showed some divergence from this pattern. One study found that the autoregressive effect of suicidal ideation was positive in direction for all individuals (n = 3; Kuehn et al., 2022), while another study found that suicidal ideation did not significantly predict itself on the following day across ten individuals (Zhu et al., 2022).

Although suicidal ideation generally demonstrated temporal persistence over adjacent time points based on 34 studies that provided relevant statistical details, the strength of its carryover effect varied from small to large across studies. Among the 20 studies that examined suicidal ideation multiple times per day across both nomothetic and idiographic approaches, 13 studies (65%) reported small-to-moderate conditional carryover effect ($\phi < |0.3|$) (Baryshnikov et al., 2024a; Coppersmith et al., 2023a; Coppersmith et al., 2024; Ernst et al., 2024; Gerner et al., 2023; Hallensleben et al., 2019; Kaurin et al., 2022c; Kuehn et al., 2024; Mandel et al., 2024; Oakey-Frost et al., 2023; Rath et al., 2019; Rogers et al., 2022b; van Ballegooijen et al., 2022), including one study that examined different constructs of suicidal ideation, finding a small effect for suicidal desire but a large effect for suicidal intent (Coppersmith et al., 2023a). Five studies (25%) observed a stronger positive carryover, with three reporting moderate effects ($0.3 < \phi < 0.5$; Bayliss et al., 2024; Kleiman et al., 2017, sample 1; Kraiss et al., 2024) and two indicating large effects ($\phi > 0.5$). Additionally, two studies based on an identical sample (Ammerman & Jacobucci; 2023; Jacobucci, McClure, & Ammerman 2022) reported large but non-statistically significant autoregressive effects. Notably, the strength of the carryover effect tended to increase with longer time intervals

between assessments. Among the 11 studies examining suicidal ideation once daily, four (36%) reported small-to-moderate carryover effects (Ballard et al., 2022; Czyz et al., 2019; Kyron et al., 2022; Wallace et al., 2024), while another four (36%) found a general moderate temporal dependency (Coppersmith et al., 2019; Cox et al., 2023; Kuehn et al., 2022; Li et al., 2024). One study (Kyron et al., 2018) observed a large autocorrelation of suicidal ideation from one day to the next over three days, though this effect diminished when examining the interval from day one to day three. Among the two remaining idiographic studies, one did not quantify the strength of autoregressive effect (Yin et al., 2023), and another found no significant carryover effect (Zhu et al., 2022). When the assessment interval was extended to three to seven days, two studies reported a large autoregressive effect of suicidal ideation from one assessment to the next (Ortiz & Smith; 2020; Rogers et al., 2021), while one found a moderate effect from one week to the next (Selby et al., 2013).

Furthermore, some studies suggested that different constructs of suicidal ideation appear to vary in their temporal stability. This distinction was particularly emphasised in one study (Coppersmith et al., 2023a), which incorporated both regular (five prompts/day) and intensive (six prompts/hour for two hours) ecological momentary assessment over a 42-day period. The study found that suicidal intent exhibited greater moment-to-moment fluctuations, characterised by a stronger negative self-regulating effect, compared to suicidal desire. Specifically, current levels of suicidal desire predicted itself for approximately 20 hours, whereas current levels of suicidal intent were no longer predicted after 2 to 3 hours. Among the remaining studies, six examined the autoregressive effect of different constructs of suicidal ideation within a single study, allowing for direct comparisons (Ammerman & Jacobucci, 2023; Cox et al., 2023; Hallensleben et al., 2019; Lucht et al., 2022a; Oakey-Frost et al., 2023; Smith et al., 2024). However, two studies (Lucht et al., 2022a; Smith et al., 2024) did not provide sufficient details regarding the autoregressive effect. Across the studies that provided the relevant details, the focus was consistently on the temporal dynamics of passive versus active suicidal ideation. Three studies found that active suicidal ideation demonstrated relatively greater carryover effect than passive suicidal ideation (Ammerman & Jacobucci, 2023; Hallensleben et al., 2019; Oakey-Frost et al., 2023), although one study reported a non-significant autoregressive effect (Ammerman & Jacobucci, 2023). Another study observed this pattern only when controlling for all individually significant covariates (Cox et al., 2023).

While examining autoregressive effects provides insights into the extent to which past levels of suicidal ideation predicted the future levels, these findings were further enriched by six

studies (12%) that explored the change process of suicidal ideation over time from a dynamical system perspective. By using current suicidal ideation as a predictor of its subsequent change, namely SI at T predicting SI (T+1)-T, the results consistently indicated that suicidal ideation was a negative predictor of itself, across different constructs, sampling frequencies, and study durations. This suggested that suicidal ideation tended to resist change, demonstrating temporal stability around a stable set point over time (Byran & Rudd, 2018; Byran et al., 2019; Kaliush et al., 2024; Rogers & Joiner, 2019; Rogers et al., 2024b; Zuromski, Cero, & Witte 2017).

Box 2.1 *Key findings on dynamic indicators of suicidal ideation (SI)*

Persistence

- 85% (29/34) of studies reported a significant carryover effect of SI, indicating a positive but diminishing association (i.e., temporal stability) between consecutive time points.
- The strength of the carryover effect ranged from small to large across studies and tended to be stronger when assessments were conducted less frequently.
- Substantial individual variability was observed in both the direction and strength of the carryover effect.

Variability

- SI generally exhibited a significant degree of within-person variability.
- Results indicated a sampling frequency-dependent pattern: the range of 1-ICC values was narrower with less frequent sampling.
- In studies where SI was assessed multiple times per day, the 1-ICC values varied widely, indicating that 16% to 95% of the variance was attributed to within-person fluctuations.

Instability

- SI fluctuated from moment-to-moment by 8.04% to 26.8% relative to its total scale range within mere minutes or hours.
- Passive SI tended to exhibit greater momentary fluctuations between consecutive assessments than active SI.
- There was substantial individual variability in SI instability, highlighting differences in how individuals experienced the momentary fluctuations.

Other indicators

- Visual inspections showed that, on average, SI did not follow a smooth, linear trajectory over time.

2.4.2.2 The Variability of Suicidal Ideation (N = 47)

Of the 94 studies that investigated various aspects of the dynamics of suicidal ideation, 47 (42%) explored its variability over time using intraclass correlation coefficients (ICCs), within-person standard deviations (WPSDs), and other less commonly reported measures, such as the coefficient of variation, median absolute deviation of the absolute value of the successive slopes, random residual variances, and P_{mode} statistics). Among these, intraclass correlation coefficients were the most frequently reported indicators, calculated in 39 out of 47 studies (83%). Other indicators were employed in 15 studies (32%), with within-person standard deviations (n= 10) being the most commonly reported measure.

Intraclass Correlation Coefficients

All 39 studies across 31 independent samples reported ICCs across different constructs of suicidal ideation and sampling frequencies, suggesting that suicidal ideation generally exhibited a significant amount of within-person variability. Among these, only six studies examined the ICCs separately for passive and active suicidal ideation (Ernst et al., 2024; Glenn et al., 2022; Hallensleben et al., 2019; Hamilton et al., 2024; Oakey-Frost et al., 2023; Wolford-Clevenger et al., 2020). Furthermore, the extent to which variability in suicidal ideation was attributed to within-person fluctuations, as opposed to between-person differences, seemed to depend on the sampling frequencies. When suicidal ideation was measured multiple times per day, 23 studies across 17 independent samples, reporting 29 different ICCs, found values ranging from 0.05 to 0.84 (median = 0.63), indicating that 16% to 95% of variability in suicidal ideation were attributed to within-person fluctuations over a few of hours (Andrewes et al., 2024; Bagge et al., 2014; Crowe et al., 2019; Ernst et al., 2024; Gerner et al., 2023; Glenn et al., 2022; Hallensleben et al., 2019; Kaurin et al., 2022a; Kaurin et al., 2022b; Kleiman et al., 2017, sample 1; Kleiman et al., 2017, sample 2; Kuehn et al., 2024; Littlewood et al., 2019; Lucht et al., 2022a; Mandel et al., 2024; Oakey-Frost et al., 2023; Rogers & Bozzay, 2024; Rogers et al., 2022a; Rogers et al., 2022b; Rogers et al., 2024b; Sels et al., 2024; Victor et al., 2019;Wallace et al., 2024). The broad range of the ICCs suggested that suicidal ideation can fluctuate significantly within short timeframes, with some individuals experiencing rapid changes, while others remained relatively stable throughout the day. Specifically, 59% of ICCs demonstrated that more than 30% of the variability in suicidal ideation was attributed to within-person fluctuations between assessment time points (ICCs < 0.70), while 34% of ICCs showed that over 50% of the variability was due to within-person fluctuations (ICCs < 0.50).

These findings underscored the complexity and context-dependent nature of suicidal ideation dynamics across different research settings. For example, four studies based on three different adult clinical samples, one of which included a community sample as controls (Crowe et al., 2019), assessed suicidal ideation 10 times per day over six days (Crowe et al., 2019; Hallensleben et al., 2019; Lucht et al., 2022a) or ten days (Ernst et al., 2024). These studies provided converging evidence that moderate variability in suicidal ideation was due to within-person fluctuations, with ICCs ranging from 0.64 to 0.76. In contrast, noticeable differences in ICCs were observed in studies (Kleiman et al., 2017) that employed the same sampling frequency (four times per day) but primarily differed in sample characteristics (e.g., clinical context, age) and scaling properties (5-point vs. 10-point scales), with ICCs being reported as 0.53 and 0.67 in Study 1 and Study 2, respectively. Similarly, among individuals diagnosed with Borderline personality disorder (BPD) assessed six times per day, a 7-day study assessing a young clinical sample (ages 15 – 25) reported an ICC of 0.56 for active suicidal ideation (Andrewes et al., 2024), while a 21-day study of a high-risk adult sample reported a lower ICC of 0.38 for a composite suicidal ideation (Kaurin et al., 2022a).

In contrast, the degree of variability in the ICCs was smaller when suicidal ideation was measured less frequently (i.e., once per day or every few days). This resulted in a narrower range of ICCs, suggesting a relatively more consistent pattern of variability in suicidal ideation over longer time intervals. Fourteen studies across 13 independent samples calculated 19 different ICCs based on daily assessment of suicidal ideation, with values ranging from 0.20 to 0.71 and a median of 0.49 (Al-Dajani & Czyz, 2022; Ballard et al., 2017; Ballard et al., 2022; Czyz et al., 2019; Hamilton et al., 2023; Hamilton et al., 2024; Jeong, An, & Cho, 2021; Kaurin et al., 2022b; Li et al., 2024; Littlewood et al., 2019; Schatten et al., 2021; Wallace et al., 2024; Wolford-Clevenger et al., 2020; Yin et al., 2023). Notably, almost all of the ICCs (95%) indicated that more than 30% of the variability in suicidal ideation was due to within-person fluctuations, with half of the ICCs (53%) showing that these fluctuations accounted for over 50% of the variability in suicidal ideation. This suggested that, while the day-to-day variability in suicidal ideation appeared relatively consistent across studies, potential methodological biases could amplify the influence of recall bias and random noise, potentially obscuring the true representation of within-person variability in suicidal ideation. Furthermore, the most confined range of ICCs (0.42 to 0.73, median = 0.64) was observed when suicidal ideation was assessed once every few days. Six studies across five independent samples reported six different ICCs, with 83% of the ICCs indicating that over 30% of the variability in suicidal ideation was due to within-person

fluctuations, and 17% showing that more than 50% of the variability was attributed to these fluctuations (Ballard et al., 2022; Bodell, Smith, & Witte, 2021; Kaurin et al., 2024; Rogers & Joiner, 2019; Rogers et al., 2021; Selby, Yen, & Spirito, 2013).

Other variability indicators

The other less frequently used measures of suicidal ideation variability were reported in 15 studies. Among these, 10 studies utilised within-person standard deviation to indicate the degree to which an individual's suicidal ideation fluctuates around their average level (Andrewes et al., 2024; Coppersmith et al., 2023a; Czyz et al., 2019; Kleiman et al., 2017, sample 1 & 2; Kleiman et al., 2018a, sample 1 & 2; Li et al., 2024; Rogers et al., 2024a; Sels et al., 2024). The findings suggested that suicidal ideation tends to fluctuate rapidly over short time intervals. For example, Kleiman et al. (2017) examined both online and psychiatric inpatient samples and found that when suicidal ideation was assessed at 4-to-8-hour intervals within a day, nearly 30% (28% vs. 29.1%) of all suicidal ideation ratings differed by at least one within-person standard deviation from the subsequent time point. Additionally, almost all individuals (94.1% vs. 100%) experienced at least one such change over the study period (28 days vs. mean inpatient stay = 2 to 46 days). Similarly, Andrewes et al. (2024) conducted a week-long study assessing suicidal ideation six times per day among young people diagnosed with BPD. They found that individuals experienced a change in suicidal ideation by at least one unit every two days (i.e., 4.5 times a week) on a 5-point scale ranging from no thoughts to very strong thoughts, with 63% of these changes occurring within the same day. Furthermore, greater daily fluctuations in suicidal ideation were observed among adolescents following psychiatric hospitalisation. Czyz et al. (2019) reported that over a 28-day period, the frequency (54.7%), duration (44%), and urge severity (43.3%) of suicidal ideation varied considerably nearly half of the time from one day to the next, with all individuals experiencing one change in suicidal ideation by at least one within-person standard deviation.

One study (Coppersmith et al., 2023a) further highlighted the dynamic and time-transient nature of suicidal ideation by incorporating both EMA (5 prompts per day) and high-frequency burst assessments (6 prompts per hour during 2 episodes per day). Their findings indicated that burst surveys identified 19% more individuals experiencing high-risk moments of suicidal ideation (scores of 8,9, or 10 on suicidal intent) compared to EMA surveys. While there was considerable variability in change patterns across individuals, suicidal desire deviated from individuals' stable modal response 50% of the time (median

p_{mode} = 0.50), whereas variability in suicidal intent was lower, with only 9% of individuals responding differently from their modal response (median p_{mode} = 0.91). Moreover, this study identified two distinct patterns of suicidal ideation dynamics, episodic and non-episodic, characterised by different levels of variability. The episodic pattern was marked by low variability, with prolonged periods of no suicidal ideation interspersed with brief episodes of elevated ideation lasting an average one to two hours. Conversely, the non-episodic pattern demonstrated relatively high variability, with continuous fluctuations from one measurement to the next and nearly 50% of the variation in ratings occurring within 45 minutes. Finally, a few studies reported infrequently used indicators of variability, such as random residual variances (Kyron et al., 2022), coefficient of variation (Brim et al., 1984), and the median absolute deviation of the absolute value of the successive slopes (Bonilla-Escribano et al., 2023). These measures were more informative when analysed in conjunction with other risk factors (see Section 2.4.3) or used to identify clusters of clinical variability in suicidal ideation (see Section 2.4.3.3.2). Consequently, individual results for these indicators were not described here to avoid redundancy.

2.4.2.3 The Instability of Suicidal Ideation (N = 29)

Twenty-nine (31%) out of 94 studies, derived from 19 distinct samples, explored the instability of suicidal ideation during study follow-ups using statistical indicators such as Root Mean Square Successive Differences (RMSSDs; n =19), Mean Squared Successive Differences (MSSDs; n = 11), and Probability of Acute Change (PAC; n = 2). The majority of these studies (79%, n = 23) assessed suicidal ideation multiple times per day, while the remaining studies (21%) employed one assessment for each day (n = 4) and for each week (n = 2). Notably, there were some terminological inconsistencies across studies, as the concept of instability identified in this review was often referred to using related but distinct terms. These included variability or within-person variability (Herzog et al., 2023; Oquendo et al., 2020; Rizk et al., 2019), variability from one time point to the next (Gerner et al., 2023; Hallensleben et al., 2019), average fluctuation (Hadzic et al., 2020; Witte et al., 2006), and stability (Rogers & Bozzay, 2024). Only a limited number of studies explicitly defined the concept as instability (Andrewes et al., 2024; Crowe et al., 2019; Peters et al., 2022).

Despite this terminological variation, findings of 14 studies, derived from nine distinct samples, assessing suicidal ideation multiple times per day generally indicated a significant degree of suicidal ideation instability within individuals (Andrewes et al., 2024; Ernst et al., 2024; Gerner et al., 2023; Hadzic et al., 2020; Hallensleben et al., 2019; Herzog et al., 2023;

Kleiman et al., 2017, sample 1; Kleiman et al., 2017, sample 2; Lucht et al., 2022b; Oakey-Frost et al., 2023; Rizk et al., 2019; Rogers & Bozzay, 2024; Rogers et al., 2022a; Rogers et al., 2022b). The average proportional RMSSD relative to the total scale score range for the entire sample in each article ranged from 8.04% to 26.8%, varying based on sampling schedules, samples characteristics, and constructs of suicidal ideation. These findings suggested that suicidal ideation fluctuated, on average, between 8.04% to 26.8% relative to its corresponding scale score range within mere minutes or hours. For studies assessing suicidal ideation less frequently, only a limited number reported RMSSD values for the entire sample. Two studies, based on the same sample, utilised daily assessments (Witte et al., 2005; Witte et al., 2006), while one study retrospectively assessed weekly suicidal ideation (Peters et al., 2019). The findings revealed an average change of 7.5% (RMSSD = 8.14) in suicidal ideation from day to day and 10.2% (RMSSD = 0.51) from week to week, relative to their respective total scale score ranges.

Furthermore, five studies across three unique samples simultaneously examined the dynamics of both passive and active suicidal ideation, revealing a consistent pattern of fluctuations across consecutive assessments (Ernst et al. 2024; Hadzic et al., 2020; Hallensleben et al., 2019; Lucht et al., 2022b; Oakey-Frost et al., 2023). Across studies, RMSSDs for passive suicidal ideation were consistently higher than those for active suicidal ideation. This pattern was observed in a university sample assessed suicidal ideation five times per day (Oakey-Frost et al., 2023, RMSSDs = 0.23, 0.21, 0.17 for WTL, WTD, and suicidal desire, respectively) and in two clinical samples with ten assessments per day (Ernst et al. 2024, 7-point scale, RMSSDs = 1.20, 1.04, 0.94 for WTD, WTL, and suicidal desire, respectively; Hallensleben et al., 2019, 5-point scale, RMSSDs = 1.40 and 1.18 for passive and active SI, respectively). These findings suggested that passive suicidal ideation was prone to greater fluctuation than active suicidal ideation within short time frames. Notably, results from the latter two high-frequency clinical studies were highly similar when proportional RMSSD relative to the scale range was applied to facilitate comparison and interpretation. Ernst et al. (2024) reported that the average moment-to-moment changes in passive suicidal ideation accounted for 17.3% (wish to live) and 20% (wish to die) of the scale score range, while changes in active suicidal ideation accounted for 15.7% of the scale score range. These findings closely aligned with those of Hallensleben et al., (2019), who reported average changes of 17.5% of the scale score range for passive suicidal ideation and 14.8% for active suicidal ideation, from one assessment to the next. The consistency of these

findings across studies highlighted the rapid fluctuations in suicidal ideation, with significant changes occurring within intervals as short as 35 minutes to a few hours during the day.

Although suicidal ideation exhibited significant instability on average across studies, substantial individual variability was also evident. Several studies reported wide ranges of MSSD or RMSSD values, underscoring differences in the extent to which individuals experienced fluctuations within short time frames (e.g., Hallensleben et al., 2019; Kleiman et al., 2017; Oakey-Frost et al., 2023; Rizk et al., 2019; Rogers et al., 2022b). For example, in a clinical sample assessed six times per day, Rizk et al. (2019) reported an average RMSSD of 5.1 on a scale ranging from 0 to 36. However, individual differences were pronounced, with 25% of individuals exhibiting RMSSD values below 3.14 and another 25% with RMSSDs above 6.86, highlighting a broad range of variability. Similarly, an investigation assessed suicidal intent six times per day in an online adult high-risk sample and found an average RMSSD of 8.04 on a 0 to 100 visual analogue scale, with individual RMSSD values ranging from 0 to 31.4 (Rogers et al., 2022a). The wide range of RMSSDs indicated that while some adults experienced highly variable suicidal intent, others exhibited no fluctuations at all.

Moreover, the heterogeneous patterns of suicidal ideation over time were further examined in 11 studies that conducted subgroup analyses across different sampling frequencies (Auerbach et al., 2023; Brim et al., 1984; Crowe et al., 2019; Czyz et al., 2022, sample 1; Czyz et al., 2022, sample 2; Kleiman et al., 2018a, sample 1; Kleiman et al., 2018a, sample 2; Peters et al., 2022; Spangenberg et al., 2022, sample 1; Witte et al., 2005; Witte et al., 2006). Six of these studies categorised individuals into subgroups based on the trajectory of their suicidal ideation, identifying distinct fluctuation patterns characterised by RMSSDs, MSSDs and other relevant metrics (Auerbach et al., 2023; Czyz et al., 2022, sample 1; Czyz et al., 2022, sample 2; Kleiman et al., 2018a, sample 1; Kleiman et al., 2018a, sample 2; Spangenberg et al., 2022, sample 1). Across different sampling frequencies, proportional RMSSDs relative to the total scale score range for any subtypes varied from 0.3% to 28.2%, reflecting substantial variation between subgroups. The remaining five studies across four unique samples compared RMSSDs between individuals with differing histories of suicide attempt and psychiatric diagnoses. Significant group differences in these factors were found in four of these studies (Crowe et al., 2019; Peters et al., 2022; Witte et al., 2005; Witte et al., 2006), while one study reported no significant differences (Brim et al., 1984). Further details regarding group differences were discussed in Section 2.4.3.3.1.

Finally, two studies contributed to understanding of suicidal ideation instability by exploring its longitudinal patterns and the probability of acute changes between assessments. Oquendo et al. (2020) conducted a two-year follow-up study of adults with depression, administrating six waves of EMA surveys at intervals of a few months. Results indicated no significant changes in RMSSD values across time points, suggesting that the instability of suicidal ideation may function as a trait that remained relatively stable within individuals over time. In addition to the overall assessment of instability provided by measures such as RMSSD and MSSD, Jacobucci, McClure, and Ammerman (2022) examined the probability of acute change (PAC), offering insight into the degree of abrupt shifts in suicidal ideation. Assessing suicidal ideation four times per day, they found that abrupt changes (i.e., moving more than 1 or 2 points on a 5-point scale) from one measurement to the next were relatively rare, with most participants exhibiting a PAC below 0.1. Another study incorporated PAC and MSSD into a dynamic feature model of suicidal ideation (Wang et al., 2021); however, as the magnitude of instability was not their primary focus, it was not explicitly quantified.

2.4.2.4 Other dynamic indicators (N = 35)

In addition to primary research efforts investigating specific dynamic indicators of suicidal ideation (i.e., persistence, variability, and instability), several studies contributed to understanding how suicidal ideation evolves over short time frames using approaches with a descriptive focus. Of the 112 studies included in this review, 33 (29%) visualised the change process of suicidal ideation across successive time intervals through individual time-series plots (n = 21), group-level trajectory plots (n = 9), and colour-coded heat maps (n = 5). Among these, 26 studies supplemented statistical analyses of persistence, variability, and instability with visual inspection (Andrewes et al., 2024; Byran & Rudd, 2018; Byran et al., 2019; Coppersmith et al., 2023a; Coppersmith et al., 2024; Czyz et al., 2019; Czyz et al., 2022, sample 1; Czyz et al., 2022, sample 2; Ernst et al., 2024; Gerner et al., 2023; Hallensleben et al., 2019; Kaurin et al., 2022c; Kleiman et al., 2017, sample 1; Kleiman et al., 2017, sample 2; Kleiman et al., 2018a, sample 1; Kleiman et al., 2018a, sample 2; Kuehn et al., 2022; Kyron et al., 2018; Madsen et al., 2019; Oakey-Frost et al., 2023; Restifo et al., 2015; Rogers & Bozzay, 2024; Schatten et al., 2021; Spangenberg et al., 2022, sample 1; Witte et al., 2006; Zuromski et al., 2017). In contrast, seven studies relied solely on visual inspection without explicitly analysing dynamic patterns (Baryshnikov et al., 2024b; Bell & Shah, 1999; De Beurs et al., 2024; May et al., 2023; Porras-Segovia et al., 2021; van den Brink et al., 2024; Wang et al., 2021). Despite the lack of detailed statistical examination, these studies provided valuable insights into the dynamics of suicidal ideation.

Among these seven studies, four employed high-frequency assessments throughout the day (three using individual-level visualisations and one using group-level visualisations), while the remaining three conducted assessments once per day (two using individual-level visualisations and one using group-level visualisations). Visual inspection revealed that, on average, suicidal ideation across individuals did not follow a smooth linear trajectory, with no consistent increase or decrease over the study period (Baryshnikov et al., 2024b ; May et al., 2023). Instead, individual plots demonstrated significant variability both within and between individuals, often displaying saw-tooth patterns that starkly contrasted with the relatively stationary trajectories observed in some cases (Bell & Shah, 1999; De Beurs et al., 2024; Porras-Segovia et al., 2021; van den Brink et al., 2024; Wang et al., 2021). These observations aligned with the descriptive insights of two studies. Nock et al. (2009) found that when suicidal ideation occurred, a community sample of adolescents and young adults most commonly reported mild to moderate levels intensity; it typically lasted up to 30 munities (46.2%), with 30.8% persisting for over 30 minutes to five hours and 11.5% persisting beyond five hours. Similarly, Ballard et al. (2017) found that while most inpatients experienced a clinically significant reduction in daily ratings of suicidal ideation within four days, a small subset exhibited transient increases. These findings were further supported by two clinical studies assessing suicidal ideation on a daily and weekly basis, respectively, identified distinct group profiles in the trajectory of suicidal ideation intensity over time (Madsen et al., 2019; Restifo et al., 2015). See Section 2.4.3.3.2 for a detailed synthesis of the characteristics of group profiles.

2.4.3 What Factors Are Associated With Different Dynamic Patterns of Suicidal Ideation? (N = 106)

Of the 112 studies included in this review, 106 investigated risk and protective factors associated with short-term dynamic changes in suicidal ideation. A wide range of factors were investigated across the studies (Box 2.2), with broadly defined *cognitive factors, emphasising emotional and behavioural components respectively,* being the most frequently examined (n = 70). These were followed by *affective factors* (n = 48), *clinical and sociodemographic factors* (n = 32), and *social-interpersonal factors* (n = 20). Based on the temporal dynamics underlying these associations, the studies examined three types of relationships: *Concurrent relationships* (n = 56), which assessed whether the investigated factors predicted or co-occurred with suicidal ideation within the same time frame;

Box 2.2 *Factors associated with dynamic patterns of suicidal ideation*

Affective factors

- Negative affect
- Positive affect
- Agitation
- Irritability
- Hostility
- Affective sensitivity/reactivity/variability
- Emotion dysregulation
- Mood

Cognitive-behavioural factors

- Sleep
- Impulsivity
- Coping
- Attention
- Behavioural dysregulation
- Acquired capability for suicide
- Functions of SI
- Beliefs about SI
- Reasons for living
- Physical and psychological distance to suicide methods
- Fearlessness about death
- Self-efficacy to refrain from SI

Cognitive-emotional factors

- Hopelessness
- Perceived burdensomeness
- Thwarted belongingness
- Rumination
- Psychological pain
- Entrapment
- Worry
- Defeat
- Distress tolerance
- Mindfulness

Social-interpersonal factors

- Interpersonal perceptions
- Stressful events
- Social contact
- Attachment style
- Religiosity

Clinical and sociodemographic factors

- Clinical diagnosis/symptoms
- Suicide attempts
- Characteristics of SI
- Non-suicidal self-injury
- Sociodemographics
- Childhood trauma
- Substance use

Prospective or time-lagged relationships (n = 64), which explored whether prior levels of these factors predicted suicidal ideation at a subsequent time point; and *Time-invariant relationships* (n = 26), which included analyses of the relationship between the factors and an aggregated dynamic indicator of suicidal ideation (n = 17) as well as factors characterising dynamic subtypes of suicidal ideation (n = 9). Box 2.3 summarised the key findings on the dynamic associations between factors and suicidal ideation, with extracted results from individual studies provided in Appendix 4, Table A4.1.

2.4.3.1 Concurrent Relationships (N = 56)

2.4.3.1.1 Cognitive-emotional factors

At the momentary level

Eight studies consistently demonstrated significant positive associations between hopelessness and suicidal ideation across community, clinical, and university student samples within a given time frame (Aadahl et al., 2021; Baryshnikov et al., 2024b; Gerner et al., 2023; Hallensleben et al., 2019; Kleiman et al., 2017, sample 1; Kleiman et al., 2017, sample 2; Mandel et al., 2024; Mou et al., 2018*;*). This relationship remained significant even after controlling for covariates such as loneliness or thwarted belongingness, burdensomeness (Hallesleben et al., 2019; Kleiman et al., 2017, sample 1), other cognitive dysfunctions such as rumination and attention fixation (Mandel et al., 2024), psychological pain and mood factors (Baryshnikov et al., 2024b). Notably, one study examined a multivariate model of several state-level variables, including hopelessness, defeat, entrapment, and negative affect, predicting concurrent suicidal ideation (Aadahl et al., 2021). Results indicated that, cognitive factors including hopelessness and defeat were uniquely associated with state suicidal ideation, while entrapment was only a significant predictor univariately. Two studies identified moderators of the concurrent relationship between hopelessness and suicidal ideation (Mandel et al., 2024; Mou et al., 2018). Among psychiatric inpatients, those with comorbid BPD exhibited a stronger association between hopelessness and suicidal ideation compared to those without (Mou et al., 2018). In university students, different cognitive dysfunctions including hopelessness, rumination, and unbearable psychological pain, were significantly associated passive suicidal ideation at the momentary level. The study also found that social context (being with others vs being alone) moderated the strength of these relationships, with stronger effects observed when individuals were around others (Mandel et al., 2024). Further, one study found that psychological pain was significantly associated with concurrent suicidal ideation

independent of hopelessness, mood factors and BPD diagnosis, while the effect of hopelessness also remained significant (Baryshnikov et al., 2024b).

Three studies examined the concurrent relationship between burdensomeness and suicidal ideation (Hallensleben et al., 2019; Kleiman et al., 2017, sample 1; Rath et al., 2019), with two also investigating thwarted belongingness (Hallensleben et al., 2019; Rath et al., 2019), revealing positive associations between both burdensomeness and thwarted belongingness with suicidal ideation at the momentary level, even when controlling for hopelessness, depressed mood, and loneliness. Moreover, the relationship between rumination and suicidal ideation was examined in three studies, with consistent evidence supporting a positive association between rumination and suicidal ideation at the momentary level in both univariate and multivariate models (Hallard et al., 2021; Mandel et al., 2024; Rogers et al., 2022a). Additionally, four studies utilised network analysis to explore the complex interplay between cognitive-emotional factors and suicidal ideation (Coppersmith et al., 2024 ; De Beurs et al., 2024; Rath et al., 2019; Smith et al., 2024). Among these, two studies found associations between hopelessness, perceived burdensomeness, and thwarted belongingness with suicidal ideation in the contemporaneous network (Rath et al., 2019; Smith et al., 2024). Another two studies using advanced statistical methods, Dynamic Time Warping (De Beurs et al., 2024) and Group Iterative Multiple Model Estimation (Coppersmith et al., 2024), highlighted the importance of considering individual variability in the dynamics between risk factors and suicidal ideation. De Beurs et al. (2024) observed a group-level cluster among hopelessness, worrying, entrapment, rumination, sadness, and suicidal desire, indicating similar temporal patterns among these constructs over time, whereas burdensomeness was linked to restlessness but not other factors in the network. Notably, individual-level networks displayed distinct patterns across individuals, with unique but similar characteristics. Similarly, Coppersmith et al. (2024) found that while traditional multilevel models supported concurrent relationships between constructs (hopelessness, perceived burdensomeness, and thwarted belongingness) and suicidal ideation, these relationships were not consistently observed across all individuals in both adult and adolescent samples, underscoring the challenges of applying group-level effects to individual cases.

At the daily and weekly Level

Seven studies examined the concurrent associations among perceived burdensomeness, thwarted belongingness, and suicidal ideation. Of these, five studies focused on daily

associations (Al-Dajani & Czyz, 2022; Czyz et al., 2019; Kyron et al., 2018; Kyron et al., 2022; Wolford-Clevenger et al., 2020), while two investigated weekly associations (Bodell, Smith, & Witte, 2021; Rogers et al., 2021). Across six studies, higher levels of burdensomeness were consistently associated with increased suicidal ideation both on the same day and within the same week. In contrast, although most studies found significant same-day associations between thwarted belongingness and suicidal ideation, one study reported that thwarted belongingness was associated only with same-day passive suicidal ideation (Wolford-Clevenger et al., 2020). Moreover, one study identified distress tolerance as a moderator, revealing that the associations among perceived burdensomeness, thwarted belongingness and suicidal ideation weakened at higher levels of distress tolerance (Kyron et al., 2022). In weekly assessments, Bodell, Smith, and Witte (2021) found that perceived burdensomeness was associated with suicidal ideation after controlling for clinical covariates, whereas neither thwarted belongingness nor the interaction between these constructs was significant.

All four daily assessment studies that examined interaction effects provided converging evidence of a significant interaction effect between perceived burdensomeness and thwarted belongingness on same-day suicidal ideation (Al-Dajani & Czyz, 2022; Kyron et al., 2018; Czyz et al., 2019; Wolford-Clevenger et al., 2020). However, findings regarding the three-way interactions among burdensomeness, thwarted belongingness, and hopelessness were mixed. This interaction was significant in Czyz et al. (2019) but not in Wolford-Clevenger et al. (2020), with hopelessness independently predicting suicidal ideation in both studies. Additionally, in an adolescent inpatient sample at high risk for suicide, Al-Dajani et al. (2024) demonstrated that a higher mean level of hopelessness was significantly linked to more frequent suicidal ideation on a weekly basis, although neither the variability nor the inertia of hopelessness significantly predicted the frequency of suicidal ideation. Finally, two studies examined the concurrent association between rumination and suicidal ideation at daily and weekly levels. Wallace et al. (2024) reported a significant positive association between same-day rumination and suicidal ideation, whereas no such association was observed for distress intolerance. Similarly, Rogers et al. (2021) found that suicide-specific rumination significantly predicted same-week suicidal intent, after controlling for burdensomeness, thwarted belongingness, sleep disturbances, and agitation, with thwarted belongingness remaining a significant predictor in multivariate models while the effect of burdensomeness did not.

2.4.3.1.2 Cognitive-behavioural factors

At the momentary level

Cognitive-behavioural factors associated with an increased risk of suicidal behavioural enation (i.e., the proximal risk of suicide attempts) were positively associated with concurrent suicidal ideation (Aadahl et al., 2021; Al-Dajani et al., 2021; Bayliss et al., 2024; Coppersmith et al., 2023b; Rogers et al., 2022b). Specifically, physical and psychological distance to methods of suicide significantly predicted concurrent suicidal intent, even after accounting for fearlessness about death, a facet of suicide capability that also remained significant in a multivariate model (Rogers et al., 2022a). However, when all facets of suicide capability were examined simultaneously, only suicidal mental imagery uniquely predicted concurrent suicidal ideation (Bayliss et al., 2024). Furthermore, metacognitive beliefs about suicidal ideation significantly predicted suicidal ideation at the state level, after controlling for hopelessness, defeat, and negative affect (Aadahl et al., 2021). One study reported that when suicidal ideation occurred, individuals endorsed it as a means of emotion regulation in 77.7% of instances (Coppersmith et al., 2023b). Moreover, the function of suicidal ideation as a coping strategy appears to differentially influence both its occurrence and concurrent changes in negative affect. Specifically, using suicidal ideation as a problem-solving solution was associated with increases in hopelessness, sadness, stress, and overall negative affect from before to after the thought, whereas endorsing it as an escape was related to higher levels of anger (Al-Dajani et al., 2021). Finally, three studies using overlapping samples explored the relationship between impulsivity and suicidal ideation from different dimensions. While general momentary impulsivity was positively associated with state-level suicidal ideation but not with daily suicidal ideation (Kaurin et al., 2023), a single-item measure of impulsivity in social interaction contexts (i.e., rating behaviours during social interactions on a 0-100 scale, with higher scores indicating greater impulsivity) showed no association with state-level suicidal ideation (Kaurin et al., 2022a). Moreover, an idiographic approach revealed that the concurrent relationship between impulsivity and suicidal ideation was not significant as a group-level path for most participants, suggesting considerable individual heterogeneity in this association (Kaurin et al., 2022c).

Three studies examining the use of coping strategies in relation to suicidal ideation supported a momentary association between these constructs (Hallard et al., 2021; Nock et al., 2009; Stanley et al., 2021). Nock et al. (2009) documented a wide range of alternative behaviours adopted by individuals in the presence of suicidal ideation. Hallard et al. (2021) found that

maladaptive coping strategies, including worrying, punishment, and rumination, were uniquely associated with higher suicidal ideation at the state level, whereas adaptive coping strategies, including distraction, social control, and reappraisal, were uniquely linked to lower state-level suicidal ideation (Hallard et al., 2021). Focusing more closely on adaptive coping strategies, Stanley et al. (2021) indicated that both distraction/positive activity-based coping and mindfulness-oriented coping was significantly associated with momentary decreases in suicidal ideation, with greater reductions observed when more individual coping strategies were used within each timeframe. Additionally, Mandel et al. (2024) reported that momentary attention fixation, assessed by averaging three self-report items related to feeling stuck and impaired mental functioning, was significantly associated with concurrent passive suicidal ideation, after controlling for covariates such as rumination and hopelessness. One study further demonstrated that emotion regulation strategies, namely cognitive reappraisal and expressive suppression, each significantly moderated the relationship between daily stressful events and suicidal ideation (Franz et al., 2021). Finally, using network analysis, Smith et al. (2024) identified an association between momentary sleep concerns and passive suicidal ideation within a contemporaneous group network among a military sample.

At the daily and weekly level

Six studies explored the concurrent relationships between cognitive-behavioural factors and suicidal ideation at the daily (Jeong et al., 2021; Tsypes et al., 2022) and weekly levels (Kinkel-Ram et al., 2021; Porras-Segovia et al., 2021; Rogers et al., 2021; Selby, Yen, & Spirito, 2013). Evidence from three short-term longitudinal studies, with assessment frequencies ranging from every few days per week to once per week, generally found that sleep problems were linked to simultaneous increases in suicidal ideation (Kinkel-Ram et al., 2021; Porras-Segovia et al., 2021; Rogers et al., 2021). Specifically, in an adult psychiatric outpatient sample, wish to die co-occurred with various sleep problems within a 96-hour time window over a three-month period (Porras-Segovia et al., 2021). Among women diagnosed with eating disorders, agitation moderated the concurrent relationship between sleep quality and suicidal ideation, such that those with both heightened agitation and poorer sleep quality reported severe suicidal ideation in the same week relative to their own average (Kinkel-Ram et al., 2021). Additionally, a six-month timeline follow-back interview study of adolescents hospitalised for elevated suicide risk found that behavioural dysregulation was significantly correlated with higher levels of suicidal ideation within the same week (Selby, Yen, & Spirito, 2013). At the daily level, a daily diary study indicated that, among adults diagnosed with BPD, more reasons for living were associated with lower

suicidal ideation on the same day, with this association weakening at higher levels of extraversion (Tsypes et al., 2022). A study involving adult patients with complex regional pain syndrome found that higher daily impulsivity was significantly correlated with increased daily suicidal ideation (Jeong et al., 2021).

2.4.3.1.3 Affective factors

At the momentary level

Negative-valenced affect was examined in 17 studies, with most findings supporting its concurrent association with suicidal ideation (Aadahl et al., 2021; Al-Dajani et al., 2021; Armey et al., 2020; Coppersmith et al., 2023b; De Beurs et al., 2024; Humber et al., 2013; Kaurin et al., 2022a; Kaurin et al., 2022c; Kaurin et al., 2023; Kleiman et al., 2017, sample 1; Kleiman et al., 2017, sample 2; Kleiman et al., 2018b; Kuehn et al., 2024; Mou et al., 2018; Nock et al., 2009; Rath et al., 2019; Rogers et al., 2022a). Specifically, six studies investigating individual negative affect states found that various negative affective states, including loneliness (Kleiman et al., 2017, sample 1; Kleiman et al., 2017, sample 2), distress (Rogers et al., 2022b), depressive and anxious mood (Rath et al., 2019), and other negative affects (Mou et al., 2018), were significantly associated with momentary suicidal ideation. In one study, suicidal ideation was frequently accompanied by several negative emotions (e.g., sadness/worthlessness, anger, self-hatred) in over half of the momentary sampling instances in which suicidal ideation occurred (Nock et al., 2009); however, the effect of anger was not significant after adjusting for multiple testing as reported in another study (Humber et al., 2013). Two studies identified moderating effects in these associations (Mou et al., 2018; Rogers et al., 2022a). One study found that the positive relationship between discrete negative affect states (feeling abandoned, desperate, guilty, self-hatred, and upset) and momentary suicidal ideation was stronger among high-risk adults with BPD than among those without (Mou et al., 2018). Another study reported that higher levels of rumination amplified the association between distress and the frequency of momentary suicidal ideation (Rogers et al., 2022b). Four studies examining composite negative affect consistently supported its concurrent relationship with suicidal ideation (Aadahl et al., 2021; Armey et al., 2020; Kaurin et al., 2022a; Kaurin et al., 2023). Moreover, three studies tested the hypothesis that suicidal ideation functions as a means of affective regulation, by examining whether its occurrence was associated with a subsequent decrease in negative affect, but these investigations did not yield clear support for the hypothesis (Al-Dajani et al., 2021; Coppersmith et al., 2023b; Kleiman et al., 2018b).

Notably, studies employing idiographic approaches suggested that the nomothetic findings regarding the concurrent relationship between negative affect and suicidal ideation may not uniformly capture individual experiences (De Beurs et al., 2024; Kaurin et al., 2022c; Kuehn et al., 2024). Among the various affective states examined, only the association between sadness and suicidal ideation emerged as relatively substantial, as highlighted in the between-person consistencies among the within-person findings (De Beurs et al., 2024; Kuehn et al., 2024). In contrast, four studies focusing on affective overarousal found that heightened irritability, hostility, and agitation were each associated with increased momentary suicidal ideation (Armey et al., 2020; Kaurin et al., 2023; Rogers et al., 2022a; Smith et al., 2024); however, person-specific analyses did not reveal a significant group-level path between hostility and suicidal ideation (Kaurin et al., 2022c). In addition to negative affect, eight studies investigated the relationship between positive-valenced affect and suicidal ideation (Armey et al., 2020; De Beurs et al., 2024; Kaurin et al., 2022a; Kaurin et al., 2022c; Kaurin et al., 2023; Kleiman et al., 2018b; Rath et al., 2019; Rogers et al., 2022a). Five of these studies consistently indicated a negative concurrent association between positive affect, whether measured as individual states or as a composite, and suicidal ideation (Armey et al., 2020; Kaurin et al., 2022a; Kaurin et al., 2023; Rath et al., 2019; Rogers et al., 2022a), with one study identifying a moderating effect of rumination (Rogers et al., 2022b). Additionally, one study (Kleiman et al., 2018b) provided preliminary evidence for the positive-reinforcing effect of suicidal ideation, showing that positive affect increased from before to after its occurrence. However, idiographic analyses revealed that, the contemporaneous association between positive affect and suicidal ideation varied considerably across individuals, with no consistent pattern emerging in the majority of participants (De Beurs et al., 2024; Kaurin et al., 2022c).

At the daily and weekly level

Negative-valenced affect was examined in nine studies, with sampling frequencies varying from once daily (Glenn et al., 2021; Jeong et al., 2021; Kaurin et al., 2022b; Schatten et al., 2021; Wallace et al., 2024; Yin et al., 2023) to more than one day apart (Lewis et al., 2023; Porras-Segovia et al.,2021; Selby et al., 2013). Four studies exploring same-day associations consistently reported a significant positive relationship between negative affect, whether assessed as discrete emotions or as a composite measure, and suicidal ideation (Glenn et al., 2021; Kaurin et al., 2022b; Schatten et al., 2021; Wallace et al., 2024). Notably, one study of high-risk adolescents following hospitalisation revealed a time-varying effect of discrete negative affect on the occurrence of suicidal ideation. Specifically, while anger was

significantly associated with suicidal ideation only after 20 days post-discharge, misery maintained a consistent concurrent association throughout a one-month period, albeit with slight fluctuations towards the end of the follow-up (Schatten et al., 2021). Moreover, the instability of negative affect was found to significantly moderate the relationship between daily pain intensity and suicidal ideation among patients with complex regional pain syndrome (Jeong et al., 2021). Using an idiographic approach, Yin et al. (2023) found substantial individual variability in the relationship between emotional states and suicidal ideation; however, at the group and subgroup levels, a significant same-day association between misery and suicidal ideation emerged for most participants across all time points. In contrast, when assessments were conducted over longer intervals, composite negative affect was significantly associated with same-week suicidal ideation in one study (Selby et al., 2013), and elevated levels of various negative feelings tended to co-occur with wish to die in another (Porras-Segovia et al. 2021). Conversely, a study examining the weekly association between loneliness and suicidal ideation found no robust evidence supporting this relationship (Lewis et al., 2023).

In addition, two studies provided evidence of a significant same-week relationship between overarousal affective states and suicidal ideation. Specifically, higher levels of irritability (Kaurin et al., 2024) and agitation (Kinkel-Ram et al., 2021) were each associated with increased suicidal ideation within the same week. Furthermore, one study reported an interaction between agitation and sleep quality, such that higher agitation combined with poorer sleep quality predicted more severe suicidal ideation (Kinkel-Ram et al., 2021). In contrast, investigations into positive-valenced affect yielded mixed findings. Three studies examined the same-day association between positive affect and suicidal ideation (Schatten et al., 2021; Wallace et al., 2024; Yin et al., 2023). Among adolescents following hospitalisation, higher happiness was significantly associated with reduced suicidal ideation during days 4 to 12 after discharge (Schatten et al., 2021). However, another study found that a composite measure of positive affect was not significantly related to same-day suicidal ideation (Wallace et al., 2024), and person-specific examinations revealed no consistent associations between joy and suicidal ideation across individuals (Yin et al., 2023). Lastly, three studies explored affective constructs not directly tied to valence (Hamilton et al., 2023; Selby et al., 2013; Wallace et al., 2024). In a high-risk clinical sample of adolescents and young adults, differential affective reactivity to negative and positive interpersonal events significantly predicted the occurrence of suicidal ideation on the same day (Hamilton et al., 2023). Similarly, among adolescents hospitalised for elevated suicide risk, heightened

affective sensitivity was associated with same-week suicidal ideation (Selby et al., 2013). In contrast, emotion dysregulation did not show a significant same-day association with suicidal ideation among adults discharged from psychiatric hospitalisation (Wallace et al., 2024).

2.4.3.1.4 Social-interpersonal factors

At the momentary level

Three studies investigated the relationship between interpersonal perceptions and suicidal ideation at the momentary level (Kaurin et al., 2022a; Sels et al., 2024; Smith et al., 2024). Two studies indicated that negative interpersonal perceptions (e.g., perceiving partners as dominant) were associated with higher suicidal ideation simultaneously, while positive interpersonal perceptions (e.g., perceiving partners as warm and responsive) acted as a protective factor (Kaurin et al., 2022a; Sels et al., 2024). However, these associations were fully mediated by affective dysregulation (Kaurin et al., 2022a), or fully accounted for and moderated by cognitive-emotional factors (i.e., perceived burdensomeness, thwarted belongingness, and hopelessness) (Sels et al., 2024). A network analysis study (Smith et al., 2024) further highlighted that feeling ashamed and disgusted were associated with both passive and active suicidal ideation within the contemporaneous network, while other interpersonal risk factors including feeling ineffective and not feeling close to others were linked to passive and active suicidal ideation, respectively. Suicidal ideation also occurred frequently in different social contexts, such as socialising or being along, with these occurrences most-commonly coexisting with suicidal ideation (Nock et al., 2009). Similarly, one study found that social context (alone vs with others) moderated the concurrent relationships between well-established risk factors (i.e., psychological pain, hopelessness, and rumination) and suicidal ideation, with stronger effects observed when individuals were in the presence of others (Mandel et al., 2024). Lastly, a study using dynamic time warping to examine religious and spiritual experiences in relation to suicidal ideation found no significant contemporaneous group-level associations (van den Brink et al., 2024).

At the daily and weekly level

Three studies demonstrated significant concurrent associations between interpersonal perceptions and suicidal ideation with time intervals ranging from one day to one week (Coppersmith et al., 2019; Hamilton et al., 2024; Selby et al., 2013). Coppersmith et al. (2019) found that higher social support on the same day was significantly linked to lower suicidal

ideation, after accounting for sadness, perceived burdensomeness, and thwarted belongingness. Similarly, Hamilton et al. (2024) reported that in an online sample of adolescents, daily social media experiences, rather than social media usage, were significantly associated with both passive and active suicidal ideation on the same day. Adolescents who engaged in higher levels of social comparison reported more frequent suicidal ideation, whereas feeling supported and connected served as protective factors. Additionally, Selby et al. (2013) found that among adolescents hospitalised for elevated suicide risk, higher levels of perceived invalidation from family and friends were associated with increased suicidal ideation within the same week. A study with biweekly assessment also revealed that attachment style moderated the concurrent relationship between social contact and suicidal ideation (Lewis et al., 2023). Specifically, reduced in-person contact, rather than remote contact, was significantly associated with increased suicidal ideation, with this effect being stronger in adults with higher avoidant attachment. Furthermore, Franz et al. (2021) observed a significant same-day association between daily stressful events and higher levels of suicidal ideation, with this relationship being amplified at lower levels of cognitive reappraisal and suppression.

2.4.3.1.5 Clinical and sociodemographic factors

In the momentary level

Five studies investigated the momentary association between clinical variables and suicidal ideation (Baryshnikov et al., 2024b; Ernst et al., 2024; Kaurin et al., 2023; Mou et al., 2018; Oakey-Frost et al., 2023). Among both adult psychiatric inpatients and university students, two studies found that higher levels of active suicidal ideation were associated with a stronger wish to die and a weaker wish to live at the same measurement point (Ernst et al., 2024; Oakey-Frost et al., 2023). In adult inpatients with major depressive disorder (MDD), Baryshnikov et al. (2024b) observed that greater depression severity was independently associated with higher momentary suicidal ideation, while the effects of anxiety severity were accounted for by hopelessness, psychological pain, and depression severity. The other studies found that a BPD diagnosis (Mou et al., 2018) and a history of suicidal attempt (Kaurin et al., 2023) significantly moderated the concurrent relationship between negative affect and suicidal ideation, as detailed in the affective factors section.

At the daily and weekly level

In addition, three studies with assessment intervals of at least one day reported associations between various clinical conditions and suicidal ideation (Jeong et al., 2021; Porras-Segovia et al., 2021; Zhu et al., 2022). In adults with complex regional pain syndrome, daily suicidal ideation was positively associated with levels of chronic pain intensity on the same day, with this relationship being moderated by the instability of negative affect (Jeong et al., 2021). Furthermore, Zhu et al. (2022) using an idiographic approach found that while suicidal urges were correlated with symptoms of depression, anxiety, and PTSD at the daily level within individuals, the strength and direction of these relationships varied substantially across individuals. Lastly, in a clinical sample with a history of STBs, Porras-Segovia et al. (2021) found that low appetite frequently co-occurred with higher passive suicidal ideation within a 96-hour timeframe over three months.

Box 2.3 *Key findings on the dynamic associations between factors and suicidal ideation*

• A variety of cognitive, affective, social-interpersonal, and clinical/sociodemographic factors are associated with suicidal ideation across different dynamic patterns (i.e., concurrent, prospective, and time-invariant).

• Concurrent associations between factors and suicidal ideation are more consistent than prospective and time-invariant associations across different assessment time frames.

• Greater inconsistency in findings is observed in studies investigating momentary-level associations compared to those focusing on daily and weekly associations.

• Both the dynamic metrics of suicidal ideation and the associations between various types of factors and suicidal ideation exhibit substantial individual variability.

2.4.3.2 Prospective Relationships (N = 64)

2.4.3.2.1 Cognitive-emotional factors

At the momentary level

Fourteen studies examined the prospective association between hopelessness and suicidal ideation within minutes to a few hours (Al-Dajani et al., 2021; Baryshnikov et al., 2024a; Ben-Zeev, Young, & Depp, 2012; Coppersmith et al., 2024; De Beurs et al., 2024; Gerner et al., 2023; Hallensleben et al., 2019; Kleiman et al., 2017,sample 1; Kleiman et al., 2017, sample 2; Kraiss et al., 2024; Rath et al., 2019; Rogers et al., 2022a; Rogers et al., 2024b; Smith et al., 2024). Seven studies indicated that prior levels of hopelessness were significant positive predictors of suicidal ideation at the subsequent time point, after controlling for prior suicidal ideation (Al-Dajani et al., 2021; Baryshnikov et al., 2024a; Gerner et al., 2023;

Hallensleben et al., 2019; Kraiss et al., 2024; Rogers et al., 2024b; Smith et al., 2024). Among these, two studies found a robust relationship between hopelessness and subsequent suicidal ideation, with the association remaining significant in multivariate models. For instance, in an online adult sample, Rogers et al. (2024b) found that prior hopelessness significantly predicted suicidal ideation two hours later, even after accounting for concurrent rumination and stress. Similarly, in a high-risk clinical sample, Hallensleben et al. (2019) observed that hopelessness at previous measurement time significantly predicted suicidal ideation at a later time, after controlling for prior perceived burdensomeness, thwarted belongingness, and depressed mood. However, five studies did not find evidence for a lagged relationship between hopelessness and suicidal ideation (Ben-Zeev, Young, & Depp, 2012; Kleiman et al., 2017, sample 1; Kleiman et al., 2017, sample 2; Mandel et al., 2024; Rath et al., 2019). Additionally, one study (Al-Dajani et al., 2021) reported that individuals demonstrated higher levels of hopelessness and worrying after experiencing suicidal thoughts compared to prior thoughts, suggesting a potential negative reinforcement cycle between these cognitive constructs and the later occurrence of suicidal ideation.

Seven studies investigated the temporal relationship between prior perceived burdensomeness and subsequent suicidal ideation (Coppersmith et al., 2024; De Beurs et al., 2024; Hallensleben et al., 2019; Jacobucci, McClure, & Ammerman, 2022; Kleiman et al., 2017, sample 1; Kraiss et al., 2024; Rath et al., 2019). Four studies found perceived burdensomeness to be a significant positive predictor of suicidal ideation at the next time point (Hallensleben et al., 2019; Jacobucci, McClure, & Ammerman, 2022; Kraiss et al., 2024; Rath et al., 2019), while one study did not support this relationship after controlling for prior suicidal ideation (Kleiman et al., 2017, sample 1). In contrast, six studies explored the time-lagged relationship between thwarted belongingness and suicidal ideation, with two studies confirming this relationship after controlling for the prior level of suicidal ideation (Glenn et al., 2022; Jacobucci, McClure, & Ammerman, 2022). Investigations into the interaction effects between burdensomeness and thwarted belongingness on subsequent suicidal ideation were limited and yielded mixed results (Hallensleben et al., 2019; Jacobucci et al., 2022). Similar to the findings of concurrent relationships, examinations of person-specific associations revealed that substantial individual variability underlying the nomothetic associations between cognitive-emotional constructs and suicidal ideation (Coppersmith et al., 2024; De Beurs et al., 2024; Kraiss et al., 2024). For example, while burdensomeness, thwarted belongingness, and hopelessness, when analysed using multilevel models, all significantly predicted suicidal urge in the temporal networks across both adult

and adolescent samples, these findings did not hold in idiographic approach-based models (i.e., GIMME) for 75% of the individual models and therefore failed to emerge as significant group-level paths (Coppersmith et al., 2024). Unlike the group-level findings of contemporaneous networks, suicide desire in temporal group-level network was not predicted by any variables such as burdensomeness, hopelessness, entrapment, worrying, and rumination (De Beurs et al., 2024).

Rumination was investigated as a prospective predictor of suicidal ideation in four studies (De Beurs et al., 2024; Mandel et al., 2024; Rogers et al., 2022a; Rogers et al., 2024b), with significant associations observed in both the univariate models (Rogers et al., 2022b) and multivariate models covarying with hopelessness and stress (Rogers et al., 2024b). Psychological pain was found in two studies to predict higher subsequent suicidal ideation (Baryshnikov et al., 2024a; Mandel et al., 2024). In university students, psychological pain was the only significant predictor in a multivariate model that included hopelessness, attention fixation, and rumination (Mandel et al., 2024). This prospective association was found only in depressed inpatients comorbid with BPD but not in those without BPD (Baryshnikov et al., 2024a). Lastly, one study of clinical and community adults reported that entrapment was predictive of suicidal ideation at 3-to-12-hour intervals, whereas defeat was not a significant predictor of suicidal ideation at any time interval (van Ballegooijen et al., 2022).

At the daily and weekly level

Six studies explored the prospective relationship between perceived burdensomeness, thwarted belongingness, and suicidal ideation, including four daily-assessment studies (Al-Dajani & Czyz, 2022; Czyz et al., 2019; Czyz et al., 2023; Kyron et al., 2018) and two weekly-assessment studies (Bodell et al., 2021; Rogers & Joiner, 2019). Across these studies, perceived burdensomeness was consistently found to significantly predict subsequent suicidal ideation, even after controlling for previous suicidal ideation (Al-Dajani & Czyz, 2022; Bodell et al., 2021; Czyz et al., 2023; Kyron et al., 2018; Rogers & Joiner, 2019), except for one study with daily assessments (Czyz et al., 2019). In contrast, relationships between thwarted belongingness and suicidal ideation were less consistent. Three studies (two daily and one weekly assessment) reported no statistically significant associations (Al-Dajani & Czyz, 2022; Bodell et al., 2021; Czyz et al., 2019), while two studies found limited evidence of thwarted belongingness as a predictor. Specifically, a study of 417 psychiatric inpatients found that thwarted belongingness predicted worse next-day suicidal ideation, but

only between the first and second day over a three-day period (Kyron et al., 2018). Additionally, in a study of an online community sample with assessments conducted every three days, Rogers and Joiner (2019) found no direct relationship between thwarted belongingness and changes in suicidal ideation between days over time, after accounting for the stability of suicidal ideation. However, this relationship became significant when capability for suicide was entered into the models as a moderator, highlighting that thwarted belongingness only became significant predictor at higher levels of suicide capability. Both capability for suicide and chronicity of suicidal ideation significantly moderated the relationship between perceived burdensomeness and changes in suicidal ideation between days (Rogers & Joiner, 2019). Moreover, four studies examined how perceived burdensomeness and thwarted belongingness interacted to predict prospective suicidal ideation (Al-Dajani & Czyz, 2022; Bodell et al., 2021; Czyz et al., 2019; Kyron et al., 2018), with two daily-assessment studies providing supportive evidence for this interaction (Czyz et al., 2019; Kyron et al., 2018).

Further, three studies investigated the prospective relationship between hopelessness and suicidal ideation, with two using daily assessments and one incorporating varying sampling frequencies (Ballard et al., 2022; Czyz et al., 2019; Czyz et al., 2023). Ballard et al. (2022) found that a combination of hopelessness and psychological pain did not predict subsequent suicidal ideation in either short-term or long-term analyses (corresponding to daily and weekly assessment, respectively). However, Czyz et al. (2019) demonstrated that although hopelessness was not a direct predictor of next-day suicidal ideation parameters (i.e., frequency, duration, and intensity), the interaction between hopelessness and thwarted belongingness significantly predicted suicidal ideation frequency and duration in the next day. In a study aimed at identifying risk factors for post-hospitalisation suicidal ideation, Czyz et al. (2023) found that a model integrating hopelessness, burdensomeness, and self-efficacy to refrain from suicidal action best predicted next-day suicidal ideation. Two studies demonstrated that rumination prospectively predicted next-day suicidal ideation after controlling for prior levels of suicidal ideation (Glenn et al., 2021; Wallace et al., 2024). Moreover, in a study with a longer assessment interval, suicide-specific rumination significantly predicted suicidal intent three days later, even after controlling for covariates such as perceived burdensomeness and thwarted belongingness (Rogers et al., 2021). Finally, an additional two studies identified significant moderating effects on the prospective relationship between entrapment and suicidal ideation (Littlewood et al., 2019), as well as between mindfulness and suicidal ideation (Li et al., 2024). Specifically, Littlewood et al.

(2019) found that sleep quality moderated the association between pre-sleep entrapment and next-day awakening suicidal ideation in a sample drawn from both community and clinical settings, after controlling for baseline depression and anxiety severity. Likewise, Li et al. (2024) reported that trait mindfulness moderated the negative relationship between a specific subcomponent of state mindfulness (i.e., non-judgmental acceptance) and next-day suicidal ideation in female university students.

2.4.3.2.2 Cognitive-Behavioural Factors

At the momentary level

Among three studies investigating proximal risk factors (Bayliss et al., 2024; Coppersmith et al., 2023b; Rogers et al., 2022b), two explored different facets of suicide capability and found evidence supporting the prospective association between specific facets and suicidal ideation. Specifically, after controlling for suicidal ideation at t-1, age, and gender, Rogers et al. (2022b) found that psychological distance to suicide means uniquely predicted subsequent suicidal intent, while other facets (i.e., physical distance to suicide means and fearless about death) were not significant. However, suicide attempt history significantly moderated the negative relationship between physical distance and subsequent suicidal intent, with individuals who had a history of suicide attempts exhibiting a weaker association. Similarly, Bayliss et al. (2024) found that, among the facets of suicide capability, only suicidal mental imagery remained a significant predictor of subsequent suicidal ideation in the multivariate model, after controlling for previous suicidal ideation, whereas other facets such as acquired capability (i.e., not afraid of death) and practical capability (i.e., access to the mean) were not significant. In another study, Coppersmith et al. (2023b) investigated the function of suicidal ideation among an online forum sample and reported that while suicidal ideation as a coping mechanism for negative emotions significantly predicted suicidal ideation severity at the next time point, this effect dissipated after controlling for previous suicidal ideation.

Two studies examining the predictive impact of sleep problems on subsequent suicidal ideation yielded inconsistent results. Rogers and Bozzay (2024) found that sleep duration of the previous night, but not the recent three-day average of sleep duration, significantly predicted momentary suicidal intent and desire the following day, after controlling for age, gender, and baseline psychopathology. In contrast, a network analysis study using a military sample reported that momentary sleep concerns were not associated with suicidal ideation within a temporal network over a 3- to 4-hour timeframe (Smith et al., 2024). Additionally,

among adults hospitalised for suicide attempts following discharge, impulsivity was not significantly associated with the next occurrence of suicidal ideation after controlling for prior suicidal ideation (Husky et al., 2017). This finding aligned with results from an idiographic study by Kaurin et al. (2022c), which found no significant group-level path between any suicide risk factors (including impulsivity) and suicidal ideation in a sample of adults diagnosed with BPD with a history of lethal suicide attempt. Finally, two studies examining the prospective relationship between momentary attention difficulties and suicidal ideation found no significant association after controlling for the stability of suicidal ideation (Ben-Zeev et al., 2012; Mandel et al., 2024).

At the daily and weekly level

Six out of seven studies indicated that sleep problems in the previous day significantly predict of suicidal ideation the following day (Brudern et al., 2022; Cox et al., 2023; Glenn et al., 2021; Hamilton et al., 2023; Kaurin et al., 2022b; Littlewood et al., 2019; Ratzon et al., 2024), with the only exception being a study of adults with BPD and healthy controls (Kaurin et al., 2022b). Despite this overall finding, there is inconsistency regarding specific sleep parameters. For example, while three studies using mixed clinical and community samples did not find that longer sleep onset latency prospectively predicted greater next-day suicidal ideation (Cox et al., 2023; Littlewood et al., 2019; Kaurin et al., 2022b), two studies focusing on clinical adolescents did indicate a significant association (Glenn et al., 2021; Ratzon et al., 2024). Similarly, poor sleep quality during the night significantly predicted higher next-day suicidal ideation in two adult samples, after adjusting for relevant covariates (Cox et al., 2023; Littlewood et al., 2019), while another study found that sleep quality only indirectly predicted next-day occurrence of suicidal ideation through reduced affective reactivity to positive interpersonal events (Hamilton et al., 2023). Moreover, one study observed the positive association between sleep quality and suicidal ideation among adolescent outpatients (Glenn et al., 2021); however, this relationship was not significant in another study (Kaurin et al. 2022b). Similar patterns were observed sleep duration, with several studies reporting its predictive value for next-day suicidal ideation (Cox et al., 2023; Glenn et al., 2021; Hamilton et al., 2023; Kaurin et al., 2022b; Littlewood et al., 2019; Ratzon et al., 2024). In contrast, the presence of nightmares during the night was consistently associated with higher suicidal ideation the following day, as evidenced in two studies (Cox et al., 2023; Glenn et al., 2021). Notably, among the various components of sleep disturbances, only nightmares and poor sleep quality remained significant predictors of

higher passive suicidal ideation in the next day among young adults with a recent history of STBs (Cox et al., 2023).

When the time intervals between assessments increased, sleep quality in the preceding week no longer predicted suicidal ideation the following week in one study with women diagnosed with eating disorders (Kinkel-Ram et al., 2021). Two studies with assessments every three days yielded contradictory findings (Rogers et al., 2021; Zuromski et al., 2017). In a community sample of adults, prior insomnia predicted lagged changes in suicidal ideation from assessment to assessment over a 15-day period, even after controlling for concurrent depression symptoms (Zuromski et al., 2017). However, in the multivariate model, neither insomnia nor nightmares predicted suicidal intent after adjusting for prior suicidal intent (Rogers et al., 2021). Additionally, three studies explored the relationship between proximal risk factors for suicide and next-day suicidal ideation. Tsypes et al. (2022) found that, among adults with BPD, having more reasons for living in the previous day significantly predicted lower levels of suicidal ideation the following day, after controlling for previous-day suicidal ideation and negative affect, with extraversion significantly moderating this relationship. Similarly, Czyz et al. (2023) identified self-efficacy to refrain from suicide attempt as significant predictor of next-day suicidal ideation in the best-performing model leveraging machine learning methods. Nevertheless, there was substantial individual variability in both the presence and strength of the relationship between self-efficacy to refrain from SI and suicidal urges, as well as between coping strategies and suicidal urges, even among individuals with similar suicide risk profiles (Kuehn et al., 2022). Lastly, a study utilising the timeline follow-back method confirmed that behavioural dysregulation significantly predicted suicidal ideation in the following week, with this effect being more pronounced in male participants (Selby et al., 2013).

2.4.3.2.3 Affective factors

At the momentary level

Fourteen studies investigating the effect of prior negative-valenced affect on subsequent suicidal ideation yielded inconsistent findings (Ben-Zeev et al., 2012; Coppersmith et al., 2023b; De Beurs et al., 2024; Hallensleben et al., 2024; Humber et al., 2013; Husky et al., 2017; Kaurin et al., 2022c; Kleiman et al., 2017, sample 1; Kleiman et al., 2017, sample 2; Kuehn et al., 2024; Lucht et al., 2022a; Rath et al., 2019; Rogers et al., 2022a; Victor et al., 2019). Three studies reported that higher composite negative affect prospectively predicted more severe suicidal ideation, after controlling for the temporal dynamics of suicidal ideation

(Coppersmith et al., 2023b; Rogers et al., 2022a; Victor et al., 2019), with one study demonstrating that internalising negative affect remained a significant predictor in a sample of young adult women, over the effect of its externalising component and substance use (Victor et al., 2019). In contrast, among adult psychiatric inpatients, Lucht et al. (2022a) found that, after controlling for prior suicidal ideation, only the negative valence of mood predicted subsequent suicidal ideation, whereas the composite negative affect became a non-significant predictor.

Six studies examined discrete negative affect as a predictor of suicidal ideation at the next time point, generally finding limited evidence for its predicting effect (Ben-Zeev et al., 2012; Humber et al., 2013; Husky et al., 2017; Kleiman et al., 2017, sample 1; Kleiman et al., 2017, sample 2; Rath et al., 2019). For example, in adult inpatients with MDD, greater sadness predicted an increase in subsequent suicidal ideation after controlling for prior suicidal ideation, although this effect was not independent of other depressive symptoms in the multivariate model (Ben-Zeev et al., 2012). Similarly, among high-risk adults after discharge of hospitalisation, Husky et al. (2017) reported that only sadness and anxious mood significantly predicted subsequent suicidal ideation, whereas anger did not. This was in line with a study of an inmate sample (Humber et al., 2013), which found that one aspect of anger expression (i.e., internalised anger) rather than anger affect, was a significant predictor of subsequent wish to live, suggesting a counterintuitive positive relationship. Other discrete negative affect or mood states, including loneliness (Kleiman et al., 2017, sample 1; Kleiman et al., 2017, sample 2), anhedonia (Ben-Zeev et al., 2012), anxious and depressive feelings (Rath et al., 2019), did not emerge as significant prospective predictors. The prospective relationship between overarousal states and suicidal ideation was investigated in three studies with mixed findings. In one study of adults with past-week suicidal ideation, higher arousal, measured as the mean of agitation and irritability, predicted increased suicidal ideation frequency at the next time point, even after controlling for prior suicidal ideation frequency (Rogers et al., 2022b). However, a network analysis found that agitation did not predict suicidal ideation within a temporal network (Smith et al., 2024), and time-lagged associations between hostility and suicidal ideation were inconsistent across individuals (Kaurin et al., 2022c).

Positive-valenced affect was examined in four studies (Husky et al., 2017; Lucht et al., 2022a; Rath et al., 2019; Rogers et al., 2022a), with evidence largely supporting a negative prospective association with suicidal ideation. Notably, two studies conducting different analyses based on an identical sample revealed contradictory findings (Lucht et al., 2022a;

Rath et al., 2019). In a clinical sample of adult inpatients with depression at risk for suicide, lower positive affect significantly predicted a subsequent increase in suicidal ideation after controlling for prior suicidal ideation (Lucht et al., 2022a). In contrast, a network analysis involving several psychological risk factors revealed that positive affect did not significantly predict suicidal ideation in the temporal network, with only perceived burdensomeness emerging as a significant predictor (Rath et al., 2019). In addition, four studies employing idiographic approaches challenged the generalisability of these nomothetic-level findings by demonstrating that the effects of both negative and positive affect on subsequent suicidal ideation varied substantially at the individual level (De Beurs et al., 2024; Hallensleben et al., 2024; Kaurin et al., 2022c; Kuehn et al., 2024).

At the daily and weekly level

Eight studies investigated whether affective states predicted suicidal ideation at subsequent time points, either the following day (Czyz et al., 2023; Schatten et al., 2021; Wallace et al., 2024; Yin et al., 2023) or the following week (Auerbach et al., 2023; Depp et al., 2017; Kinkel-Ram et al., 2021; Selby et al., 2013). Among these, four studies focused on negative-valenced affect (Selby et al., 2013; Schatten et al., 2021; Wallace et al., 2024; Yin et al., 2023), with two finding a positive association between composite negative affect and suicidal ideation using lags of one day and one week, respectively (Selby et al., 2013; Wallace et al., 2024). In contrast, the time-varying effects of discrete negative affect, both anger and misery, did not predict next-day suicidal ideation during the study period (Schatten et al., 2021). Furthermore, agitation was not a significant predictor of next-week suicidal ideation among women diagnosed with eating disorders (Kinkel-Ram et al., 2021) and was not selected by a machine learning model as a predictor of next-day suicidal ideation among high-risk adolescents following hospitalisation (Czyz et al., 2023). Additionally, positive-valenced affect was examined in three studies with a one-day time lag, yielding contradictory findings (Schatten et al., 2021; Wallace et al., 2024; Yin et al., 2023). Wallace et al. (2024) found that higher positive affect, measured as a composite score, significantly predicted a decrease in next-day suicidal ideation after controlling for the autoregressive effect of suicidal ideation, whereas Schatten et al. (2021) reported a positive relationship between previous-day happiness and subsequent suicidal ideation. Moreover, person-specific analyses by Yin et al. (2023) revealed that neither negative nor positive affect was consistently associated with suicidal ideation across individual time-lagged models.

Beyond affective valence, four studies explored other affective constructs such as mood (Auerbach et al., 2023; Depp et al., 2017), emotion dysregulation (Wallace et al., 2024), and affective sensitivity (Selby et al., 2013). Two studies with a one-week time lag demonstrated that previous-week mood predicted suicidal ideation in the next week (Auerbach et al., 2023; Depp et al., 2017). In one study, reductions in mood (rather than mood variability, as measured by RMSSD) among a subgroup of adolescents at medium and high suicide risk predicted clinically significant suicidal ideation in the following week (Auerbach et al., 2023). Similarly, in depressed adults with bipolar II disorder, mood changes from two weeks prior predicted increased suicidal ideation, with interactions between mood and energy changes further predicting the severity of weekly suicidal ideation (Depp et al., 2017). Additionally, one study indicated that emotion dysregulation predicted severe suicidal ideation the following day (Wallace et al., 2024), while another study reported that affective sensitivity in the preceding week significantly predicted higher levels of suicidal ideation in the following week among adolescent inpatients, with this effect being stronger in male adolescents (Selby et al., 2013).

2.4.3.2.4 Clinical and sociodemographic factors

At the momentary level

Four studies examined the predictive effects of clinical risk factors on subsequent suicidal ideation (Bagge et al., 2014; Baryshnikov et al., 2024a; Ernst et al., 2024; Oakey-Frost et al., 2023). Two studies focusing on the prospective relationships between components of passive suicidal ideation (i.e., wish to live and wish to die) and active suicidal ideation yielded inconsistent findings. In a sample of university students with a lifetime history of suicidal ideation, Oakey-Frost et al. (2023) reported that a higher wish to die and greater suicidal ambivalence (i.e., the difference between wish to live and wish to die) significantly predicted elevations in suicidal ideation at the next assessment, after controlling for prior suicidal ideation, whereas wish to live was not a significant predictor on its own. Conversely, in adult psychiatric inpatients, Ernst et al. (2024) found that only the wish to live significantly predicted subsequent suicidal desire, and a significant interaction between wish to live and wish to die was observed. Furthermore, Bagge et al. (2014) showed that, when participants recalled the 24 hours prior to a suicidal attempt, substance use in the previous hour (particularly alcohol use) was predictive of increases in suicidal ideation the following hour, even after controlling for prior suicidal ideation, whereas drug use did not. Similarly, among clinically depressed adults with acute suicide risk, Baryshnikov et al. (2024a) identified

current depression severity as the sole significant predictor of subsequent suicidal ideation, surpassing the predictive effects of current anxiety, hopelessness, psychological pain, and prior suicidal ideation; this study also highlighted that comorbid BPD moderated the prospective relationship between psychological pain and suicidal ideation, as detailed in the cognitive-emotional factors section.

At the daily and weekly level

Three studies investigated the time-lagged effects of clinical symptoms on suicidal ideation at different time points (next-day: Zhu et al., 2022; next-week: Depp et al., 2017; Ortiz & Smith; 2020). Zhu et al (2022) using an idiographic approach found that for most participants, prior-day levels of psychiatric symptoms (i.e., depression, anxiety, and PTSD) did not significantly predict next-day suicidal ideation, with only one participant showing a negative association between prior-day depression severity and next-day suicidal ideation. In contrast, Depp et al. (2017) analysed weekly averages of mood and energy levels in depressed patients with bipolar II disorders and found that both the main effects and the interaction between mood and energy predicted suicidal ideation. Notably, energy levels emerged as an earlier predictor of suicidal ideation, preceding ideation by three weeks, whereas mood levels predicted suicidal ideation at two weeks prior. Ortiz and Smith (2020) examined the predictive effect of eating disorder symptoms on next-week suicidal ideation and found limited evidence for a prospective relationship, with only certain symptom subtypes showing a predictive effect. Additionally, a daily diary study among psychiatric inpatients (Kyron et al., 2018) demonstrated that changes in suicidal ideation were associated with the occurrence of NSSI, with suicidal ideation increasing in the two days preceding an NSSI and remaining elevated thereafter.

2.4.3.2.5 Social-interpersonal factors

At the momentary level

The prospective association between negative or stressful life events and suicidal ideation was examined in four studies (Bagge et al., 2014; Glenn et al., 2022; Oquendo et al., 2020; Rogers et al., 2024b). Of which, findings from two studies supported the unique influence of negative life events on subsequent suicidal ideation in both adolescent and adult clinical samples (Bagge et al., 2014; Glenn et al., 2022). However, a study of high-risk adults recruited from online forums (Rogers et al., 2024b) found that life event stress did not independently predict subsequent changes in suicide intent when accounting for

hopelessness, suicide-specific rumination, and prior suicide intent. Notably, the relationship between real-time assessments of stressful events and subsequent suicidal ideation was moderated by baseline suicidal ideation variability, with individuals exhibiting higher variability at baseline reporting greater suicidal ideation following stressful events (Oquendo et al., 2020). Furthermore, two studies investigating the role of social contact produced consistent results. In adults with past-year STBs, the absence of social contact predicted greater passive and active suicidal ideation at the next time point, even after controlling for the autoregressive effects of suicidal ideation (Ammerman & Jacobucci, 2023). Similarly, a study of high-risk adults following hospitalisation identified several contextual factors associated with suicidal ideation at the following time point, after controlling for prior-time suicidal ideation (Husky et al., 2017). Specifically, being alone, experiencing negative family events, and engaging in passive leisure activities increased the likelihood of suicidal ideation in the next time point, whereas spending time with close others, doing chores, and engaging in general sustenance or hygiene activities served as protective factors. Additionally, prior interpersonal perceptions significantly predicted subsequent suicidal ideation (Smith et al., 2024; Victor et al., 2019). In a military sample, feeling ineffective and ashamed/disgusted were associated with passive suicidal ideation within the temporal network, whereas a lack of closeness to others did not demonstrate a significant effect (Smith et al., 2024). In a community sample of young adult women, interpersonal stress (i.e., rejection and criticism) predicted an increased suicide urge at the next time point, although this effect was fully mediated by heightened internalising negative affect (Victor et al., 2019). Finally, one of religious and spiritual experience (i.e., inner peace) was significantly related to more reasons to live than die in the next time point in group-level analyses within the directed network (van den Brink et al., 2024).

At the daily and weekly level

Among studies involving longer time intervals, the predictive effects of social support and interpersonal perceptions on suicidal ideation were each examined in two studies, with time lags of one day (Coppersmith et al., 2019) and one week (Selby, Yen, & Spirito, 2013). In a sample of adults who had attempted suicide in the past year, social support did not significantly predict next-day suicidal ideation after controlling for prior-day suicidal ideation (Coppersmith et al., 2019). In contrast, a study of adolescents hospitalised for elevated suicide risk found that experiences of family and friend invalidation in the preceding week significantly predicted higher levels of suicidal ideation in the following

week (Selby et al., 2013). Moreover, this study also reported a stronger association between family invalidation and suicidal ideation among male adolescents.

2.4.3.3 Time-invariant Relationships (N = 27)

2.4.3.3.1 Aggregated Dynamic Patterns of Suicidal Ideation

Clinical and sociodemographic factors

Five studies examined the association between clinical variables and the average variability of suicidal ideation across the EMA period (Crowe et al., 2019; Ernst et al., 2024; Husky et al., 2017; Oquendo et al., 2020; Rogers et al., 2024a). Among these, four studies provided evidence that STBs were linked to the variability of suicidal ideation. One study found that low controllability of thoughts in the past month uniquely predicted greater average within-person standard deviations in suicidal ideation intensity, surpassing the predictive effects of past-month suicidal ideation frequency, duration, and intensity, while none of which were significant predictors (Rogers et al., 2024a). Ernst et al. (2024) examined different constructs of suicidal ideation (i.e., wish to die, wish to live, suicidal ambivalence, and suicidal desire) among adult inpatients and found the variability (MSSD) of each construct was significantly correlated with its correspondent mean level. Notably, a higher mean level of wish to live was correlated with lower variability in wish to live, whereas the correlations were positive for the other three constructs. Additionally, inpatients with a history of suicide attempts exhibited greater fluctuations in all constructs compared to those without a history, consistent with the findings of Husky et al. (2017). In contrast, another study involving six waves of EMA data collection over two years (Oquendo et al., 2020) found that suicidal ideation variability (RMSSD) did not significantly differ between depressed adults with and without a history of suicidal attempts. However, individuals with greater variability in suicidal ideation over the study period reported higher mean levels of suicidal ideation at baseline. Two studies examined the predictive influence of childhood trauma and found no support for its influence on predicting suicidal ideation variability over a week (Husky et al., 2017) or over a two-year follow-up (Oquendo et al., 2020). However, baseline physical abuse was initially associated with suicidal ideation variability, but this effect was no longer significant after controlling for lifetime aggression, impulsivity, and affective liability (Oquendo et al., 2020). One study (Crowe et al., 2019) observed that adults with MDD exhibited greater suicidal ideation instability (RMSSD) than controls without psychiatric history; however, this relationship became non-significant after adjusting for within-person mean levels of suicidal ideation. Similarly, after adjusting for sex and age, neither psychiatric diagnosis nor

symptoms of depression and anxiety were significantly associated with the average frequency of suicidal ideation over a week; however, women demonstrated greater suicidal ideation variability throughout the week (Husky et al., 2017).

For longer time intervals, six studies examined the effects of clinical and demographic factors on average suicidal ideation variability, using either daily (Brim et al., 1984; Witte et al., 2005; Witte et al., 2006) or weekly (Byran & Rudd, 2018; Byran et al., 2019; Peters et al., 2019) assessments. Findings on the influence of suicidal attempt history on suicidal ideation variability were inconsistent. Specifically, three studies, two involving overlapping military samples (Byran & Rudd, 2018; Byran et al., 2019) and one examining university students (Witte et al., 2006), identified attempt status as a significant predictor of greater suicidal ideation variability across different sampling intervals. However, a study employing weekly assessments in hospitalised adolescents at elevated suicide risk found that suicidal ideation instability (MSSD) was not significantly correlated with suicidal attempt history or suicidal attempts during a six-month follow-up period (Peters et al., 2019). This study also found that the instability of suicidal ideation was not correlated with most clinical variables, including average suicidal ideation intensity over the study period, baseline suicidal ideation, and NSSI at both baseline and follow-up. In contrast, Witte et al. (2005) reported that, among university students, suicidal ideation variability was significantly correlated with its intensity and duration over a 28-day period. Neither study, however, found a significant association between gender and suicidal ideation variability (Peters et al., 2019; Witte et al., 2005). In addition, two studies examined the relationship between suicidal ideation instability and psychiatric conditions. While Peters et al. (2019) found no significant correlation between suicidal ideation instability and BPD criteria, Brim et al. (1984) provided some evidence suggesting that suicidal ideation variability differed between subtypes of depression. Specifically, individuals with secondary depression exhibited lower suicidal ideation variability (coefficient of variation) over the hospitalisation period compared to those with primary depression, although day-to-day variability assessed by MSSD did not significantly differ between the groups.

Cognitive-behavioural factors

Six studies investigated the relationship between cognitive-behavioural factors and the variability of suicidal ideation, with five assessing suicidal ideation multiple times per day (Hadzic et al., 2020; Herzog et al., 2023; Kaliush et al., 2024; Lucht et al., 2022b; Oquendo et al., 2020) and one conducting assessments every three days (Rogers & Joiner, 2019).

Among the five EMA studies, two studies utilised an identical sample of adult psychiatric inpatients found that both state and trait impulsivity (especially its motor aspect) were significantly associated with greater variability (i.e., MSSD) in passive suicidal ideation over a six-day follow up period (Hadzic et al., 2020; Lucht et al., 2022b). These findings were supported by another study that conducted six EMA data collection windows over two years, which indicated that baseline impulsivity and lifetime aggression each significantly predicted suicidal ideation variability (i.e., RMSSD) among both clinical and community adults with MDD (Oquendo et al., 2020). Furthermore, attentional control deficits, as measured at baseline by the Stroop task, significantly predicted suicidal ideation variability (i.e., RMSSD) over a seven-day period, after controlling for depressive mood and suicidal ideation severity (Herzog et al., 2023). Additionally, a study following women from late pregnancy to four months postpartum, with three waves of twice-daily assessments over seven days, found that the link between sleep efficiency and emotion dysregulation varied by fluctuations in desire to live. Among women with fluctuating desire to live, high sleep efficiency predicted decreased emotional dysregulation, and vice versa (Kaliush et al., 2024). When sampling frequency was reduced to once every three days, Rogers and Joiner (2019), using dynamical systems modelling, indicated that suicide capability moderated the temporal stability of suicidal ideation among high-risk adults, with individuals possessing higher capability for suicide exhibiting more stable suicidal ideation.

Affective factors

The relationship between affective factors and the instability of suicidal ideation during the study period was investigated in four studies. Among these, three assessed suicidal ideation instability through multiple assessment per day (Oquendo et al., 2020; Peters et al., 2022; Rizk et al., 2019), while one study used single assessment per week (Peters et al., 2019). In a study of adult psychiatric inpatients, Peters et al. (2022) found that the instability of both depressive mood and feelings of connectedness were significant predictors of suicidal ideation instability, after controlling for the average momentary intensity of suicidal ideation, whereas the instability of anger/irritability was not significant predictor. The predictive role of baseline affective instability, as measured by the Affective Lability Scale (ALS), was examined in three studies and yielded inconsistent findings. Two studies involving adult patients did not observe a significant association between affective instability and suicidal ideation instability (Oquendo et al., 2020; Peters et al., 2022); however, this relationship was significant in a study involving women diagnosed with BPD (Rizk et al., 2019). Furthermore, in a six-month follow-up study of high-risk adolescents after hospitalisation, Peters et al.

(2019) found that both negative affect instability and intensity were significantly associated with the instability of suicidal ideation, whereas positive affect intensity was not a significant correlate.

2.4.3.3.2 Characterising Subtypes of Suicidal Ideation

Nine studies explored subtypes of suicidal ideation based on its characteristics over the study period, consistently highlighting the heterogeneous nature of suicidal ideation, regardless of varying sampling frequencies (Auerbach et al., 2023; Bonilla-Escribano et al., 2023; Czyz et al., 2022, sample 1; Czyz et al., 2022, sample 2; Kleiman et al., 2018a, sample 1; Kleiman et al., 2018a, sample 2; Madsen et al., 2019; Restifo et al., 2015; Spangenberg et al., 2022, sample 1). Among these, four studies using EMA identified distinct patterns of suicidal ideation based on characteristics such as mean levels, variability, and occurrence during the EMA period (Czyz et al., 2022, sample 1; Kleiman et al., 2018a, sample 1; Kleiman et al., 2018a, sample 2; Spangenberg et al., 2022, sample 1). Kleiman et al. (2018a) identified five subtypes of suicidal ideation based on variations in mean levels and variability across two samples with different suicide risk acuity. In a sample of adults who had attempted suicide in the past year, individuals with high mean but low variability reported highest proportion of recent suicidal attempts, whereas none of those in the high mean – high variability group endorsed a suicide attempt in the past month. However, in their clinical sample of high-risk adult inpatients, no significant differences in suicide attempt history were found between subtypes, a pattern that was consistent with findings of Spangenberg et al. (2022, Sample 1) and Czyz et al. (2022, Sample 2).

In a sample of adult psychiatric inpatients (Sample 1), Spangenberg et al. (2022) identified four subtypes based on mean levels and instability of suicidal ideation. Among clinical variables, only baseline levels of suicidal ideation and depression significantly differed between subtypes, whereas suicide attempt history, childhood trauma, and trait impulsivity did not. Notably, the high-unstable subtype exhibited the highest average suicidal ideation, baseline suicidal ideation, and baseline depression levels compared to the low-stable and low-moderate stable subtypes. Likewise, Czyz et al. (2022) found that suicidal attempt history did not distinguish between three suicidal ideation subtypes among adolescents at heightened suicide risk, despite differences in sampling frequencies and study context (Sample 1: multiple assessments per day during inpatient stay; Sample 2: one assessment per day after discharge). The persistent high trajectory group demonstrated similar instability in suicidal ideation to the declining group, with both showing significantly higher instability

than the low ideation group. Across both samples, the three subtypes also differed in several baseline clinical and psychological characteristics, including depressive symptoms, hopelessness, self-efficacy to cope with suicidal ideation, emotion regulation, and lifetime NSSI.

Furthermore, a study by Bonilla-Escribano et al. (2023) examined symptom instability in suicidal patients across Spain and France, progressively reducing assessment frequency from five times per day to once per day over six months. This study identified two subtypes (*low* and *high variability*), with 35% of individuals exhibiting high instability in passive suicidal ideation alongside an unstable pattern across multiple factors, including social withdrawal, social support, sleep index, and appetite. A machine learning algorithm identified key clinical features distinguishing these subtypes, including baseline depression severity, cognitive instability (i.e., a facet of impulsivity), marital status, intensity and frequency of passive suicidal ideation, and other clinical factors (e.g., nicotine dependence and binge eating disorders), and the occurrence of clinical meaningful events during follow-up (e.g., suicidal attempt and hospitalisation). Similarly, Restifo et al. (2015) found that suicidal ideation at 24 hours after initial endorsement, alongside subsequent self-injury incident, distinguished psychiatric inpatients with persistent high suicidal ideation from those who initially exhibited high ideation but experienced a rapid and substantial improvement.

Two additional studies employing weekly assessments explored suicidal ideation subtypes and key distinguishing factors across different domains (Auerbach et al., 2023; Madsen et al., 2019). Auerbach et al. (2023) classified suicide risk into three subgroups based on the characteristics of suicidal ideation, with instability increasing as risk levels rose. These subgroups differed significantly in clinical variables (e.g., depression diagnosis, comorbid conditions, baseline depression and suicidal ideation severity, and past-month occurrence of suicidal ideation), baseline psychological factors (e.g., psychological pain and perceived burdensomeness), weekly mood, and suicidal events during follow-up. However, suicidal attempt history, baseline thwarted belongingness, and sociodemographic variables did not significantly differentiate the subgroups. Madsen et al. (2019) examined a large sample of individuals undergoing 12 weeks of antidepressant treatment and identified five suicidal ideation trajectories. Among these, two subtypes (*fluctuating* and *slow-response-relapse*) representing 10% of individuals, exhibited highly unstable suicidal ideation patterns. Multivariate analysis revealed significant differences between these groups in terms of suicide attempt history, marital status, and mood symptom severity.

2.5 Discussion

The temporal dynamics of suicidal ideation has emerged as a rapidly evolving research area in recent years. This review provided a comprehensive narrative synthesis of the short-term fluctuations in suicidal ideation, focusing on its persistence, variability, and instability through relative dynamic metrics. Additionally, it synthesised findings on the dynamic associations between suicidal ideation and various factors, categorising these relationships into concurrent, prospective, and time-invariant patterns. Findings from 112 studies across 68 unique samples highlighted the inherently dynamic nature of suicidal ideation, which fluctuates over minutes, hours, and days due to the complex interplay of various factors across cognitive, affective, social-interpersonal, and clinical-sociological factors.

2.5.1 Characterising the temporal dynamic of suicidal ideation

This review explored short-term fluctuations in suicidal ideation by synthesising research evidence on its persistence (the extent to which previous levels are carried over to subsequent time points), variability (the proportion of total variance attributed to within-person fluctuations versus between-person differences), and instability (the average change between consecutive time points). Examination of the persistence of suicidal ideation at the average group level (nomothetic approach) revealed significant temporal dependency in 35/42 studies (83%), indicating that, in most cases, current levels of suicidal ideation were influenced by prior levels across time intervals of minutes, hours, and days. Specifically, 91% of studies (32/35) found a positive but diminished carryover effect, suggesting that while higher levels of suicidal ideation were followed by elevated suicidal ideation at subsequent time points, the strength of this effect weakened over time. This pattern indicated temporal stability rather than an escalating trajectory. In contrast, a negative carryover effect suggested an oscillatory dynamic, where high and low suicidal ideation alternated between consecutive time points. Although only a small number of studies reported negative carryover effects, these findings underscored the oscillatory dynamic trajectory of suicidal ideation over time in some individuals. Specifically, only one study identified this pattern at the average group level, whereas five studies using idiographic approaches observed both positive and negative autoregressive effects of suicidal ideation at the individual level. Furthermore, among studies employing short time intervals of minutes to hours (n = 20), 65% reported small-to-moderate autoregressive effects, while only 25% of studies found these effects to be moderate or strong.

By contrast, in studies using once-daily assessments (n = 11), similar proportions reported small-to-moderate effects (36%) and moderate effects (36%), with no studies identifying a strong effect. In studies where assessments of suicidal ideation were spaced a few days apart (n = 3), findings suggested a moderate to large degree of carryover to the next assessment day or week. These findings add to our understanding of the nature of temporal stability in suicidal ideation. While suicidal ideation exhibited temporal dependency, the self-predicting effect was generally modest, indicating fluctuations between measurement points, particularly in momentary assessments. In comparison, suicidal ideation appeared more persistent when assessed over longer time intervals; however, this interpretation should be considered with caution, as it was based on a limited number of studies.

Suicidal ideation variability was examined in 47% studies using different statistical metrics, with 83% examining ICCs to quantify the proportion of variance attributed to within-person fluctuations (1-ICC) versus between-person differences. Across 39 studies derived from 31 distinct samples, 54 different ICCs were calculated for composite, active, and passive suicidal ideation. In general, findings indicated substantial within-person fluctuations across studies with assessment intervals, with no sufficient evidence supporting the differences between suicidal ideation constructs. However, the sampling frequencies appeared to reveal different patterns in the extent to which variance in suicidal ideation was attributed to within-person fluctuations versus a stable trait. As assessment intervals increased from multiple times per day to once in every few days, ICC ranges became narrower. These findings highlighted the complexity and heterogeneity in investigating suicidal ideation dynamics. The broad ICC range observed in studies using momentary assessments suggested that suicidal ideation may operate on different timescale for different individuals, with it fluctuating rapidly within minutes or hours for some, but not for other (59% and 34% ICCs below 0.70 and 0.50, respectively). Surprisingly, studies assessing suicidal ideation once daily reported a general greater proportion of variance attributed to within-person fluctuations, with 95% and 53% ICCs capturing at least 30% and 50% within-person variability, respectively. In comparison, studies with weekly assessments found that while 83% of ICCs accounted for at least 30% within-person variability, only 17% of ICCs explained at least 50% of the total variance due to within-person fluctuations. These results suggested that daily assessments effectively captured substantial within-person variability. However, this does not preclude the possibility that the proportion of variance attributed to within-person fluctuations may be inflated due to methodological bias such as recall bias associated with once-daily assessments. Acknowledging this, the findings further underscore

the highly variable nature of suicidal ideation within individuals, even when assessed sparsely throughout the week or only once per week. While most studies were well-capable of capturing at least 30% within-person variability, only a few detected within-person variability beyond 50%, suggesting a relatively stable trajectory for some individuals over time. Furthermore, these findings were reinforced by studies examining other metrics such as within-person standard deviations or P_{mode} statistics using intensive sampling design (multiple and once assessments per day). These studies indicated that suicidal ideation frequently fluctuated within a single day or a few days to a degree that exceeded an individual's own average level of suicidal ideation.

Compared to the persistence and variability of suicidal ideation, fewer studies (31%) examined its instability, which was commonly measured using MSSD/RMSSD but referred to by various terminologies in the existing suicide literature. The findings indicated significant fluctuations in suicidal ideation between assessments conducted minutes to hours apart, with proportional RMSSDs ranging from 8.04% to 26.8% of the total measurement scale from one measurement to the next. However, one study examined the probability of change (PAC) suggested that the abrupt changes from moment to moment was uncommon. In contrast, the average proportional change in suicidal ideation remained comparable across the two studies with longer assessment intervals, with fluctuations of 7.5% from day to day, and 10.2% from week to week, respectively. Of note, given the differences in time intervals, a 7.5% change in daily assessments reflected a greater degree of instability than the similar unit change in weekly assessments. Furthermore, although examined in only a few studies, passive suicidal ideation consistently showed slightly greater average moment-to-moment fluctuations than active suicidal ideation. Importantly, this pattern aligned with findings on the persistence of suicidal ideation, where active suicidal ideation demonstrated a stronger carryover effect from one moment to the next compared to passive suicidal ideation. Additionally, consistent with findings on both the persistence and variability of suicidal ideation, the broad range of RMSSDs across individuals highlighted substantial individual differences contributing to the overall instability. This pattern was further reinforced by visual inspections of time-series plots for individuals presented in 21 studies.

2.5.2 The dynamic associations between factors and suicidal ideation

Among 112 studies included in this review, 106 studies from 65 unique samples (95%) examined the relationships between various factors and suicidal ideation. These relationships were assessed across concurrent (56/106, 53%), prospective (64/106, 63%), and time-invariant (26/106, 25%) patterns at momentary (n = 58), daily (n = 29), and weekly (n = 16) levels. Across these association patterns, nearly half of the studies focused on affective factors (n = 48, 45%), with negative affect being the most frequently examined (32/48). Cognitive-behavioural factors (n = 43, 41%) and cognitive-emotional factors (n = 40, 38%), were the next most studied categories, with sleep (15/43) and hopelessness (24/40) receiving the most attention within their respective domains. These were followed by sociodemographic/clinical factors (n = 33, 31%) and social interpersonal factors (n = 20, 19%), among which, clinical diagnosis/symptoms (18/33) and interpersonal perceptions (8/20) emerging as the most investigated within these categories.

Overall, findings suggested that several factors were significantly associated with both current and subsequent suicidal ideation, as well as average variability or instability of suicidal ideation over the study period. Notably, investigated factors appeared to be better associated with concurrent suicidal ideation than with time-lagged suicidal ideation at a later assessment. This was evidenced by the consistency of findings across studies examining the same factor and the absence of significant associations between the investigated factors and suicidal ideation. At the momentary level, a wide range of factors across all five categories were found to be simultaneously associated with suicidal ideation. However, among the 13 factors examined in more than one study, only 54% (7/13) of findings were consistent. These included studies investigating hopelessness, proximal factors of suicide, rumination, interpersonal perceptions, coping, and clinical factors. In contrast, time-lagged associations at the momentary level provided less conclusive evidence, with only 25% (4/16) of associations being consistent across studies. These included psychological pain, interpersonal perceptions, social contact, and constructs of suicidal ideation. For instance, hopelessness and negative affect were among the most frequently examined factors in both concurrent and time-lagged associations. While concurrent associations between hopelessness and suicidal ideation was highly consistent across all studies (12/12, 100%), its ability to predict suicidal ideation in the following hours was supported in only 57% (8/14) of examinations, after controlling for prior suicidal ideation. Similarly, studies examining

negative affect found an 82% (14/17) consistency rate in concurrent associations, but only 50% (7/14) consistency in the time-lagged associations. This pattern was also observed for other affective constructs such as positive affect and overarousal states (e.g., irritability, agitation, hostility), potentially highlighting the influence of emotion dynamics (Ebner-Priemer & Sawitzki, 2007; Nelson et al., 2020; Trull et al., 2015), which adds complexity to their associations with suicidal ideation even over short time intervals.

Similar patterns were observed in both daily- and week-level associations. At the daily level, 60% (6/10) of studies reported consistent findings regarding same-day associations between various factors and suicidal ideation. However, only 38% (3/8) of examinations aligned in their findings on next-day predictions of suicidal ideation. Among studies exploring same-day associations, most focused on affective and cognitive-emotional factors. While several factors within these categories were significantly associated with suicidal ideation, consistent findings were primarily observed for cognitive-emotional factors (e.g., burdensomeness, thwarted belongingness, hopelessness), as well as clinical symptoms, interpersonal perceptions, and overarousal affective states. In contrast, time-lagged associations at the daily level yielded fewer consistent findings. However, evidence of positive affect, proximal risk for suicide, and rumination showed consistent across studies. Additionally, sleep problems were the most frequently examined time-lagged predictor, with 86% (6/7) studies consistently identifying them as a significant predictor of next-day suicidal ideation. Importantly, despite this overall predictive value of sleep problems, findings varied depending on which sleep construct was assessed, revealing contradictions across studies. A similar pattern emerged for negative affect, where studies examining discrete emotions reported greater discrepancies than those using composite measures.

Although sleep problems, as a broad construct, were a relatively stable predictor of next-day suicidal ideation, findings were less consistent in studies with once or twice assessments per week. Only one out of three studies (33%) detected a significant prospective association. At the weekly-level, a small number of studies examining a limited range of factors provided support for same-week associations. However, most of these findings were based on factors assessed in only in a single study, except for sleep, which was examined in two studies and yielded consistent evidence. Moreover, most factors investigated by single study at the weekly level were in the cognitive-emotional and social-interpersonal categories and indicated significant same-week associations with suicidal ideation, except for thwarted belongingness. When examining time-lagged associations at the weekly-level, studies showed support for most factors. Among studies assessing the same factors, half of their

findings (50%, 3/6) were consistent, particular for burdensomeness, mood, and psychiatric symptoms.

Unlike the focus on affective and cognitive factors in explorations of concurrent and prospective associations, sociodemographic and clinical factors were most commonly examined in studies investigating time-invariant associations. Across studies with varying assessment intervals, these factors were generally found to predict average variability/instability of suicidal ideation over the study period, as well as help in characterising different subtypes of suicidal ideation. However, consistent findings among these association across studies were reported less frequently, likely due to the heterogenous nature of the subgroups analysed in each study. The most consistent findings emerged in studies examining ideation-focused constructs, such as baseline suicidal ideation, and clinical symptoms severity. In contrast, findings on the relationship between history of suicidal attempts and variability/instability of suicidal ideation were inconsistent. Overall, more than two-thirds of studies supported this association at the daily (2/3, 66%) and weekly (4/5, 80%) levels, whereas less than half (3/7, 43%) of studies found support at the momentary level. Similarly, studies using momentary-based assessment also observed inconsistent findings for other clinical background such as childhood trauma, with only 25% (1/4) of studies found a significant association.

Taken together, these findings indicated a substantial decrease (nearly 50%) in the consistency of evidence across studies when moving from concurrent to time-lagged associations with suicidal ideation. Furthermore, greater inconsistency in findings appeared to be more prevalent in momentary-level associations compared to daily and weekly associations, reflecting the complexity of capturing relationships between highly variables factors. Our synthesis of temporal dynamics in suicidal ideation suggested that suicidal ideation exhibited significant short-term fluctuations within minutes to hours in a day, with some evidence suggesting that it may operate on different timescales depending on the constructs examined. For the most part, suicidal ideation showed only a small to moderate carryover effect from one moment to the next, with average fluctuations ranging from 8.04% to 26.8% of the total measurement scale within minutes to hours. This rapidly evolving nature at short time scales potentially makes it difficult to identify stable momentary-level associations. Moreover, perhaps the most consistent finding across all investigations was the substantial individual variability in both the temporal dynamic patterns of suicidal ideation and the dynamic associations between different types of factors and suicidal ideation. This discrepancy between findings from nomothetic (group-level) and idiographic (individual-

level) approaches has drawn significant attention in psychological science (Barlow & Nock, 2005), with recent advocacy for incorporating a person-specific perspective in suicide research (Sewall & Wright, 2021). Indeed, in our review, while nomothetic approaches identified several risk factors for suicidal ideation that have been deemed well-established, idiographic studies found no consistent associations for most factors, in terms of both effect direction and strength. The only exceptions were two studies that found relatively consistent contemporaneous associations between sadness and suicidal ideation and between misery and suicidal ideation across most individuals (Kuehn et al., 2024; Yin et al., 2023). These finding highlighted the heterogeneity of individual experiences, suggesting that each person may have a unique set of risk and protective factors associated with suicidal ideation in daily life.

2.5.3 Integration with theoretical frameworks

Through a narrative synthesis of findings on the temporal dynamics of suicidal ideation and its associated factors, this review provides empirical support for theoretical accounts describing the dynamic nature of suicidal ideation. The Fluid Vulnerability Theory (FVT; Rudd, 2006) was the first framework in the suicide literature to explicitly address the time frame of a suicide crisis. It posits that suicidal episodes are time-limited, typically lasting for hours, days, or weeks, depending on the duration of activation of the suicide mode. This aligns with our findings, which indicated that suicidal ideation is not a static construct but rather fluctuates over short time frames, as evidenced by the examinations on its persistence, variability, and instability. Furthermore, this review identified more than 30 risk and protective factors, across cognitive, affective, social-interpersonal, and clinical domains that were concurrently and prospectively associated with suicidal ideation. The broad range of these factors, which form dynamic associations with suicidal ideation, closely map onto the key components of the suicidal model proposed in the FVT; namely, the suicidal belief system, affective system, physiological system, and behavioural system.

An important insight from the FVT is that the intensity of suicidal episodes depends on the interaction between triggering factors and an individual's baseline risk. According to FVT, individuals differ in their baseline vulnerability to the activation of suicidal mode, which is shaped by historical and developmental factors. This person-specific perspective partially explains the individual variability observed in both the temporal dynamics of suicidal ideation and its association with influencing factors in this review. Additionally, the

examination of temporal dependency and instability of suicidal ideation in this review also aligns with the perspective of Nonlinear Dynamic System Theory (Mishara, 1996; Butner et al., 2015). As suggested by Bryan et al. (2020), while suicidal ideation fluctuates as responsive to internal and external disturbances, the overall change process tends to remain stable (i.e., mild, gradual, and self-regulatable) rather than being out of control. This stability means that when suicidal ideation is temporarily elevated, it will gradually return to a homeostatic equilibrium through self-regulatory mechanisms (i.e., small-to-moderate positive autoregressive effects and RMSSDs). However, if a sufficiently strong force (e.g., major negative life events) disrupts the system and undermines its inherent self-regulating capacity to cope, it may lead to rapid and large fluctuations, pushing suicidal ideation further away from its homeostatic set point (i.e., negative autoregressive effects and large RMSSDs).

2.5.4 Strengths and limitations

This is the first review study in suicide literature to systematically synthesise research findings on short-term fluctuations in suicidal ideation. By employing a narrative synthesis approach, the temporal dynamics of suicidal ideation were examined in terms of persistence, variability, and instability, with relevant dynamic metrics utilised to assess the extent to which suicidal ideation is a dynamic process. Additionally, this review provides a comprehensive overview of the dynamic relationships between various factors and suicidal ideation by stratifying findings across different time frames (i.e., concurrent, prospective, and time-invariant). Unlike previous reviews in this field, which typically focus exclusively on intensive longitudinal studies (e.g., EMA and Daily diaries), this review included studies with assessment intervals ranging from multiple times per day to at least once a week. This broader scope allows for a more comprehensive examination of how suicidal ideation and its associated factors evolve across different time frames, which is an essential consideration for identifying optimal intervention windows in clinical practice. Furthermore, the findings shed light on the timescale at which risk and protective factors influence suicidal ideation, thereby helping to more accurately identify warning signs and allocate resources for effective preventions. For example, this review helps clarify whether factors associated with suicidal ideation in the moment can still be meaningful for predicting suicidal ideation in the next few days or whether these associations vary across momentary, daily, and week timescales. Moreover, a recurring theme in the synthesised findings was the discrepancy between group-level findings and individual-level scenarios. This highlights the need for both researchers

and clinicians to move beyond a one-size-fits-all approach when developing theoretical frameworks and designing prevention and intervention strategies.

While this review bridged the gap in suicide literature by providing a comprehensive narrative analysis of the temporal dynamics of suicidal ideation, several limitations should be noted. First, insights into dynamic patterns were primarily derived from the interpretations of autoregressive effects, intraclass correlation coefficients (ICCs), and proportional RMSSD (root mean squared successive differences) changes relative to the total scale score range. Because no meta-analysis was conducted, the synthesis of autoregressive effects focused on the presence and direction of a significant effects rather than precise effect sizes. Regression coefficients were reported to approximate effect strength, but this approach did not account for the dependence of measurement scale, and the values of coefficients were influenced by the covariates included in individual models. Additionally, ICCs were synthesised as a proxy measure of suicidal ideation variability. While ICCs provide useful information on determining the proportion of variances in suicidal ideation attributable to fluctuations within individual (1-ICC) versus between-individual differences, they do not demonstrate the degree of variability. Moreover, this review provides only an overarching theme of factors associated with different dynamic patterns of suicidal ideation, focusing on identifying relevant factors rather than elucidating how they exert influence within dynamic associations. Previous research has demonstrated the complexity of suicidal ideation dynamics through a fine-grained examination on the exact timescale of suicidal ideation (Coppersmith et al., 2023a). Studies using network analysis also revealed complex interactions between associated factors (Smith et al., 2024), with multiple factors closely interacting with each other making a collective impact on suicidal ideation (De Beurs et al., 2024). However, this review was unable to uncover such granular patterns, and the synthesis did not examine cross-lagged associations between suicidal ideation and influencing factors, and thus some interpretations ran the risk of being out of context. Lastly, although this review included a large number of studies, the number of studies with daily and weekly assessments were disproportionally fewer than studies with momentary assessments. As a result, this reduced the reliability of cross-group comparisons across different timescales.

2.5.5 Future directions

The findings of this review highlighted the highly variable nature of suicidal ideation time frames ranging from within minutes to days, as well as the complexity of real-time prediction.

To advance this research field, future research would benefit from adopting a meta-analytic approach to systematically examine existing evidence to clarify inconsistencies and better understand the overall magnitude of dynamic metrics of suicidal ideation and their association with risk and protective factors. Similar work has been conducted by Houben et al. (2015) examining the emotion dynamics and psychological wellbeing. In this regard, future studies are suggested to ensure consistent terminological use when describing dynamic patterns (e.g., avoiding interchangeable use of variability and instability) to enhance clarity and comparability across studies, as these were indeed distinct constructs (Ebner-Priemer et al., 2009; Jahng et al., 2008). In addition, the development or new theories or refinement of existing ones would benefit from explicitly considering the timeframe of an effect, such as the duration of a proposed factor's influence, and specifying a model's short-term and long-term applicability. Notably, among existing studies investigating short-term fluctuations in suicidal ideation, there is a lack of diversity in theoretical-informed examinations, with the majority of studies in this review focusing on constructs from the Interpersonal Theory of Suicide (IPTS; Joiner, 2005). Surprisingly, despite hopelessness being examined in 24 studies, only four studies investigated entrapment, while its closely related factor, defeat, was explored in just two studies.

Expanding theory-thriven investigations by integrating frameworks that contextualise associations within complex interplay between factors could provide valuable insights. The Integrated Motivational-Volitional (IMV; O'Connor, 2011; O'Connor & Kirtley, 2018) is particularly well-suited for this purpose, as it theorises the progression from defeat/humiliation to entrapment and suicidal ideation, while also considering several stage-specific moderators (e.g., coping, rumination, future thoughts, resilience etc.) that influence the occurrence of suicidal ideation. Finally, given the inevitable nature of individual variability, future research perspectives may benefit from shifting away from a binary "supported versus unsupported" approach to a more "fluid" perspective. Instead of focusing solely on whether a theory is validated, researchers should consider how theoretical frameworks can better accommodate individual differences in suicidal ideation and related constructs in a more constructed way. More importantly, a deep reflection on what individual differences signify and how can we make it inform and advance our future work across theoretical, empirical, and clinical domains is needed. To achieve this, qualitative research capturing first-hand accounts could offer important insights into both the temporal evolution of suicidal ideation in daily life and the individual variability in these experiences.

2.5.6 Conclusions

This review presents the first comprehensive narrative synthesis of the temporal dynamics of suicidal ideation and its associated factors. In summary, suicidal ideation fluctuates considerably across time frames ranging from minutes to days. It exhibits a small-to-moderate positive temporal dependency, substantial proportion of within-person variability with ranges depending on assessment frequency, and small-to-moderate instability. Concurrent associations between various factors and suicidal ideation were more consistent across assessment time frames than prospective associations, while no clear patterns emerged for time-invariant associations. These results should be interpreted with caution. Future theoretical and empirical research would benefit from integrating temporal dynamics and individual variability into in the study of suicidal ideation.

Chapter 3: Factors Associated with Suicidality and Parameters of Suicidal Ideation: A Preliminary Investigation of Cognitive Reactivity and Ego Depletion

3.1 Abstract

Background: Despite decades of research efforts dedicated to understanding the psychology of suicide, predictive accuracy has shown limited improvement over time. A major challenge may lie in the conflation of risk factors related to suicidality and the diverse characteristics of suicidal ideation, which hinders a clear understanding of suicide risk.

Aim: This study investigated psychological factors, particularly cognitive reactivity and ego depletion, associated with different suicidal histories and their links to the frequency, duration, and intensity of suicidal ideation.

Methods: An anonymous, cross-sectional online survey was conducted between October and December 2021 using opportunity sampling. Eligible participants (n = 312; M_{age} = 28.44, SD = 10.0; 80.4% White; 64.7% Female) were adults aged 18 or older living in the UK. The survey included self-reported measures of cognitive reactivity, ego depletion, and suicidal outcome (lifetime history of suicidal ideation and suicide attempts, as well as parameters of suicidal ideation), along with measures of impulsivity, entrapment, depression, perceived stress, resilience, and mindfulness.

Results: In univariate analysis, most psychological factors significantly distinguished between suicidal history groups, except for certain subcomponents of cognitive reactivity (i.e., Acceptance Coping, Control/Perfectionism) and impulsivity (i.e., Lack of perseverance). Most factors differentiated between the no history (NH) vs ideation (SI), and no history vs attempt (SA) groups, whereas fewer differentiated SI from SA groups. Factors that distinguished between the SI and SA groups included ego depletion, cognitive reactivity, impulsivity, depression, and protective factors such as mindfulness and resilience. However, in multivariate models, only impulsivity (SI vs. SA) and depression (NH vs. SA, SI vs. SA) independently predicted group membership. Furthermore, while most investigated factors

were individually associated with all three parameters of suicidal ideation, only a few predicted its frequency and duration beyond the effect of depression. In contrast, most factors independently predicted intensity of suicidal ideation, except for impulsivity and certain subcomponents of cognitive reactivity. Specifically, after controlling for depression, entrapment predicted both frequency and intensity, but not duration, whereas impulsivity predicted frequency only. The duration of suicidal ideation was only predicted by cognitive reactivity (total score and Hopelessness/Suicidality subscale) and perceived stress, beyond the effect of depression. Notably, Hopelessness/Suicidality subscale was the only factor that significantly predicted all three parameters of suicidal ideation. Sensitive analyses showed that, even after removing the suicidality-related items, hopelessness reactivity remained a significant predictor of the duration and intensity of suicidal ideation, independent of depression.

Limitations: The cross-sectional design limited causal inference. Small sample size in the no history group reduced statistical power for between-group comparisons.

Conclusions: These findings support the Integrated Motivational-Volitional Model, suggesting that entrapment is most strongly linked to suicidal ideation, while impulsivity is more associated with suicide attempts. Preliminary evidence indicated that cognitive reactivity and ego depletion can differentiate between individuals with different suicidal histories, although less strongly than impulsivity and depression. The results underscores the importance of examining the multidimensional nature of suicidal ideation and the challenges in predicting its more dynamic features, such as frequency and duration. Given the exploratory nature of this study, future research with larger samples is needed to replicate these findings.

3.2 Introduction

Suicide is a global health concern. Despite decades of research into the psychological underpinnings of suicide, suicide prediction remains poor with limited improvement in recent decades (Franklin et al., 2017). Key barriers to understanding suicide risk include conflating factors associated with distinct histories of suicidal behaviours (May & Klonsky, 2016) and the lack of examination of the multidimensional nature of suicidal ideation (Jobes et al., 2024; Reeves et al., 2022). For example, internalised cognitions, such as cognitive reactivity and ego depletion, have been shown to have roles in the development of suicidal

distress, however the nature of their association remains underexplored in suicide research. Therefore, the present study aims to explore these two factors in relation to suicide histories and the frequency, duration, and intensity of suicidal thoughts.

3.2.1 Current issues in suicide research

3.2.1.1 Differentiating between suicidal history groups

Identifying risk and protective factors associated with suicide has been a major pathway of suicide prevention efforts. Identifying factors associated with suicidal ideation, has received substantial research attention. However, a cross-national study has indicated that only 29% of individuals experiencing suicidal ideation proceed to make a suicidal attempt (Nock et al., 2008a). Despite this, the failure to disentangle the conflation of risk factors between suicidal ideation and attempts remains a pressing issue in contemporary suicide research (Byran & Rudd, 2016). A meta-analysis of 27 studies by May and Klonsky (2016) suggested that many of the identified suicide risk factors are better considered as risk factors for suicidal ideation due to their limited ability to distinguish between individuals with suicidal ideation vs suicide attempt. Therefore, it is essential to identify factors that differentiate the risk of suicidal ideation from the risk of suicidal attempts to better understand the mechanisms underlying the transition from ideation to behaviour.

There are several theories of suicidal behaviour. One leading model is the Integrated Motivational-Volitational (IMV) Model of Suicidal Behaviour (O'Connor, 2011; O'Connor & Kirtley, 2018) which is a comprehensive framework for understanding the distinct risk profiles underlying ideation formation and behavioural enactment (see Figure 1.1). The model outlines three distinct phases of suicide risk: the pre-motivational phase, which involves genetic and early life factors that create a predisposition for suicide risk; the motivational phase, where feelings of defeat and entrapment (triggered by stressful events) are key drivers of suicidal ideation; and the volitional phase, which encompasses eight specific factors that facilitate the progression from ideation to action. Research has provided converging evidence supporting the link between motivational-phase variables (such as defeat and entrapment) and suicidal ideation (e.g., Höller et al., 2021; Wetherall et al., 2018; Wetherall et al., 2021). Equally, volitional factors such as impulsivity have also been widely examined as predictors of suicide attempts, with general support for a positive relationship

between impulsivity and suicidality (Anestis et al., 2014; Brezo et al., 2006; Dhingra et al., 2015; Gvion & Apter, 2011; Millner et al., 2020, O'Connor et al., 2012).

3.2.1.2 Understanding the complexity of suicidal ideation

Another notable limitation in suicide research is the tendency to oversimplify the experience of suicidal ideation, thereby neglecting its dynamic and multifaceted nature. Recent studies using ecological momentary assessment have demonstrated that suicidal ideation varies considerably over a short period of time (i.e., hours and days) (Coppersmith et al., 2023; Hallensleben et al., 2019; Kleiman et al., 2017). Additionally, research shows that suicidal ideation is heterogeneous both within and between individuals in terms of frequency, duration, variability, and intensity (Czyz et al., 2019; Czyz et al., 2021; Witte et al., 2005). Notably, frequent, severe, and prolonged suicidal ideation was associated with a higher likelihood of suicidal attempts, independent of baseline demographical and clinical variables, in a 4-to-6-year follow-up study among adolescents (Miranda et al., 2014). Despite the significance of these phenomenological features of suicidal ideation, only a small number of studies explicitly examined distinct parameters of suicidal ideation. Moreover, definitions and measures of characteristics of suicidal ideation have tended to be inconsistent and conflated across studies, which potentially hinders accurate measurement and synthesis of research findings (Reeves et al., 2022).

3.2.2 Variables of primary focus in the present study

3.2.2.1 Cognitive reactivity

Cognitive reactivity (CR) is defined as the ease with which dysfunctional cognitions that were present during previous depressive episodes but had become dormant in remission are reactivated by a mild deterioration of mood (Ingram, Miranda, & Segal, 1998; Van der Does, 2002). Embedded in the Differential Activation Hypothesis (DAH; Teasdale, 1988), cognitive reactivity is conceptualised as a model of cognitive vulnerability to depressive relapse. According to Teasdale (1985), the information-processing system is influenced by emotional state, and thus it is the accessibility of the selective activation of depressogenic cognitions that is crucial in maintaining depression or predicting relapse. In support of the DAH, research evidence indicates that individuals with a history of depression exhibit higher cognitive reactivity than those without depression (Van der Dose, 2005). Moreover, the strength of this association varies as a result of the number of depressive episodes, with

individuals experiencing multiple episodes showing higher CR than those with a single or no previous episode (Elgersma et al., 2015).

Extending its application to suicidal behaviour, Lau and colleagues (2004) argued that suicidal ideation emerges from the negative thinking patterns, especially associated with hopelessness, established during previous depressive episodes. As a result, the association between depressed mood and suicidal cognition strengthens over time, leading to readily available suicidal thoughts when in a low mood. Research shows that previously depressed patients with suicidal ideation tended to exhibit higher levels of cognitive reactivity, specifically in respect of the hopeless and suicidal reactivity, compared with previously depressed patients without suicidal ideation (Antypa, Van der Does, & Penninx, 2010; Williams et al., 2008). Despite its potential to shed light on the cognitive mechanisms underlying suicide, cognitive reactivity has received relatively little research attention in recent years.

3.2.2.2 Ego Depletion

The strength theory of self-regulation in social psychology postulates that volitional behaviours (i.e., the human capacity to exert control or make alterations on their own behaviours) draw on limited self-regulation resources that are subject to depletion, akin to the way muscle strength deteriorates with exertion (Baumeister & Heatherton, 1996; Baumeister, 2002). Ego depletion is thought to occur when initial self-control related to a behaviour adversely interferes with the performance of subsequent acts that require self-control (Baumeister, Vohs, &Tice, 2007). The effect of ego depletion can lead to behavioural disinhibition due to diminished self-control resources and more intense urges to engage in a behaviour (Baumeister, 2014). Research supports the effect of ego depletion on a range of behaviours (see Hagger et al., 2010 for a review), including increased frequency of impulsive behaviours (DeWall et al., 2007; Vohs & Faber, 2007), problematic alcohol consumption (Muraven, Collins, & Neinhaus, 2002), greater susceptibility to automatic attitude conflicting with personal standards (e.g., automatic preference for candy vs. dietary restraints) (Hofmann, Rauch, & Gawronski, 2007), and increased death-related thoughts (Gailliot, Schmeichel, Baumeister, 2006). In suicide research, the Escape Theory of Suicide (Baumeister, 1990) posits that individuals at risk of suicide experience failures in self-regulations as their lived reality falls short of their personal expectations. The negative self-comparison intensifies aversive self-awareness and generates unbearable emotional distress that individuals want to escape. Consequently, individuals may experience *cognitive*

deconstruction, characterised by reduced cognitive inhibition and diminished higher-level cognitive processing, which are essential for maintaining meaningful self-awareness and eliciting negative affect. This deconstructed mental state lessens inner constraints, thereby removing both cognitive and behavioural barriers to suicidal ideation and behaviours (Vohs & Baumeister, 2002). Despite the well-established theoretical foundation, there is currently a dearth of research directly examining the relationship between the depletion of self-regulation resources and suicide risk.

3.2.3 The present study

Given the dearth of literature exploring both cognitive reactivity and ego depletion in relation to suicidal ideation (including frequency, duration and intensity), the overarching aim of this study was to explore the extent to which cognitive reactivity and ego depletion contribute to the development of suicide risk. To address this aim, we had two objectives. First, we sought to determine whether cognitive reactivity and ego depletion could differentiate between individuals with a history of suicidal ideation only (SI group), those with a history of suicidal attempts (SA group), and those who have never experienced suicidal ideation/behaviours (NH group). Second, we planned to identify the factors associated with different quantifiable aspects of suicidal ideation, including its frequency, duration, and intensity. The IMV model was adopted to guide this exploratory study, with other established factors associated with suicidal ideation (including impulsivity, resilience, stress and depression) incorporated into the analyses to contextualise the findings. Moreover, suicide research has largely focused on identifying risk, with comparatively fewer studies examining protective factors (De Beurs et al., 2019; Nock et al., 2008b). Mindfulness-based approaches have been commonly-used in suicide intervention, enhancing awareness of the activation of negative thoughts and regulating attention during negative mood states to reduce suicidality (Williams & Swales, 2004). However, limited studies have explored the protective role of mindfulness in relation to suicide history and the parameters of suicidal ideation.

As Chapter 2 demonstrated, the association patterns between suicidal ideation and the investigated factors were most consistent when examined concurrently. Accordingly, and in light of the exploratory focus of this study, a cross-sectional design was adopted. Taken together, this study had the following research questions and hypotheses:

Q1: To what extent do cognitive reactivity, ego depletion, and other psychological factors (i.e., entrapment, impulsivity, resilience, mindfulness, depression, and stress) differentiate between individuals with a history of suicidal ideation (SI group), suicidal attempt (SA group), and no history of suicide (NH group)? What are the most important risk factors for differentiating individuals by their suicide history?

> H1: Participants in the SI and SA groups would show higher cognitive reactivity, ego depletion, entrapment, impulsivity, depression, and stress, and lower mindfulness and resilience, compared to the NH group. Impulsivity would be especially elevated in the SA group relative to the SI group.

Q2: To what extent are cognitive reactivity, ego depletion, and other psychological factors (i.e., entrapment, impulsivity, resilience, mindfulness, depression, and stress) associated with the frequency, duration, and intensity of suicidal ideation? Which risk factors remain significant predictors over and above depression?

> H2: Cognitive reactivity, ego depletion, entrapment, impulsivity, depression, and stress, would be positively associated with suicidal ideation (including frequency, duration, and intensity). Conversely, mindfulness and resilience would be negatively associated with suicidal ideation parameters.

3.3 Methods

3.3.1 Participants and Design

This study employed a cross-sectional design to collect participants' self-report data through an online survey. Opportunity sampling was used to recruit participants. The research was advertised on online forums (e.g., Reddit and the Student Room), the University of Glasgow Psychology participant pool, social media sites (i.e., Twitter and Facebook), and the Suicidal Behaviour Research Laboratory (SBRL) website between October and December 2021. Eligible participants were adults aged 18 and over, living in the UK who had an opportunity to view the advert and were interested in taking part in the study. Individuals with no history of suicidal ideation and attempts were encouraged to participate in the study for conducting between-group comparisons with the suicidal history group. No additional exclusion criteria were applied. To determine the minimum required sample size, a priori power analysis was

conducted using G*power 3.1 for a hierarchical regression. Given the absence of similar prior investigations, the analysis assumed a medium effect size of $f^2 = 0.15$, alpha = 0.05, power = 0.80, and maximum number of predictors = 17, resulting in a requirement of 146 participants to ensure adequate statistical power. Since subgroups analyses were planned to further explore the nuances within the dataset in greater detail, we aimed to recruit a minimum of 300 participants.

3.3.2 Procedure

The study protocol entitled "Exploring psychological factors related to fluctuations in suicidal ideation" was approved by the University of Glasgow's Medical, Veterinary and Life Sciences Ethics Committee (Project No: 200200143). The study survey was pre-tested with SBRL researchers and people from general population to ensure clarity and acceptability prior to implementation. Interested participants were invited to complete the study questionnaire through a web link created using Online Surveys (https://www.onlinesurveys.ac.uk). The landing page included an information sheet, privacy notice, consent form, and support sheet. Consent was indicated by ticking the checkbox. The survey began with demographics and mental health history questions, followed by the main questionnaire on the next page. To counterbalance any potential order effects, question order was reversed for half of the participants (N = 155, 47%), with suicide-related items remaining mid-way for both versions. Upon survey completion, participants were invited to enter a prize draw for a £200 Amazon e-voucher via a separate hyperlink to ensure their survey responses remained unlinked and anonymous.

3.3.3 Measures

Suicidal outcomes. The Columbia-Suicide Severity Rating Scale (C-SSRS; Posner et al., 2011) was used to measure suicidal outcomes, and its psychometric properties have been validated in both clinical and research settings among adolescents and adults (Nam et al., 2024; Posner et al., 2011). For this study, minor modifications were made to the wording of the questions to ensure the suitability for addressing the research questions. Lifetime suicidal ideation and attempts were assessed using two items, each with a dichotomous answer "Yes" or "No". Frequency of suicidal ideation was rated using a 5-point scale ("When you are having thoughts about ending your life, how frequently do the thoughts tend to occur?" 1 = less than once a week, 2 = once a week, 3 = 2 to 5 times in week, 4 = daily or almost daily,

5 = many times each day). Duration of suicidal ideation was assessed by the following item "When you are having thoughts about ending your life, how long do they last?" with responses ranging from 1 to 5 (1 = fleeting/few seconds or minutes, 2 = less than 1 hour/some of the time, 3 = 1 to 4 hours/a lot of time, 4 = 4 to 8 hours/most of day, 5 = more than 8 hours/persistent or continuous). To assess the intensity of suicidal ideation, a modified item from Czyz et al. (2019) was used (i.e., "When you are having thoughts about ending your life, how intense are the thoughts?") with a 7-point scale from "extremely mild" to "extremely intense".

Cognitive reactivity. The 30-item revision of the Leiden Index of Depression Sensitivity-Revised (LEIDS-RR; Solis et al., 2017, Van der Does & William, 2003) assesses to what extent dysfunctional cognitions could be activated by a mild mood deterioration. Participants were primed before filling out each statement by being asked to imagine a situation where they feel somewhat sad. The LEIDS-RR was comprised of five subscales including Hopelessness/Suicidality (HOP; e.g., "When I feel down, I more often feel hopeless about everything"), Acceptance/Coping (ACC; e.g., "When in a sad mood, I feel more like myself"), Aggression (AGG; e.g., "In a sad mood, I do more things that I will later regret"), Control/Perfectionism (CTR; e.g., "When I feel down, I am more inclined to want to keep everything under control"), and Avoidant Coping (AVC; e.g., "When in a low mood, I take fewer risks"). It is scored on a 5-point Likert-type scale from "not at all" to "very strongly" and higher scores indicate that dysfunctional cognitions are reactivated to a greater extent during a sad mood. The LEIDS-RR has an improved scale structure compared to its previous revised version (i.e., the LEIDS-R), and both versions have demonstrated good reliability and validity in diverse samples (Himle, Havik, & Thimm, 2020; Solis et al., 2017). In the present study, the complete LEIDS-RR total score demonstrated good internal consistency (Cronbach's $\alpha = 0.87$). The internal consistency for the five subscales was good to acceptable, except for the CTR subscale (Cronbach's $\alpha = 0.90$, 0.71, 0.80, 0.76, and 0.64, for HOP, ACC, AGG, AVC, and CTR, respectively).

Ego depletion. Two reliable psychometric scales that capture different aspects of ego deletion concept were used. The Depletion Sensitivity Scale (DSS; Salmon et al., 2014) is a self-report measurement of the rate at which the conditions requiring self-control resources would result in the state of ego depletion (e.g., "When I am (mentally) fatigued, I am easily tempted to do things that are actually no good for me"). It consists of 11 items with a 7-point scale ranging from "totally disagree to "totally agree" and higher scores indicate more vulnerable to be ego-depleted. According to Salmon et al. (2014), the DSS has good

psychometric properties, and it measures conceptually distinct constructs from impulsivity, fatigue, and trait and state self-control. The internal consistency of the DSS within the current study is good, with a Cronbach's α value of 0.86. The Self-Regulatory Fatigue Scale (SRF; Nes et al., 2013) is a self-report measure assessing the cognitive, emotional, and behavioural components of self-regulation capacity (e.g., "I experience uncontrollable temper outbursts"). It consists of 18 items on a 5-point scale ranging from "strongly disagree" to "strongly agree" and higher scores reflect the exhaustion of self-regulatory resources. The SRF was originally developed to measure self-regulatory capacities in chronic illness, but it has been applied to diverse samples outside of the target population, with evidence of its validity and effectiveness as a measure of ego depletion (Cui et al., 2022; Özden & Tuna, 2022; Zhang, Bai, &Yang et al., 2022). In the current study, the SRF showed good internal consistency (Cronbach's α = 0.83).

Impulsivity. The short-version UPPS-P (S-UPPS-P; Cyders et al., 2014; Whiteside & Lynam, 2001) is a multi-faceted measurement of impulsive behaviours, which consists of 20 items on a 4-point scale ranging from "agree strongly" to "disagree strongly" and higher score indicates a higher level of impulsivity. It comprises five impulsive personality traits, including Negative Urgency ("Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse"), Lack of Perseverance ("I generally like to see things through to the end"), Lack of Premeditation ("My thinking is usually careful and purposeful"), Sensation Seeking (" I quite enjoy taking risks"), and Positive Urgency ("I tend to act without thinking when I am really excited"). The results of a meta-analysis conducted by Beach, Gissandaner, and Schmidt (2021) support the utility of the UPPS model in relation to suicide assessment, suggesting it is a promising tool for use in clarifying inconsistent findings between impulsivity and suicide. Additionally, the validity of the S-UPPS-P has been previously demonstrated (Cyders et al., 2014). In the current study, internal consistency was good for the total score of S-UPPS-P (Cronbach's α = 0.83) and was generally acceptable for each subscale except for Lack of perseverance (Cronbach's α = 0.72, 0.77, 0.73, 0.82, 0.68 for Negative Urgency, Lack of Premeditation, Sensation Seeking, Positive Urgency, Lack of Perseverance, respectively).

Entrapment. The Entrapment Short-Form Scale (E-SF; De Beurs et al., 2020) is a 4-item assessment of internal entrapment (e.g., "I feel trapped inside myself") and external entrapment (e.g., "I often have the feeling that I would just like to run away"), derived from the 16-item full scale developed by Gilbert and Allan (1998). Items are rated on a 5-point scale, from "Not at all like me" to "Extremely like me" with higher scores indicating a

greater sense of feeling entrapped. The psychometric properties of the E-SF have been examined in both clinical and general populations, providing evidence of its reliability and validity as a brief measure of entrapment (De Beurs et al., 2020). In the current study, the E-SF demonstrated good internal consistency (Cronbach's α = 0.87).

Depression. The 9-item depression scale of the Patient Health Questionnaire depression scale (PHQ-9; Kroenke, Spitzer, & Williams, 2001) scores each of the nine DSM-IV criteria for depressive disorder from "0" (not at all) to "3" (nearly every day). Higher scores indicate increased severity of depression. The item 9 assessed thoughts of self-harm and suicide and was therefore excluded from the total score of the scale. The PHQ-9 has been widely used in both clinical and research settings and has demonstrated good reliability and validity in measuring the severity of depression (Kroenke et al., 2001). The internal consistency of the 8-item PHQ was good within the current study (Cronbach's α = 0.88).

Perceived stress. The Perceived Stress Scale – Short Form (PSS-4; Cohen & Williamson, 1988) assesses the level of stress perceived by participants within a month. It comprises 4 items on a 5-point scale from "Never" to "Very often" and higher scores indicate a higher level of stress. The PSS-4 has been proven to be a reliable, abbreviated measure of psychological stress (Lee, 2012), demonstrating good internal consistency in the current study (Cronbach's α = 0.82).

Resilience. The Brief Resilience Scale (BRS; Smith et al., 2008) assesses the ability to bounce back following stressful circumstances. It consists of 6 items on a 5-point scale ranging from "Strongly disagree" to "Strongly agree" and higher scores indicate higher levels of resilience. The BRS has been found to be a reliable and valid measure of resilience in the adult population (Windle, Bennett, & Noyes, 2011), and good internal consistency was evidenced in the current study (Cronbach's α = 0.89).

Mindfulness. The 15-item Five Facets Mindfulness Questionnaire (FFMQ-15; Baer et al., 2008) is an assessment of mindfulness in Observing, Describing, Acting with Awareness, Non-Judging of inner experience, and Non-Reactivity to inner experience. Items are rated on a 5-point scale from "Never or very rarely true" to "Very often or always true". The FFMQ-15 is a widely used measure of mindfulness with good reliability and validity across a range of populations (Gu et al., 2016; Hou et al., 2014). Within the current study, the internal consistency of the FFMQ-15 total score is acceptable (Cronbach's α = 0.77).

3.3.4 Statistical analyses

Missing data analyses. Statistical analysis was conducted using SPSS (version 28). Missing data analysis was conducted for all outcome measures. Following previous research (e.g., McClelland, Evans, & O'Connor, 2021; Wetherall et al., 2018), any participant who completed less than 75% of the overall survey was removed from the study; likewise, participants' data were removed from any scale if less than 75% of the scale items were completed. Subsequently, five participants (1.6%) were removed from the dataset (of which three participants did not complete any scale items) and one additional case (0.3%) was removed from the impulsivity measure (S-UPPS-P). Missing data at the item-level ranged from 0 to 0.6%. Little's Missing Completely at Random (MCAR) test indicated that data were missing completely at random for most scales, except for the Depletion Sensitivity Scale ($p < 0.01$) and the 15-item Five-Facets Mindfulness Questionnaire ($p = 0.018$). However, as missingness was below the acceptable threshold of 5% (Dong & Peng, 2013; Schafer et al., 1999), estimation-maximisation (EM) imputation was employed to generate a complete dataset.

Preliminary analyses. Descriptive statistics for categorical demographic variables (e.g., gender, ethnicity, mental health history, etc.) and continuous demographic variables (i.e., age) were examined by frequencies and means with standard deviations, respectively (see Table 3.1). Between-group differences in age and gender were investigated by using one-way ANOVA and Chi-square test, which indicated no differences between suicidal history group on age, $F(2, 305) = 1.575$, $p = 0.209$ and gender, $\chi^2(4) = 8.587$, $p = 0.072$. Next, distributions of scores on continuous variables were checked by inspecting the shape of histograms as an indication of whether a normal distribution was evident. Visual inspection showed no extreme values signalled as potential outliers and depicted acceptable normally distributed shapes for almost all variables with both Skewness and Kurtosis values ranging between -1 and 1, except for frequency of suicidal ideation (Skewness = -0.325, Kurtosis = -1.287), acceptance coping (Skewness = 1.445, Kurtosis = 2.240), and internal entrapment (Skewness = -0.323, Kurtosis = -1.277); therefore, parametric statistics were used in the subsequent analyses.

Primary analyses. Participants were classified into three groups based on their self-report suicide history at the point they completed the survey: no history (NH), suicidal ideation only (SI), and suicidal attempt (SA group). Multinomial logistic regressions were used to

explore relationships between continuous independent variables and suicide history group, with group differences reported by using odds ratio (OR) and 95% confidence intervals (95% CI). First, univariate models were used to explore the relationship between individual variables and the outcome variable. Next, risk factors, excluding mindfulness and resilience, that significantly differentiated between groups were entered into a multivariate model to determine the most important risk factor in differentiating between suicidal history groups. Subscale scores were not investigated in the multivariate model due to insufficient power. To investigate predictors of suicidal ideation parameters (frequency, duration, intensity), simple linear regressions were conducted among participants in the SI and/or SA groups. Significant risk factors were then separately tested in multiple linear regressions controlling for depression to assess their independent contributions.

Sensitivity analyses. Given the potential inflation of cognitive reactivity effects due to suicide-related items in the HOP subscale, two post-hoc sensitivity analyses were undertaken to test the robustness of the findings. One excluded the three suicide reactivity items (the remaining items were referred to as "Hopelessness Reactivity" by Williams and colleagues, 2008), and the other excluded the entire HOP subscale. Additionally, given conceptual overlap between depletion sensitivity and self-regulatory fatigue, separate analyses were conducted for each variable, where relevant. Full details of sensitivity analyses are presented in the supplementary materials.

3.4 Results

The study sample consist of 312 participants aged between 18 and 70 years old (M_{age} = 28.44, SD = 10.0, 64.7% female) who live in the UK at the time of completing the online survey. As shown in Table 3.1, the majority of participants endorsed White (80.4%) ethnicity and more than half of them were single (60.6%), heterosexual (55.1%), and had a higher education degree (61.9%). In terms of self-reported mental health history, depression (52.2%) and anxiety (49.7%) were the most common diagnoses reported by participants, and 31.4% of participants reported no history of any mental health diagnosis. Small-to-moderate significant correlations (Pearson's r) were found between most variables and suicidality (see Appendix 5).

Table 3.1 *Participants' demographic characteristics by self-reported suicidal thoughts and attempts history (N = 312)*

	Total sample (n = 312)	NH group (n = 43)	SI group (n = 154)	SA group (n = 115)
Gender n (%)				
Male	98 (31.4)	20 (46.5)	44 (28.6)	34 (29.6)
Female	202 (64.7%)	23 (53.5)	105 (68.2)	74 (64.3)
Other	10 (3.2%)	0	4 (2.6)	6 (5.2)
Missing/Not stated	2 (0.6)	0	1 (0.6)	1 (0.9)
Age				
Mean (SD)	28.44 (10.0)	28.10 (9.4)	27.58 (10.1)	29.74 (9.9)
n	308	42	153	113
Missing/Not stated, n (%)	4 (1.3)	1 (2.3)	1 (0.6)	2 (1.7)
Ethnicity n (%)				
White	251 (80.4)	28 (65.1)	123 (79.9)	100 (87.0)
Black/African/Caribbean/ Black British	10 (3.2)	3 (7.0)	5 (3.2)	2 (1.7)
Asian/Asian British	23 (7.4)	5 (11.6)	14 (9.1)	4 (3.5)
Arab/Arab British	5 (1.6)	1 (2.3)	3 (1.9)	1 (0.9)
Mixed/Multiple Ethnicities	13 (4.2)	2 (4.7)	4 (2.6)	7 (6.1)
Other	8 (2.6)	4 (9.3)	4 (2.6)	0
Missing/Not stated	2 (0.6)	0	1 (0.6)	1 (0.9)
Education n (%)				
Left school without qualifications	6 (1.9)	0	0	6 (5.2)
Standard grades/GCSE/O Level	26 (8.3)	5 (11.6)	9 (5.8)	12 (10.4)
Highers/A Levels	62 (19.9)	7 (16.3)	31 (20.1)	24 (20.9)
HNC/HND/NQ/SVQ/Other vocational qualification	24 (7.7)	1 (2.3)	7 (4.5)	16 (13.9)
Undergraduate degree	106 (34.0)	18 (41.9)	61 (39.6)	27 (23.5)
Postgraduate degree	87 (27.9)	12 (27.9)	45 (29.2)	30 (26.1)
Missing/Not stated	1 (0.3)	0	1 (0.6)	0
Sexual orientation n (%)				
Heterosexual/Straight	172 (55.1)	36 (83.7)	91 (59.1)	45 (39.1)
Gay/Lesbian	19 (6.1)	1 (2.3)	5 (3.2)	13 (11.3)
Bisexual	81 (26.0)	2 (4.7)	38 (24.7)	41 (35.7)
Asexual	9 (2.9)	0	6 (3.9)	3 (2.6)
Not sure	20 (6.4)	4 (9.3)	6 (3.9)	10 (8.7)
Other	9 (2.9)	0	7 (4.5)	2 (1.7)
Missing/Not stated	2 (0.6)	0	1 (0.6)	1 (0.9)
Employment status n (%)				
Employed full time	30 (9.6)	2 (4.7)	13 (8.4)	15 (13.0)
Employed part time	35 (11.2)	6 (14.0)	17 (11.0)	12 (10.4)
Self-employed	8 (2.6)	2 (4.7)	2 (1.3)	4 (3.5)
Unemployed/Looking for work	12 (3.8)	2 (4.7)	7 (4.5)	3 (2.6)
Unemployed/Not looking for work	29 (9.3)	1 (2.3)	11 (7.1)	17 (14.8)
Retired	57 (18.3)	9 (20.9)	31 (20.1)	17 (14.8)
Student	128 (41.0)	21 (48.8)	68 (44.2)	39 (33.9)
Other	11 (3.5)	0	4 (2.6)	7 (6.1)
Missing/Not stated	2 (0.6)	0	1 (0.6)	1 (0.9)
Marital status n (%)				
Single	189 (60.6)	30 (69.8)	100 (64.9)	59 (51.3)
Married	41 (13.1)	8 (18.6)	21 (13.6)	12 (10.4)
Separated	2 (0.6)	0	2 (1.3)	0

Divorced	5 (1.6)	0	0	5 (4.3)
Widowed	3 (1.0)	0	2 (1.3)	1 (0.9)
Co-habiting	55 (17.6)	4 (9.3)	19 (12.3)	32 (27.8)
Other	15 (4.8)	1 (2.3)	9 (5.8)	5 (4.3)
Missing/Not stated	2 (0.6)	0	1 (0.6)	1 (0.9)
Mental health history n (%)				
Depression	163 (52.2)	7 (16.3)	73 (47.4)	83 (72.2)
Anxiety	155 (49.7)	8 (18.6)	68 (44.2)	79 (68.7)
Bipolar disorder	20 (6.4)	2 (4.7)	7 (4.5)	11 (9.6)
Borderline personality disorder	22 (7.1)	0	2 (1.3)	20 (17.4)
Eating disorder	23 (7.4)	0	8 (5.2)	15 (13.0)
None	98 (31.4)	31 (72.1)	55 (35.7)	12 (10.4)
Other	55 (17.6)	1 (2.3)	25 (16.2)	29 (25.2)

Note. Mental health history was self-reported. NH = no history group, SI = history of suicidal ideation only group, SA = history of suicidal attempt group

3.4.1 Factors distinguishing between individuals by their suicidal history groups

3.4.1.1 The univariate multinomial logistic regression models

Results showed that all variables significantly distinguished between suicidal history groups, apart from two sub-components of cognitive reactivity (i.e., Acceptance Coping and Control/Perfectionism), and one sub-component of impulsivity (i.e., Lack of Perseverance) (Table 3.2). Pairwise analysis indicated that cognitive reactivity (i.e., total score, Avoidant Coping, Aggression, and Hopelessness/Suicidality) and ego depletion (i.e., depletion sensitivity and self-regulatory fatigue) significantly distinguished between NH and SI groups, as well as between NH and SA groups. Specifically, both suicide groups (SI and SA) were higher on these variables than those without a suicidal history (NH) (CR total score: NH vs SI: OR = 1.06, 95% CI = 1.04 to 1.09; NH vs SA: OR = 1.08, 95% CI = 1.06 to 1.11. Avoidant Coping: NH vs SI: OR = 1.16, 95% CI = 1.09 to 1.23; NH vs SA: OR = 1.19, 95% CI 1.11, 1.27. Aggression: NH vs SI: OR = 1.13, 95% CI = 1.06 to 1.21; NH vs SA: OR = 1.19, 95% CI = 1.11 to 1.28. Hopelessness/Suicidality: NH vs SI: OR = 1.36, 95% CI = 1.23 to 1.49; NH vs SA: OR = 1.50, 95% CI = 1.35 to 1.66. Depletion sensitivity: NH vs SI: OR = 1.08, 95% CI = 1.04 to 1.11; NH vs SA: OR = 1.11, 95% CI = 1.07 to 1.15. Self-regulatory fatigue: NH vs SI: OR = 1.10, 95% CI = 1.06 to 1.14; NH vs SA: OR = 1.14, 95% CI = 1.10 to 1.19).

Furthermore, those with higher scores on both measures of ego depletion and cognitive reactivity (i.e., Total score, Aggression and Hopelessness/Suicidality) were more likely to be

Table 3.2 *Univariate multinomial logistic regression comparing scales scores between participants' suicidal history groups (NH, n = 43; SI, n = 154; SA, n = 115), N = 312, df = 2.*

Variable	χ^2	p	Mean (SD)		
			NH group	SI group	SA group
Depletion sensitivity	**40.051**	**< .001**	**47.42 (10.54)**	**57.02 (10.81)**	**60.10 (10.02)**
Self-regulatory fatigue	**53.703**	**< .001**	**50.32 (10.60)**	**60.56 (10.13)**	**64.40 (9.66)**
Cognitive reactivity					
Total score	**49.777**	**< .001**	**40.20 (17.08)**	**57.31 (16.08)**	**61.74 (15.82)**
Acceptance Coping	0.404	.817	4.49 (4.28)	4.22 (3.88)	4.04 (4.15)
Avoidant Coping	**31.156**	**< .001**	**15.51 (5.90)**	**20.49 (5.62)**	**21.22 (5.30)**
Control/Perfectionism	2.972	.226	8.49 (3.73)	9.73 (4.16)	9.53 (4.43)
Aggression	**25.483**	**< .001**	**7.19 (4.94)**	**10.67 (5.47)**	**12.17 (5.73)**
Hopelessness/Suicidality	**104.969**	**< .001**	**4.53 (3.66)**	**12.20 (5.23)**	**14.78 (5.15)**
Impulsivity					
Total score	**14.212**	**< .001**	**44.34 (6.45)**	**44.71 (8.34)**	**48.50 (9.73)**
Negative Urgency	**30.276**	**< .001**	**9.55 (2.53)**	**11.39 (2.72)**	**12.28 (2.57)**
Positive Urgency	**14.837**	**< .001**	**8.21 (2.66)**	**7.97 (3.06)**	**9.41 (3.12)**
Lack of Perseverance	3.506	.173	7.88 (1.95)	8.19 (2.29)	8.59 (2.43)
Lack of Premeditation	**7.072**	**.029**	**7.55 (2.12)**	**7.67 (2.29)**	**8.40 (2.68)**
Sensation Seeking	**9.428**	**.009**	**11.14 (2.89)**	**9.49 (3.02)**	**9.83 (3.29)**
Entrapment					
Total score	**53.709**	**< .001**	**4.81 (3.84)**	**9.98 (4.56)**	**11.00 (4.52)**
Internal entrapment	**52.860**	**< .001**	**1.88 (2.10)**	**4.87 (2.74)**	**5.46 (2.65)**
External entrapment	**34.946**	**< .001**	**2.93 (2.20)**	**5.11 (2.24)**	**5.54 (2.26)**
Depression	**63.731**	**< .001**	**6.74 (4.67)**	**12.58 (5.64)**	**15.17 (5.90)**
Stress	**37.195**	**< .001**	**6.82 (2.45)**	**9.88 (3.27)**	**10.47 (3.54)**
Mindfulness	**20.367**	**< .001**	**47.17 (6.84)**	**43.01 (8.25)**	**40.58 (8.28)**
Resilience	**44.103**	**< .001**	**19.77 (4.74)**	**14.86 (5.07)**	**13.52 (4.88)**

Note. Depression was measured with the 8-item PHQ9. Values highlighted in bold are statistically significant ($p < .05$). χ^2 = Chi-square, p = p-value. SD = Standard deviation.

in suicide attempt group than the suicidal ideation group (Depletion sensitivity: OR = 1.03, 95% CI = 1.01 to 1.06; Self-regulatory fatigue: OR = 1.04, 95% CI = 1.01 to 1.07; CR Total: OR = 1.02, 95% CI = 1.00 to 1.03; Aggression: OR = 1.05, 95% CI = 1.00 to 1.10; Hopelessness/Suicidality: OR = 1.10, 95% CI = 1.05 to 1.16). Other psychological factors, including entrapment (total score, internal and external entrapment), depression, stress, mindfulness, and resilience, significantly distinguished individuals with a suicidal history (i.e., the SI and SA groups) from those without such a history. Compared with the NH group, the SI and SA groups reported higher levels of entrapment, depression, stress, as well as lower levels of mindfulness and resilience. Moreover, the SA group had higher depression and lower mindfulness and resilience compared to the SI group (see Appendix 6).

In line with our prediction, individuals who made a suicidal attempt reported significantly higher impulsivity than with those who only thought about suicide or had no suicidal history. Specifically, higher impulsivity total score, Negative Urgency, Positive Urgency, and Lack of Premeditation increased the risk of having a history of suicidal attempt in comparison of having a history of suicidal ideation (Impulsivity total score: OR = 1.05, 95% CI = 1.02 to 1.08; Negative urgency: OR = 1.14, 95% CI = 1.04 to 1.26; Positive urgency: OR = 1.17, 95% CI = 1.08 to 1.27; Lack of premeditation: OR = 0.13, 95% CI = 1.02 to 1.25). Also, higher impulsivity total score, Negative Urgency, Positive Urgency, and lower Sensation Seeking were associated with the risk of having a history of suicidal attempt compared to having no history of suicide (Impulsivity total score: OR = 1.06, 95% CI = 1.01 to 1.10; Negative urgency: OR = 1.45, 95% CI = 1.26 to 1.66; Positive urgency: 1.13, 95% CI = 1.01 to 1.28; Sensation seeking: OR = 0.87, 95% CI = 0.77 to 0.98). Additionally, individuals with higher Negative urgency (OR = 1.27, 95% CI = 1.12 to 1.44) and lower Sensation Seeking (OR = 0.84, 95% CI = 0.75 to 0.94) were more likely to have a history of suicidal ideation than those who had no suicidal history.

3.4.1.2 The multivariate multinomial logistic regression models

Cognitive reactivity total score, ego depletion (i.e., depletion sensitivity and self-regulatory fatigue), impulsivity total score, entrapment total score, depression, and stress were entered into the multivariate model. As shown in Table 3.3, among the variables investigated, only impulsivity and depression made significant contributions in differentiating individuals by suicidal history group. In the context of controlling for other variables, pairwise analysis (Table 3.4) revealed that impulsivity significantly distinguished between NH vs SI groups and between SI vs SA groups; depression significantly distinguished between NH vs SA groups and between SI vs SA groups. Specifically, with a one-unit increase in depression, the likelihood of being in the SA group increased by 15.4% compared to the NH group. Moreover, a higher score of impulsivity and depression was associated with a 3.3% increase and an 8.9% increase, respectively, in the likelihood of being in the SA group compared to the SI group. Additionally, contrary to our hypothesis, higher impulsivity was associated with being in the NH group compared to the SI group (OR = 0.94, 95% CI = 0.89 to 0.99). However, this result appears to be spurious given that impulsivity (overall level) did not significantly distinguish between the NH and SI group in the univariate model. Furthermore, the mean scores presented in Table 3.2 indicate minimal differences in impulsivity levels between the NH (M = 44.71, SD = 8.34) and SI (M = 44.34, SD = 6.45) groups. It is noteworthy that, although the effect of cognitive reactivity was not statistically significant

in the multivariate model (p =.103), pairwise comparisons did indicate that a higher level of cognitive reactivity was associated with the SI group compared to the NH group (OR = 1.031, 95% CI 1.001, 1.062, p = .045), and a marginal effect for distinguishing between the NH group and the SA group (OR = 1.032, 95% CI 1.000, 1.065, p = .053). By inference, cognitive reactivity failed to reach the statistical significance was likely due to the small sample size in the NH group.

Table 3.3 *Multivariate multinomial logistic regression between NH, SI, and SA groups (N = 311, df = 2).*

Variables	$\chi 2$	*p*
Cognitive reactivity (Total score)	4.540	.103
Depletion sensitivity	1.733	.421
Self-regulatory fatigue	1.417	.492
Impulsivity (Total score)	**7.794**	**.020**
Entrapment (Total score)	2.888	.236
Depression	**9.332**	**.009**
Stress	1.537	.464

Note. Depression was measured with the 8-item PHQ9. Values highlighted in bold are statistically significant (p < .05). NH = no history group, SI = history of suicidal ideation only group, SA = history of suicidal attempt group, χ^2 = chi square, *p* = p-value.

Table 3.4 *Pairwise analysis following multivariate multinomial logistic regressions between NH, SI, and SA groups (N = 311).*

	NH vs SI[a]					NH vs SA[a]					SI vs SA[b]				
			95% CI					95% CI					95% CI		
	B	OR	Low	High	*p*	B	OR	Low	High	*p*	B	OR	Low	High	*p*
Cognitive reactivity (Total score)	0.030	1.031	1.001	1.062	.045	0.032	1.032	1.000	1.065	.053	0.001	1.001	0.981	1.021	.909
Depletion sensitivity	0.033	1.033	0.984	1.085	.191	0.030	1.031	0.978	1.086	.257	-0.003	0.997	0.965	1.031	.876
Self-regulatory fatigue	0.012	1.012	0.950	1.078	.714	0.033	1.033	0.966	1.105	.338	0.021	1.021	0.981	1.063	.308
Impulsivity (Total score)	**-0.061**	**0.941**	**0.893**	**0.992**	**.023**	-0.028	0.972	0.920	1.028	.321	**0.033**	**1.033**	**1.000**	**1.068**	**.047**
Entrapment (Total score)	0.117	1.124	0.981	1.287	.091	0.093	1.097	0.951	1.267	.204	-0.024	0.976	0.892	1.068	.603
Depression	0.058	1.059	0.951	1.180	.297	**0.143**	**1.154**	**1.029**	**1.294**	**.014**	**0.086**	**1.089**	**1.019**	**1.164**	**.011**
Stress	0.008	1.008	0.837	1.214	.934	-0.066	0.936	0.768	1.141	.513	-0.074	0.929	0.824	1.046	.223

Note. Depression was measured with the 8-item PHQ9. B = unstandardised beta; OR = odds ratio; CI = confidence interval; *p* = p-value; [a] NH group is reference; [b] SI group is reference. Values highlighted in bold are statistically significant (p < .05). NH = no history of suicidal ideation or attempts; SI = history of suicidal ideation only; SA = history of suicidal attempt

3.4.1.3 Sensitivity analyses

Analyses examining the two measures of ego depletion separately along with other variables revealed that, when depletion sensitivity was entered into the model, the pattern of results remains unchanged as described above. However, in the model where self-regulatory fatigue was included, the cognitive reactivity total score was a significant predictor of suicidal history group, in addition to impulsivity and depression. Higher cognitive reactivity total score was associated with individuals with a suicidal history compared to those without (NH vs SI: OR = 1.04, 95% CI = 1.01 to 1.07; NH vs SA: OR = 1.04, 95% CI = 1.01, 1.07) (Appendix 7). Additionally, the multinomial logistic regressions were rerun using the LEIDS-RR with suicide reactivity items removed from the HOP subscale and with the entire HOP subscale removed from the total score, respectively (Appendix 8). The results were largely consistent with the findings stated above, expect that the cognitive reactivity total score in these two contexts could no longer distinguish between the SI and SA groups in the univariate model.

3.4.2 Factors associated with the parameters of suicidal ideation

To test our research hypothesis, simple and multiple linear regressions were conducted on individuals in the SI and SA groups (N = 269). Before interpreting the results, the assumptions of linear regressions were checked, revealing no major violations of multicollinearity, normality, linearity, and homoscedasticity. Pearson correlations between all study variables were presented in Table 3.5. Of note, two sub-components of cognitive reactivity (i.e., Acceptance Coping and Control/Perfectionism) and one sub-component of impulsivity (i.e., Sensation Seeking) did not correlate with any suicidal outcome (i.e., parameters of SI and composite SI score).

Table 3.5 *Correlations (two-tailed Pearson r) between all study variables (N =269)*

	Suicidal ideation				Ego depletion		Cognitive reactivity						Entrapment			Impulsivity						Depression	Stress	Mindfulness	Resilience
	Frequency	Duration	Intensity	Composite score	DS	SRF	Total	ACC	AVC	CTR	AGG	HOP	Total	Internal	External	Total	NU	Lack of Perseverance	Lack of Premeditatio	SS	PU				
Suicidal ideation																									
Frequency		.367**	.496**	.784**	.196**	.232**	.162**	-0.117	0.11	0.006	0.119	.333**	.286**	.261**	.264**	.183**	.203**	.167**	0.064	0.014	.166**	.302**	.218**	-.201**	-.245**
Duration			.573**	.770**	0.114	.240**	.237**	0.039	0.08	0.111	.184**	.320**	.235**	.222**	.209**	.135*	0.082	0.102	0.079	0.023	.158**	.282**	.281**	-.264**	-.168**
Intensity				.866**	.254**	.323**	.250**	-0.067	.192**	0.028	.179**	.396**	.322**	.294**	.298**	.165**	.187**	0.103	.143*	-0.013	.141*	.303**	.297**	-.267**	-.291**
Composite score					.239**	.330**	.266**	-0.067	.162**	0.054	.197**	.434**	.351**	.323**	.322**	.201**	.201**	.154*	0.119	0.009	.191**	.366**	.327**	-.300**	-.296**
Ego depletion																									
DSS						.654**	.508**	0.019	.518**	.191**	.394**	.417**	.432**	.413**	.378**	.367**	.501**	.267**	.240**	-0.036	.282**	.460**	.397**	-.374**	-.486**
SRF							.521**	-0.021	.389**	0.085	.528**	.562**	.635**	.621**	.537**	.434**	.513**	.342**	.336**	-0.018	.316**	.604**	.586**	-.564**	-.573**
Cognitive reactivity																									
Total								.400**	.722**	.635**	.679**	.751**	.484**	.475**	.408**	.383**	.506**	0.084	.176**	.147*	.331**	.440**	.400**	-.347**	-.315**
ACC									0.001	.300**	.185**	0.023	0.07	0.063	0.067	0.071	0.01	-.141*	-0.069	.181**	.177**	0.012	-0.001	0.08	.122*
AVC										.421**	.257**	.542**	.424**	.401**	.376**	.168**	.294**	0.087	0.089	-0.04	.140*	.361**	.389**	-.353**	-.421**
PC											.178**	.269**	.136*	.142*	0.106	0.067	.161**	-.145*	-0.063	0.112	0.103	.154*	.134*	-0.049	-0.099
AGG												.449**	.260**	.278**	.191**	.531**	.624**	.153*	.321**	.246**	.392**	.287**	.186**	-.242**	-.148*
HOP													.588**	.567**	.507**	.317**	.430**	.223**	.201**	0.001	.226**	.520**	.504**	-.448**	-.374**
Entrapment																									
Total														.933**	.901**	.280**	.361**	.272**	.190**	-0.08	.230**	.648**	.723**	-.526**	-.460**
Internal															.685**	.251**	.364**	.227**	.163**	-0.083	.201**	.615**	.667**	-.524**	-.451**
External																.264**	.293**	.277**	.187**	-0.063	.224**	.570**	.661**	-.435**	-.389**
Impulsivity																									
Total																	.661**	.566**	.708**	.573**	.781**	.327**	.241**	-.252**	-.197**
NU																		.229**	.343**	.143*	.476**	.291**	.276**	-.391**	-.353**
Lack of Perseverance																			.457**	0.07	.266**	.310**	.374**	-.249**	-.244**
Lack of Premeditation																				.208**	.420**	.260**	.197**	-.257**	-.154*
SS																					.327**	0.026	-0.101	.165**	.253**
PU																						.235**	.128*	-.172**	-.217**
Depression																							.667**	-.496**	-.353**
Stress																								-.530**	-.426**
Mindfulness																									.489**

Note. Depression was measured with the 8-item PHQ9. SI composite score was not included in the data analyses conducted for the present study. DS = Depletion sensitivity, SRF = Self-regulatory fatigue, ACC = Acceptance Coping, AVC = Avoidant Coping, CTR = Perfectionism/Control, AGG = Aggression, HOP = Hopelessness/Suicidality, NU = Negative Urgency, SS = Sensation Seeking, PU = Positive Urgency. *p<0.05, **p<0.01

3.4.2.1 The frequency of suicidal ideation

Simple linear regressions results indicated that both measures of ego depletion, depletion sensitivity (F (1, 267) = 10.707, p = .001, β = 0.196) and self-regulatory fatigue (F (1, 267) = 15.252, p < .001, β = 0.232), were positively associated with the frequency of suicidal ideation, with a higher score predicting more frequent suicidal ideation. Additionally, higher cognitive reactivity total score was associated with suicidal ideation frequency (F (1, 267) = 7.204, p = .008, β = 0.162), which was primarily driven by Hopelessness/Suicidality (F (1, 267) = 33.230, p < .001, β = 0.333). None of other subscales of cognitive reactivity were significant statistical predictors of the frequency of suicidal ideation, although Aggression (F (1, 267) = 3.837, p = .051, β = 0.119) and Acceptance Coping showed a marginal effect (F (1, 267) = 3.717, p = .055, β = -0.117). In addition, other psychological factors, including higher levels of entrapment (total score, internal and external entrapment), impulsivity (Total score, Negative and Positive Urgencies, Lack of Perseverance), depression, stress, and lower levels of mindfulness and resilience, were also significantly associated with more frequent suicidal ideation (Appendix 9). After controlling for depression, the effects of Hopelessness/Suicidality (t = 3.603, p < .001, β = 0.241), Negative Urgency (t = 2.073, p = .039, β = 0.126) and entrapment total score (t = 2.037, p = .043, β = 0.155) remained significant, with depression remaining significant in each model. When the effect of depression was considered, a one-standard-deviation increase in Hopelessness/Suicidality, overall entrapment, and Negative Urgency would likely result in a 24%, 16%, and 13% increase in the frequency of suicidal ideation, respectively.

3.4.2.2 The duration of suicidal ideation

Results of the simple linear regressions indicated that the total score of cognitive reactivity (F (1, 267) = 15.878, p < .001, β = 0.237), as well as Aggression (F (1, 267) = 9.365, p = .002, β = 0.184) and Hopelessness/Suicidality (F (1, 267) = 30.399, p < .001, β = 0.320), were associated with the duration of suicidal ideation, with higher scores predicting longer-lasting suicidal ideation when it occurs. Only one of the ego depletion measures, namely self-regulatory fatigue, was positively associated with the duration of suicidal ideation (F (1, 267) = 16.341, p < .001, β = 0.240). Although higher depletion sensitivity showed a trend toward experiencing longer suicidal ideation, the effect did not reach statistical significance (F (1, 267) = 3.508, p = .062, β = 0.114). Additionally, individuals with higher levels of entrapment (total score, internal and external entrapment), impulsivity (Total score and Positive Urgency), depression, and stress tend to experience longer suicidal ideation, while individuals with higher levels of mindfulness and resilience tend to have briefer suicidal

ideation (Appendix 9). After controlling for depression, cognitive reactivity total score (t = 2.154, p = .032, β = 0.140) and Hopelessness/Suicidality (t = 3.523, p < .001, β = 0.237), as well as stress (t = 2.131, p = .034, β = 0.167) were significant predictors of the duration of suicidal ideation, with depression remaining significant in each model. When the effect of depression was considered, with a one-standard-deviation increase in Hopeless/Suicidality, stress, and overall cognitive reactivity, the duration of suicidal ideation would likely increase by 24%, 17%, and 14%, respectively.

3.4.2.3 The intensity of suicidal ideation

Results of the simple linear regressions indicated that, cognitive reactivity total score (F (1, 267) = 17.856, p < .001, β = 0.250) and its three subscales (Avoidant Coping: F (1, 267) = 10.271, p = .002, β = 0.192; Aggression: F (1, 267) = 8.852, p = .003, β = 0.179; Hopelessness/Suicidality: F (1, 267) = 49.542, p < .001, β = 0.396) predicted the intensity of suicidal ideation. Individuals with higher levels on these factors tend to experience more intense suicidal ideation. Additionally, both measures of ego depletion were significant predictors, indicating that individuals were more likely to experience intense suicidal ideation if they have higher depletion sensitivity (F (1, 267) = 18.381, p < .001, β = 0.254) and self-regulatory fatigue (F (1, 267) = 31.085, p < .001, β = 0.323). Moreover, higher entrapment (total score, internal and external entrapment), impulsivity (Total score, Negative and Positive Urgencies, and Lack of Premeditation), depression, and stress were significant predictors of experiencing more intense suicidal ideation, while higher mindfulness and resilience predicted less intense suicidal ideation (Appendix 9). Table 3.6 indicated that, after controlling for depression, cognitive reactivity (i.e., Total score and Hopelessness/Suicidality), ego depletion (i.e., depletion sensitivity and self-regulatory fatigue), entrapment (total score, internal and external entrapment), and stress remained significant predictors of the intensity of suicidal ideation, with small to median effect sizes. Higher scores on these factors were associated with more intense suicidal ideation.

Table 3.6 *Multiple regression analyses of risk factors on predicting the intensity of suicidal ideation, depression was included as the control variable (N = 269)*

Variable	B	SE	95% CI		β	p
			LL	*UL*		
Depression	**0.063**	**0.017**	**0.030**	**0.097**	**0.239**	**< .001**
Cognitive Reactivity (Total score)	**0.014**	**0.006**	**0.002**	**0.026**	**0.145**	**.025**
Depression	**0.071**	**0.017**	**0.039**	**0.104**	**0.269**	**< .001**
Avoidant Coping	0.027	0.018	-0.008	0.062	0.095	.128
Depression	**0.073**	**0.016**	**0.041**	**0.104**	**0.274**	**< .001**
Aggression	0.028	0.017	-0.005	0.061	0.100	.099
Depression	**0.035**	**0.017**	**0.001**	**0.070**	**0.134**	**.042**
Hopelessness/Suicidality	**0.095**	**0.019**	**0.058**	**0.133**	**0.326**	**< .001**
Depression	**0.063**	**0.017**	**0.029**	**0.097**	**0.236**	**< .001**
Depletion Sensitivity	**0.021**	**0.010**	**0.002**	**0.040**	**0.145**	**.027**
Depression	**0.045**	**0.019**	**0.008**	**0.083**	**0.170**	**.019**
Self-Regulatory Fatigue	**0.034**	**0.011**	**0.012**	**0.056**	**0.220**	**.002**
Depression	**0.043**	**0.020**	**0.004**	**0.083**	**0.163**	**.032**
Entrapment (Total score)	**0.074**	**0.026**	**0.023**	**0.125**	**0.217**	**.004**
Depression	**0.052**	**0.019**	**0.014**	**0.090**	**0.196**	**.008**
Internal Entrapment	**0.100**	**0.042**	**0.017**	**0.183**	**0.174**	**.019**
Depression	**0.052**	**0.019**	**0.016**	**0.089**	**0.198**	**.005**
External Entrapment	**0.128**	**0.049**	**0.032**	**0.223**	**0.185**	**.009**
Depression	**0.074**	**0.016**	**0.042**	**0.106**	**0.279**	**< .001**
Impulsivity (Total score)	0.013	0.011	-0.008	0.033	0.074	.233
Depression	**0.072**	**0.016**	**0.040**	**0.104**	**0.272**	**< .001**
Negative Urgency	0.062	0.035	-0.007	0.132	0.108	.077
Depression	**0.076**	**0.016**	**0.044**	**0.107**	**0.286**	**< .001**
Positive Urgency	0.037	0.030	-0.022	0.095	0.074	.216
Depression	**0.076**	**0.016**	**0.044**	**0.107**	**0.285**	**< .001**
Lack of Premeditation	0.043	0.038	-0.032	0.117	0.068	.258
Depression	**0.050**	**0.021**	**0.009**	**0.091**	**0.189**	**.016**
Stress	**0.079**	**0.036**	**0.008**	**0.149**	**0.171**	**.029**

Note. Depression was measured with the 8-item PHQ9. B = unstandardised coefficients; SE = standard error; CI = Confidence interval; β = standardised coefficients; p = p-value. Values highlighted in bold are statistically significant ($p < .05$).

3.4.2.4 Sensitivity analyses

Results showed that when the suicide reactivity items were excluded (i.e., hopelessness reactivity remained) or the entire HOP subscale was excluded, the CR total score predicted neither the frequency of suicidal ideation independently nor the duration and intensity of suicidal ideation over and above the effect of depression. Furthermore, Hopelessness Reactivity significantly predicted the duration and intensity of suicidal ideation, independent of depression (Appendix 10).

3.5 Discussion

This is the first study to explore cognitive reactivity and ego depletion in relation to suicide history and parameters of suicidal ideation using cross-sectional data.

3.5.1 Main results

3.5.1.1 Cognitive reactivity

Rooted in the Differential Activation Hypothesis (Teasdale, 1988), Lau and colleagues (2004) elucidated that the re-emergence of suicide-related negative thinking patterns over time, formed during previous depressive episodes, can lower the threshold for suicidal cognitions, even in response to a mild depressive mood. Indeed, cognitive reactivity related to hopelessness and suicidality has been shown to be higher in depressed individuals with a history of suicidal ideation compared to those without such a history (Williams et al., 2008). The present study extends previous findings, suggesting that cognitive reactivity and most of its subscales, except for Acceptance Coping and Control/Perfectionism, are not only positively associated with higher levels of suicidality but also linked to a more severe pattern of suicidal ideation that is frequent, prolonged, and intense when it occurs. Importantly, individuals with a history of SA were more prone to the reactivation of a holistic dysfunctional cognitive patterns in response to a sad mood, compared to those with SI only. This reactivation was specifically characterised by increased aggressive tendencies and an emerging sense of hopelessness alongside suicidal thoughts. In a multivariant model, where the total score of cognitive reactivity was analysed to maximise statistical power, overall cognitive reactivity appeared to differentiate the non-suicidal control group from those with

a history of SI and SA. However, the small sample size in the non-suicidal group may have limited the ability to detect a statistically significant overall effect of cognitive reactivity.

Another notable finding was the profound influence of Hopelessness/Suicidality on heightened suicide risk, emerging as the only variable among those examined that predicted the frequency, duration, and intensity of suicidal ideation, even after accounting for depression. While not everyone at risk for suicide necessarily experiences hopelessness or thoughts of taking their own life when feeling a bit sad, the fact that suicide-related cognition is more readily activated in some individuals in response to mild mood deterioration may be linked to the "adaptive" function of these thoughts. Suicidal ideation has been suggested to serve as a coping strategy for managing negative emotions in some individuals, or as a seemingly logical solution to end intolerant pain (Van Wyk & Gibson, 2022), through which individuals are able to regain their control over life (Crocker, Clare, & Evans, 2006; Siegel & Meyer, 1999). In this sense, suicidal ideation represents a form of negative reinforcement, encouraging the recurrence of such thoughts in the future (Coppersmith et al., 2023; Kleiman et al., 2018). While the easily reactivated suicidal ideation as a way of coping may comfort individuals in the moment (Crane et al., 2014), it backfires in the long run by evoking a profound sense of defeat and entrapment (Lau et al., 2004, Williams et al., 2005b). This perspective aligns with our findings, which showed that Hopelessness/Suicidality predicted more frequent, prolonged, and more intense suicidal ideation, independent of depression.

3.5.1.2 Ego depletion

Our findings provide the first direct evidence linking the depletion of self-regulation resources with suicide risk. Consistent with our hypothesis, ego depletion, measured by depletion sensitivity and self-regulatory fatigue, significantly differentiated the non-suicidal control group from individuals with a history of suicidal ideation and attempts. Furthermore, individuals who attempted suicide reported higher levels of self-regulatory fatigue and greater sensitivity to ego depletion compared to those who only thought about suicide. Additionally, higher ego depletion (self-regulatory fatigue and depletion sensitivity) was associated with higher intensity of SI, even after controlling for depression. According to Baumeister (1990), suicidal attempts arise as an escape from heightened aversive self-awareness, triggered by a series of unpleasant experiences that deplete self-regulatory resources. In light of this theory, individuals with a history of suicidal ideation or attempts may have been gradually ego-depleted due to past distressing experiences that undermine self-awareness. Suicide is driven by the complex interactions between risk factors across all

aspects of living, including maladaptive cognitive strategies, vulnerable personality traits, traumatic life events, and life stress (O'Connor & Nock, 2014). Our findings support this perspective, showing that individuals with a suicidal history exhibited higher levels of entrapment, stress, impulsivity, and depression, as well as lower levels of mindfulness and resilience compared to non-suicidal individuals. The inability to effectively cope with these negative experiences and emotional distress, which is often the case for suicidal individuals, further depletes self-regulation resources, making them more susceptible to cognitive deconstruction and suicidal thoughts when facing internal or external crises.

3.5.1.3 Other psychological factors

Consistent with our hypothesis, entrapment distinguished between the NH and the suicidal groups, but not between the SI and SA groups, whereas the effect of impulsivity was primarily observed in its relationship with the SA group compared to the NH group and the SI group. These findings align with the key premises of the IMV model, which conceptualise entrapment as a critical factor in the motivational phase responsible for ideation formation, while impulsivity acts as a volitional moderator governing the transition from ideation to attempt (Dhingra et al., 2015; O'Connor & Kirtley, 2018). Notably, results from the multivariate model indicated that depression and impulsivity were significant risk factors, contributing the most in distinguishing individuals by their suicidal histories. Specifically, higher level of depression was associated with the SA group compared to the NH and SI groups, and a higher level of overall impulsivity was associated with SA group compared to the SI group. In Wetherall et al., (2018), depression did not distinguish between any suicidal history groups after controlling for other key variables in the IMV model. The discrepancy between our study and the previous study may be due to differences in sample characteristics. Wetherall and colleagues (2018) used a large, nationally representative sample, with 14.3% and 11% reporting lifetime SI and SA, respectively, whereas our study recruited a smaller number of participants by opportunity sampling, with 49.4% and 36.9% reported a lifetime SI and SA, respectively.

Regardless of heterogeneity in the assessment of impulsivity in the literature, accumulated research evidence has found that impulsivity significantly differentiates individuals who think about suicide or self-harm from those who take actions (Dhingra et al., 2015, Millner et al., 2020, O'Connor et al., 2012). Our results stress the importance of the affective aspects (negative and positive urgencies) and a cognitive aspect (lack of premeditation) of impulsivity in distinguishing an online adult sample by their lifetime suicidal histories. This

largely aligns with a large-sample study conducted by Klonsky and May (2010) among high school and college students, with the exception that negative urgency was additionally found to distinguish the SI group from the SA group in our study. Previous studies have suggested that although the affective aspects of impulsivity within the UPPSP model have the most substantial influence across categories of psychopathology, they appear to be closely associated with suicidal groups compared to controls, with comparable levels observed in both the SI and SA groups (Berg et al., 2015; Bruno et al., 2023; Teh et al., 2023). Although our finding that the affective aspects of impulsivity distinguished between the SI and SA groups requires further replication, as it was examined univariately without controlling for other variables, it seems unlikely to be coincidental. Millner et al. (2020) observed that negative urgency was the only robust subcomponent of impulsivity elevated in adult inpatients who had recently attempt suicide compared to those who had only thought about it, as well as in an online sample with a lifetime history of suicidal attempts compared to those with a lifetime history of passive suicidal ideation. Although a fine-grained examination of the relationship between impulsivity subcomponents and suicidal histories was beyond the scope of the present study, the overall level of impulsivity, measured by a short version of the UPPSP Impulsive Behaviour Scale, was found to distinguish between the SI and SA groups beyond the effects of depression and other risk factors investigated in this study. Therefore, our findings strengthen the longstanding recognition that impulsivity is closely associated with higher suicide risk, particularly in relation to behavioural enactment.

Largely consistent with our research hypotheses, we found that higher impulsivity, entrapment, depression, and stress, as well as lower mindfulness and resilience, were univariately associated with a more frequent, long-lasting, and intense suicidal ideation. However, multiple regression models controlling for depression revealed that higher entrapment was linked to frequent and intense suicidal ideation, while higher perceived stress was associated with prolonged and intense suicidal ideation, independent of depression. Notably, negative urgency continued to predict the frequency of suicidal ideation, whereas neither overall impulsivity not its subcomponents remained significant predictors of the duration and intensity of suicidal ideation after accounting for depression. This highlights the importance of examining the fine-grained patterns of suicidal ideation, as it could lead to more precise predictions by pinpointing specific dimensions of SI that correlate with particular risk factors. While previous studies have shown that impulsive individuals, particularly in negative emotional states, are more likely to have a history of suicidal ideation

or to experience greater severity of suicidal ideation (Beach et al., 2022; Gonzalez & Neander, 2018; Klonsky & May, 2010; Lynam et al., 2011), two prospective studies using the same dataset found that neither daily impulsivity nor trait impulsivity, measured by the Momentary Impulsivity Scale (Tomko et al., 2014) and Barratt Impulsivity Scale (Patton, Stanford, & Barratt, 1995), were significantly associated with the intensity of suicidal ideation. However, both were linked to greater instability of passive suicidal ideation (Hadzic et al., 2020; Lucht et al., 2022b). Our findings may help clarify the inconsistent results observed in previous studies, which often rely on an all-encompassing composite score to measure suicidal ideation despite the nuances within this concept. By breaking suicidal ideation into measurable parameters, it becomes evident that impulsivity, particularly negative urgency, is more strongly associated with how often suicidal ideation occurs rather than how intense the experience is.

3.5.2 Implications

Our findings supported the key premises of the IMV model by showing that entrapment and impulsivity each distinguished individuals with SI from those without a history of suicidal ideation or behaviour, and individuals with SI from those who have attempted suicide, respectively. Building on previous studies, this study offers an innovative exploration of the motivational phase of the IMV model by incorporating the Differential Activation Hypothesis and the self-regulatory model of suicide. Although the precise roles of cognitive reactivity and ego depletion were not included within the IMV model's three-phase framework, our results provide preliminary evidence of their significant impact within the motivational phase. Both aspects of ego depletion (self-regulatory fatigue and sensitivity to ego depletion) performed equally well in distinguishing individuals by their suicidal histories. However, differential associations with suicidality were found within the multi-dimensional concept of cognitive reactivity. In Solis and colleagues (2017), Hopelessness/Suicidality and Avoidant Coping were the strongest predictors for distinguishing individuals with and without a history of depression. Avoidant Coping was proposed as a suitable short-form assessment of cognitive reactivity due to its high correlation with the overall CR score. In comparison, our study found that overall CR was similarly correlated with both Hopelessness/Suicidality and Avoidant Coping, with Hopelessness/Suicidality demonstrating a slightly stronger correlation ($r = 0.790$ and 0.758, respectively). Nevertheless, our results suggest that the predictive power of Avoidant Coping on the history of suicidal attempts appears to be limited, not even surpassing that of

Aggression, which aligns with the well-established association between higher aggression and suicidal behaviour (Gvion & Apter, 2011). This implies that the mechanisms underlying the prediction of depression may differ from those predicting suicide, with Hopelessness/Suicidality emerging as the most influential subcomponent of cognitive reactivity in the context of suicide.

When investigating risk factors associated with the parameters of suicidal ideation, only a few univariately significant risk factors persisted in predicting the frequency and duration of SI beyond the effect of depression. Individuals reported more frequent suicidal ideation if they tended to feel hopeless and suicidal when in a sad mood, perceived themselves as deeply entrapped, and acted impulsively in negative emotional states. Additionally, those with longer-lasting suicidal ideation reported higher levels of stress and greater cognitive reactivity (both overall cognitive patterns and those specifically tied to hopelessness and suicidality). By contrast, the effects of most risk factors on predicting the intensity of SI were not diminished by depression, suggesting that the risk factors examined in this study contribute more to predicting the intensity of suicidal ideation than its frequency or duration. This may be because how often suicidal ideation occurs and how long it lasts reflect its dynamic nature, which requires more sophisticated research methodologies to capture and is particularly vulnerable to complex interactions between internal and external factors (Coppersmith et al., 2023; Nock, Prinstein, & Sterba, 2009; Oquendo et al., 2021). Short-term longitudinal studies, such as daily diaries and ecological momentary assessments, are promising methods to unpack these dynamic interactions between suicidal ideation and associated factors (Kleiman & Nock, 2018).

Nevertheless, our findings, while preliminary, offer valuable insights by highlighting nuanced differences in the risk factors associated with the frequency, duration, and intensity of suicidal ideation. Although it is somewhat surprising that risk factors investigated in this study were more effective at predicting the intensity of suicidal ideation, this may be reasonable considering that most established risk factors for suicide are identified in studies where suicidal ideation is often measured using a composite scale score, with a higher score indicating greater severity or intensity. Given the limited research exploring distinct aspects of suicidal ideation, it is plausible that the majority of established risk factors are specifically pertinent to its intensity. Last but not least, the differential associations between risk factors and the parameters of suicidal ideation underscore the need for conceptual frameworks that more effectively address the distinct aspects of suicidal ideation to improve the specificity and accuracy of predictions in future research.

3.5.3 Limitations and future directions

This study has several limitations, primarily stemming from its cross-sectional nature, which limits the ability to gauge causal relationships. Our findings related to factors distinguishing between suicidal history groups should be interpreted with caution, as the small sample size of 43 participants in the NH group compromised statistical power, limiting the detection of significant effects. This also precluded a more detailed analysis of decomposing the effects of cognitive reactivity and impulsivity in the multivariate logistic analysis. Given the exploratory nature of this study, future replications with larger samples are needed to validate our findings concerning the frequency, duration, and intensity of suicidal ideation. Researchers have suggested at least two subtypes of suicidal ideation: stress-responsive and non-stress responsive. The former involves greater fluctuations in suicidal thoughts triggered by stressful events and is often linked to impulsive suicidal behaviour, whereas the latter reflects persistent suicidal ideation due to prolonged depressive mood, typically associated with planned suicidal behaviour (Bernanke et al., 2017). Future studies would benefit from examining the extent to which different subtypes of suicidal ideation can characterise the frequency, duration, and intensity of suicidal ideation. Another limitation is the reliance on retrospectively reported suicidal ideation, which are subject to recall bias. A cross-sectional online survey provides only a snapshot of suicidal ideation, without capturing its full dynamic picture in real life (Andrewes et al., 2024; Czyz et al., 2019; Hallensleben et al., 2018). Future studies should utilise more ecologically valid research methods to gain a more nuanced understanding of this complex phenomenon. Lastly, the generalisability of our findings is limited by the sample characteristics. The small sample was primarily comprised of white female participants recruited through online advertisement using opportunity sampling. Therefore, it is unknown whether our results can be generalised to individuals with less smartphone usage and those in clinical settings.

3.5.4 Conclusions

This study provides the first detailed examination of cognitive reactivity and ego depletion, along with other well-established psychological factors, in relation to both suicidal history and the parameters of suicidal ideation. Overall, cognitive reactivity and ego depletion were associated with a higher risk of suicide. Specifically, cognitive reactivity and ego depletion independently distinguished individuals based on their suicidal histories. However, impulsivity and depression made the greatest contributions in distinguishing individuals by

suicidal history when controlling for all investigated risk factors. Furthermore, most risk factors remained significant in predicting the intensity, but not the frequency or duration, of suicidal ideation after accounting for depression. This underscores the importance of a fine-grained examination of suicidal ideation, particularly its frequency and duration, to enhance our understanding of its dynamic nature and improve the specificity and accuracy of predictions. These findings are preliminary and warrant further replication.

Chapter 4: An Exploration of the Roles of Cognitive Reactivity and Ego Depletion in the Relationship Between Entrapment and Suicidal Ideation

4.1 Abstract

Background: The relationship between entrapment and suicide risk is well-established in the literature, with several theoretical frameworks conceptualising suicide as an escape from unbearable situations in which entrapment plays a central role. However, the mechanisms through which entrapment increases the risk of suicidal ideation, as well as the extent to which entrapment may be activated by negative affect, remain insufficiently understood.

Aim: As part of a broader investigation detailed in Chapter 3, the present study specifically aimed to explore the role of cognitive reactivity and ego depletion in the relationship between entrapment and suicidal ideation through mediation analyses, within the framework of the Integrated Motivational-Volitional Model.

Methods: This study employed a cross-sectional online survey to collect self-report data from participants recruited through opportunity sampling. The original sample consisted of 312 participants aged 18 or older living in the UK. For the purpose of this study, analyses focused on a subsample of participants with a history of suicidal ideation and suicide attempts (n = 269; M_{age} = 28.50, SD = 10.06; 82.9% White; 66.5% Female). The survey measures relevant to the present study included suicidal ideation, cognitive reactivity, ego depletion, entrapment, and mindfulness.

Results: Entrapment fully mediated the relationship between cognitive reactivity and suicidal ideation; however, contrary to our hypothesis, the mediated effect was not moderated by mindfulness. Additionally, the relationship between entrapment and suicidal ideation was partially mediated by ego depletion as measured by self-regulatory fatigue, but not by depletion sensitivity.

Limitations: This study represents a preliminary exploration with limitations including a relatively small sample size and the use of a composite suicidal ideation score derived from

the sum of frequency, duration, and intensity. These limitations may reduce the validity and reliability of the findings.

Conclusions: Grounded in relevant theoretical frameworks, the findings highlighted the significance of cognitive reactivity as a cognitive vulnerability to suicidal ideation, as well as the value of understanding suicide risk through a self-regulation perspective. These findings should be consolidated through future replication with a larger sample and a prospective design.

4.2 Introduction

Significant research efforts have been devoted to understanding the psychology of suicide in recent decades, with suicidal ideation representing a critical starting point for this exploration. A large-scale study cross 17 countries revealed that 9.2% of participants reported lifetime suicidal ideation, of whom 29.0% eventually made a suicidal attempt (Nock et al., 2008a). Increasingly, researchers have recognised the need to move beyond viewing suicide solely as a by-product of psychiatric diagnoses. Instead, greater emphasis should be placed on understanding the complex psychological and psychosocial mechanisms underlying suicide risk, in order to develop clearer and more specific targets for intervention (O'Connor & Nock, 2014). Among psychological risk factors, entrapment has consistently emerged as a key cognitive construct linked to suicidal ideation (O'Connor & Portzky, 2018). To build on this, the present study investigates how cognitive reactivity and ego depletion influence the relationship between entrapment and suicidal ideation within the framework of the Integrated Motivational-Volitational (IMV) Model of Suicidal Behaviour (O'Connor, 2011; O'Connor & Kirtley, 2018).

4.2.1 Entrapment

4.2.1.1 Theoretical accounts of entrapment in relation to suicidal behaviour

Entrapment is a state in which individuals are stuck in a defeated situation from which they have strong motivation to escape but feel unable to find a way out (Gilbert & Allan, 1998). This account draws from an evolutionary perspective, specifically social rank theory which suggests that animals who lose conflicts for competing resources (e.g., territories and mating partners) are likely to behave submissively, characterised by inhibiting their own attack

behaviour, avoiding adventurous activities, and showing demobilisation (i.e., 'arrested flight'; Dixon et al, 1989). Similarly, akin to defeated animals, experiences of defeat and humiliation in humans give rise to an overwhelming desire of escape, which has been observed in depressed individuals (Brown, Harris, & Hepworth, 1995; Gilbert & Gilbert, 2003). Furthermore, mainstream contemporary suicide frameworks theorise that entrapment is a crucial factor in shaping our understanding of the pathways leading to suicidal ideation and behaviours, viewing suicide as an escape attempt (more details in the section below) made by individuals who perceive themselves as being in unbearable psychological pain (Baumeister, 1990; O'Connor, 2003; Williams et al., 2005b, Chapter 5, p.75-76).

One such framework is the Integrated Motivational-Volitional (IMV) Model of suicidal behaviour (O'Connor, 2011; O'Connor & Kirtley, 2018), which posits that the pathway from defeat and humiliation to entrapment plays a key role in the emergence of suicidal ideation (Motivational Phase). As the cornerstone of the IMV model, the transitions from feeling defeat and/or humiliation to entrapment and from entrapment to suicidal ideation are facilitated by a variety of factors, namely threat to self-moderators (TSMs) and motivational moderators (MMs), respectively. The former consists of factors associated (positively or negatively) with problem resolution, such as memory biases and rumination. The latter includes factors that, when present, either have the potential to offer an alternative perspective to suicide or act as the last straw in developing suicidal ideation when in absence of other factors such as social support, resilience, and future thoughts. Additionally, the IMV model lists factors governing the transition from suicidal ideation to attempt, a stage known as the Volitional Phase. These factors, referred to as volitional moderators (VMs), include factors such as fearlessness about death and impulsivity. Given that this study aims to explore potential pathways leading to suicidal ideation, our investigation specifically focused on the motivational phase of the IMV model.

4.2.1.2 Empirical studies on entrapment and suicide

As noted above, extant research evidence supports the relationship between higher levels of entrapment and suicidal thoughts and behaviour (see O'Connor & Portzky, 2018, for a review). Studies have focused on examining the direct effect of entrapment on suicidal behaviours and on explaining the relationship between a range of risk factors and suicidal ideation via entrapment, such as defeat (Owen et al., 2017), rumination (Teismann & Forkmann, 2017), and sleep problems (Littlewood et al., 2016). Furthermore, a comparatively small number of studies have investigated the pathway underlying which

entrapment increases the risk of suicide. These studies primarily concentrate on examining the mediating effect of increased hopelessness (Holler et al., 2022; Littlewood et al., 2016) and mental pain (Li et al., 2018). However, there is still a paucity of knowledge in advancing our understanding of how entrapment renders the heightened risk of suicide. As suggested in O'Connor and Portzky (2018), to address the gaps in our knowledge, more research is needed to investigate the cognitive mechanisms involved in the relationship between entrapment and suicidal thoughts/behaviour and to examine the extent to which entrapment can be activated by negative affect.

4.2.2 Cognitive reactivity

4.2.2.1 Differential Activation Hypothesis

Building upon the cognitive model of depression, which highlights the central role of non-specific and negative information processing bias played in depression relapse (Beck, 1967; Robins & Hayes, 1993), Teasdale (1985) has emphasised the interaction between depressed mood and cognitive processing bias in the maintenance of depression. According to the Differential Activation Hypothesis (DAH; Teasdale, 1988), a link between depressed mood and dysfunctional thinking patterns becomes established during early depressive episodes. Therefore, subsequent activations of negative thinking patterns would not necessarily require the same level of depressogenic stressors; instead, they can be triggered by the presence of a similar mood state associated with those negative cognitive schemas. In light of the DAH, cognitive reactivity (CR) is conceptualised as the ease with which latent dysfunctional cognitions can be reactivated by a mild mood deterioration (Ingram, Miranda, & Segal, 1998; Van der Does, 2002). Indeed, in one study, higher cognitive reactivity was observed in previously depressed individuals compared to those never depressed (Van der Dose, 2005), and in another among those with multiple depressive episodes compared to individuals with only a single episode (Elgersma et al., 2015). Furthermore, cognitive reactivity was found to predict increases in depressive symptoms at a one-year follow-up period, even after controlling for baseline depression and other cognitive vulnerabilities to depression (Struijs et al., 2013).

4.2.2.2 Cognitive reactivity as a potential cognitive mechanism of suicide risk

From a cognitive theory perspective, certain dispositional vulnerabilities such as a general tendency towards maladaptive cognitive style and overgeneral memory, rooted in past

negative life experience, predispose individuals to a higher risk of experiencing a suicidal crisis, by triggering severe psychological disturbances and impairing problems solving during a stressful time (Wenzel & Beck, 2008). Based on the DAH, Lau and colleagues (2004) suggested that suicidal ideation arises from the activation of negative thinking patterns, particularly those linked to hopelessness, that were ingrained in earlier depressive episodes. Therefore, with each episode, depressive mood and suicide-related cognitions are more tied up with each other, making it easier for suicidal cognitions to be triggered whenever a depressed mood reoccurs. These holistic negative thinking patterns related to suicide are likely to evoke a profound sense of defeat and entrapment, which impact upon some aspects of information processing such as autobiographical memory bias and hopelessness. This phenomenon is referred to as the "holistic entrapment schema" by Williams and colleagues (2005b, p.82), who found that the levels of defeat and entrapment increased significantly following a negative mood induction in an undergraduate sample (Goldstein & Willner, 2002).

Previous research has supported the differential activation framework of cognitive vulnerability to suicide, suggesting that higher cognitive reactivity is associated with increased suicidality. For example, individuals with a history of suicidal ideation exhibited a distinct cognitive reactivity profile, especially associated with higher reactivity to hopelessness and suicidal cognitions, compared to those who had never been suicidal (Antypa et al., 2010; Williams et al., 2008). Moreover, during remission of depression, individuals who had a history of suicidal attempt reported higher cognitive reactivity, characterised by hopelessness/suicidal reactivity and aggression tendency, compared to those with a history of suicidal ideation only (Antypa et al., 2010). While it appears promising that cognitive reactivity has the potential to illuminate the cognitive mechanisms underlying the suicidal process, there has been far less research attention devoted to this in recent years.

4.2.3 Ego Depletion

4.2.3.1 The Strength Theory of Self-Regulation

The ability to regulate and override emotions, thoughts, and responses in accordance with personal and social standards is a distinctive characteristic of human beings. Taking the analogue of a muscle that becomes tired after exertion, the strength model postulates that

self-regulatory resources draw on a limited energy pool that is worn down after continuous use (Baumeister & Heatherton, 1996; Baumeister, 2002). Thus, when the self's inner resources are temporally depleted due to prior tasks requiring self-regulatory effort, individuals are less likely to perform to their full potential in subsequent tasks, a phenomenon known as Ego Depletion (Baumeister et al., 1998; Baumeister, Vohs, &Tice, 2007). Ego depletion can result in behavioural disinhibition, as reduced self-regulatory resources intensify the urge to engage in certain behaviours that may otherwise be avoided when these resources are plentiful (Baumeister, 2014). Results of a meta-analysis on 83 studies conducted by Hagger and colleagues (2010) lent support for the effect of ego depletion and the strength model. They reported medium to large effect sizes for the relationship between ego depletion and diminished task performances and other subjective perceptions such as perceived difficulty, fatigue, and negative emotion.

4.2.3.2 The Self-Regulatory Theory of Suicide

In a closely related social psychological account of suicide, a suicidal attempt is considered to be an escape from heightened aversive self-awareness which has resulted from a series of unpleasant experiences that deplete self-regulatory resources (*The Escape Theory of Suicide*; Baumeister, 1990). According to Baumeister's escape theory, the suicidal cycle begins with events that make an individual aware of the salient discrepancy between personal expectations and actual current states (i.e., a self-regulatory failure). The unfavourable self-comparisons subsequently trigger a holistic and internal negative attribution to the self that heightens self-awareness, which, in turn, evokes an intense feeling of negative affect from which an individual wants to escape. In the affective downward spiral, a suicidal act is fuelled by a disinhibited and passive state (*cognitive deconstruction*) characterised by narrowing attentional focus to present, concrete, and meaningless stimuli in order to avoid higher-order cognitive interpretations that generate negative emotion and self-evaluation (Baumeister, 1990).

By integrating the strength theory of self-regulation into the escape theory of suicide, Vohs and Baumeister (2002) proposed that perceived self-regulatory failure in failing to meet personal standards further depletes the self's regulatory resources by exerting control over intensely distressing feelings. Experiencing emotion regulation failure, such as rumination (Morrison & O'Connor, 2008), potentially leads an individual to slip into a state of cognitive deconstruction, which lessens the inner constraints that protects against self-destructive

behaviours. Consequently, this disinhibited state makes the depleted individual more vulnerable to acting on their thoughts of suicide (Vohs & Baumeister, 2002, p.35).

While theoretical frameworks have laid a solid foundation for further investigation, to our knowledge, empirical evidence regarding the relationship between ego depletion and suicidal ideation and behaviour is scarce. This study attempts to bridge the research gap by examining ego depletion in relation to entrapment and suicide risk. As mentioned earlier, behavioural demobilisation and passivity have been observed in animals trapped in arrested escape (Dixon et al., 1989), a state also known as learned helplessness (Seligman, 1972). Furthermore, the repeated experience of "trying to escape but could not" evokes a sense of losing control over life (Gilbert & Gilbert, 2003). Taken together, the process of entrapment (what causes it and what it leaves people feeling) gives rise to a sense of mental and physical fatigue, which arguably can be potentially ego-depleting. In light of the perspective that conceptualises demobilisation and passivity as coping mechanisms for defeat and entrapment, it is plausible that ego depletion, characterised by diminished self-regulatory resources and inhibition over urges and behaviours, serve as a linkage between entrapment and suicidal outcome.

4.2.4 The present study

As shown in Chapter 3, self-reported cognitive reactivity and ego depletion were found to significantly distinguish between individuals with different suicidal histories (no history, history of suicidal ideation, and history of suicidal attempts) in a univariate model. Additionally, higher levels of cognitive reactivity and ego depletion were associated with a more severe pattern of suicidal ideation (i.e., more frequent, prolonged, and intense). Using an existing dataset (Chapter 3), the present study sought to explore the role of cognitive reactivity and ego depletion in the emergence of suicide risk, based on the key premises of the motivational phase of the IMV model. Building upon the theoretical and empirical evidence presented earlier, the aim of this study was to investigate how cognitive reactivity and ego depletion shed light on our understanding of the relationship between entrapment and suicidal ideation through mediation analysis.

According to Williams and colleagues (2005b), the repeated activation of negative themes and cognitive processes by mild depressive mood tends to form a more holistic activation across moods, thoughts, and body sensations. This susceptibility can lead individuals to fall

into a trapped state with no rescue, which increases the risk of suicide. However, being aware of the flow of moods and thoughts with openness and acceptance (i.e., mindfulness) has the potential to minimise the activation of maladaptive cognitive patterns (Barnhofer et al., 2015; Williams et al., 2005a). This is further supported by a meta-analysis conducted by Per and colleagues (2022), indicating a small to moderate effect of mindfulness-based interventions in reducing suicidal ideation. Accordingly, this study further explored the mediating pathway from cognitive reactivity to suicidal ideation via entrapment, with mindfulness as a potential moderator. Additionally, we also examined whether ego depletion functions as the underlying mechanism accounting for the relationship between entrapment and suicidal ideation. Specifically, we addressed the following research questions and hypotheses:

Q1: Does entrapment mediate the relationship between cognitive reactivity and suicidal ideation?

H1: Entrapment would at least partially mediate the relationship between cognitive reactivity and suicidal ideation.

Q2: Does mindfulness moderate the mediation model examined by Q1?

H2: The strength of the cognitive reactivity-to-entrapment pathway and/or the entrapment-to-suicidal ideation pathway would vary at different levels of mindfulness, with a stronger association expected at lower levels of mindfulness.

Q3: Does ego depletion mediate the relationship between entrapment and suicidal ideation?

H3: Ego depletion would at least partially mediate the relationship between entrapment and suicidal ideation.

4.3 Methods

4.3.1 Participants and Design

This study utilised a cross-sectional design to gather self-report data from participants via an online survey. As detailed in Chapter 3, the recruitment process is not discussed further in this section. The sample consisted of 312 adults (Age range: 18-70, M_{age} = 28.44, SD = 10.0,

64.7% female), of whom 43 (13.78%) self-reported no history of suicidal ideation or attempted, 154 (49.36%) had a history of suicidal ideation, and 115 (36.86%) had a history of suicidal attempts (see the previous report for details on the characteristics of the original sample). For the purpose of this study, only participants with a history of suicidal ideation or attempts were included, resulting in a final sample of 269 participant.

4.3.2 Procedure

The study protocol entitled "Exploring psychological factors related to fluctuations in suicidal ideation" was approved by the University of Glasgow's Medical, Veterinary and Life Sciences Ethics Committee (Project No: 200200143). A brief summary of the study procedure was provided here, with full details available in Chapter 3. The online survey was administered via Online Surveys platform (https://www.onlinesurveys.ac.uk), accessible on any internet-enabled device. Participants were provided with electronic copies of the information sheet, privacy notice, consent form, and support sheet. Upon confirming consent by checking a box on the consent form, participants were directed to the main section of the survey. The survey included demographic questions and a battery of topic-related questionnaires (see Measures), which took approximately 30 minutes to complete. To minimise systematic bias, the survey employed two alternating question orders, with questions regarding suicidal ideation consistently placed midway. Upon completion, participants were invited to enter a prize draw for a £200 Amazon e-voucher as an incentive for research participation.

4.3.3 Measures

Suicidal outcome. The Columbia-Suicide Severity Rating Scale (C-SSRS; Posner et al., 2011) was used to measure suicidal outcomes, and its psychometric properties have been validated in both clinical and research settings among adolescents and adults (Nam et al., 2024; Posner et al., 2011). Suicidal ideation and attempt history were assessed by two dichotomous items ("Yes" or "No"). Participants were asked to evaluate the frequency and duration of their suicidal ideation on a 5-point scale. For frequency, they responded to the question, "When you are having thoughts about ending your life, how frequently do the thoughts tend to occur?" (1 = less than once a week, 2 = once a week, 3 = 2 to 5 times in week, 4 = daily or almost daily, 5 = many times each day). For duration, they were asked, "When you are having thoughts about ending your life, how long do they last?" (1 =

fleeting/few seconds or minutes, 2 = less than 1 hour/some of the time, 3 = 1 to 4 hours/a lot of time, 4 = 4 to 8 hours/most of day, 5 = more than 8 hours/persistent or continuous). Additionally, an item adapted from Czyz et al. (2019) was used to assess the intensity of suicidal ideation, (i.e., "When you are having thoughts about ending your life, how intense are the thoughts?") with a 7-point scale from "extremely mild" to "extremely intense".

Cognitive reactivity. The 30-item Leiden Index of Depression Sensitivity-Revised (LEIDS-RR; Solis et al., 2017, Van der Does & William, 2003) assesses to what extent dysfunctional cognitions could be activated by a mild mood deterioration. Participants were primed before filling out each statement by being asked to imagine a situation where they feel somewhat sad. The LEIDS-RR is comprised of five subscales including Hopelessness/Suicidality (HOP; e.g., "When I feel down, I more often feel hopeless about everything"), Acceptance/Coping (ACC; e.g., "When in a sad mood, I feel more like myself"), Aggression (AGG; e.g., "In a sad mood, I do more things that I will later regret"), Control/Perfectionism (CTR; e.g., "When I feel down, I am more inclined to want to keep everything under control"), and Avoidant Coping (AVC; e.g., "When in a low mood, I take fewer risks"). It was scored on a 5-point Likert-type scale from "not at all" to "very strongly" and higher scores indicate that dysfunctional cognitions are reactivated to a greater extent during a sad mood. The LEIDS-RR total score demonstrated good internal consistency (Cronbach's $\alpha = 0.85$) in the present study.

Ego depletion. Two reliable psychometric scales that capture different aspects of ego deletion concept were used. The Depletion Sensitivity Scale (DSS; Salmon et al., 2014) is a 11-item self-report measurement of the rate at which the conditions requiring self-control resources would result in the state of ego depletion (e.g., "When I am (mentally) fatigued, I am easily tempted to do things that are actually no good for me", "At the end of a working day I often have difficulties staying focused"). It was rated on a 7-point scale ranging from "totally disagree to "totally agree", with higher scores indicating more vulnerable to ego depletion. The DSS has displayed good psychometric properties, effectively measuring constructs that are conceptually distinct from impulsivity, fatigue, and both trait and state self-control (Salmon et al., 2014). This measure demonstrated good internal consistency in this study (Cronbach's $\alpha = 0.85$).

The Self-Regulatory Fatigue Scale (SRF; Nes et al., 2013) is an 18-item self-report measure assessing the cognitive, emotional, and behavioural components of self-regulation capacity (e.g., "I find it difficult to exercise as much as I should", "I experience uncontrollable temper

outbursts"). It was rated on a 5-point scale ("strongly disagree" to "strongly agree"), with higher scores reflecting the exhaustion of self-regulatory resources. The SRF was originally developed to measure self-regulatory capacities in chronic illness, but it has been applied to diverse samples outside of the target population, with evidence of its validity and effectiveness as a measure of ego depletion (Cui et al., 2022; Özden & Tuna, 2022; Zhang, Bai, &Yang et al., 2022). The SRF showed good internal consistency in the present study (Cronbach's α = 0.80).

Entrapment. The Entrapment Short-Form Scale (E-SF; De Beurs et al., 2020) is a 4-item assessment of internal entrapment (e.g., "I feel trapped inside myself") and external entrapment (e.g., "I often have the feeling that I would just like to run away"), derived from the 16-item full scale developed by Gilbert and Allan (1998). Items were rated on a 5-point scale, from "Not at all like me" to "Extremely like me" with higher scores indicating a greater sense of feeling entrapped. The brief scale has demonstrated good reliability and validity in both clinical and general populations (De Beurs et al., 2020). In the present study, the E-SF displayed good internal consistency (Cronbach's α = 0.85).

Mindfulness. The 15-item Five Facets Mindfulness Questionnaire (FFMQ-15; Baer et al., 2008) assesses mindfulness across five domains: Observing, Describing, Acting with Awareness, Non-Judging of inner experience, and Non-Reactivity to inner experience. Items were rated on a 5-point scale, ranging from "Never or very rarely true" to "Very often or always true". The FFMQ-15 is a widely used and well-validated measure of mindfulness, demonstrating good reliability across various populations (Gu et al., 2016; Hou et al., 2014). In the present study, the internal consistency of the FFMQ-15 total score was acceptable (Cronbach's α = 0.77).

4.3.4 Statistical analyses

Data preparation. Statistical analyses were conducted using SPSS (version 28). Data cleaning was performed prior to analyses, and missing data analysis was conducted for all outcome measures (see Chapter 3 for details). The Little's Missing Completely at Random (MCAR) test confirmed that the data were missing completely at random. Therefore, the Estimation-Maximisation imputation approach was applied to generate a complete dataset for further analysis. To address our research questions, the suicidal ideation composite score, created by summing the frequency, duration, and intensity scores for each participant in the

SI and SA groups, was examined as the outcome variable. A higher suicidal ideation composite score suggests a severe overall pattern of suicidal ideation. Neither age (B = 0.023, t = 1.074, p = .284) nor gender (F(2, 264) = 0.193, p = .825) was significantly associated with the severity of SI. The assumption of normal distribution was assessed through the examination of skewness and kurtosis values of continuous variables, in addition to visually inspecting frequency distribution histograms. Results indicated that the distribution of most variables was acceptable, with no extreme values detected as outliers. However, exceptions were noted for the following variables: Acceptance Coping (Skewness = 1.477, Kurtosis = 2.499), and Internal Entrapment (Skewness = -0.520, Kurtosis = -1.052). With these exceptions in mind, parametric statistics were used in the subsequent analyses.

Primary analyses. Bivariate Pearson Correlations were first computed between all variables. Mediation and moderated mediation analyses were then performed using the PROCESS macro v4.2 for SPSS (Hayes, 2022) to examine: (1) whether entrapment was a mediator between cognitive reactivity and suicidal ideation, (2) whether mindfulness moderated the pathway from cognitive reactivity to entrapment and/or from entrapment to suicidal ideation, and (3) whether ego depletion was a mediator between entrapment and suicidal ideation, with depletion sensitivity and self-regulatory fatigue being examined separately. Since our hypotheses were based on the overall effects of variables, all models were tested using the scale total score (i.e., overall cognitive reactivity and entrapment). PROCESS macro employs ordinary least squares regressions to estimate moderation and mediation effects. Statistical significance was determined by bootstrap confidence intervals with 5000 iterations that do not contain zero.

Sensitivity analyses. To avoid overestimating the effect of cognitive reactivity on suicidal ideation, due to three items explicitly assessing passive suicidal ideation in response to low mood, two post-hoc sensitivity analyses were conducted. First, the LEIDS-RR total score was recalculated excluding the three suicide reactivity items. Second, the entire Hopelessness/Suicidality subscale of the LEIDS-RR was removed from the scales total score (to which the three excluded items belong). Details of these analyses are available in Appendices 11 and 12.

4.4 Results

A total of 269 participants, aged between 18 and 70 years (M = 28.50 , SD = 10.06) were included in the analysis. The sample was predominately female (66.5%) and primarily identified as White (82.9%). Most participants were single (59.1%) and held higher education degrees (32.7% undergraduate, 27.9% postgraduate). Additionally, 58.4% of the sample self-reported a diagnosis of depression, while 55.1% reported an anxiety diagnosis. In terms of lifetime suicide history, 57.2 % (N = 154) had experienced suicidal ideation only, whereas 42.8% (N = 115) reported a history of suicidal attempts, with 15.2% having attempted once, 11.2% twice, and 16.4% three or more times. Small-to-moderate significant correlations (Pearson's r) were found between all study variables and the severity of SI (Table 4.1).

Table 4.1 *Correlations (two-tailed Pearson r) between study variables (N = 269)*

	Self-Regulatory Fatigue	Entrapment	Cognitive Reactivity	Mindfulness	Composite SI
Depletion Sensitivity	.654**	.432**	.508**	-.374**	.239**
Self-Regulatory Fatigue		.635**	.521**	-.564**	.330**
Entrapment			.484**	-.526**	.351**
Cognitive Reactivity				-.347**	.266**
Mindfulness					-.300**

Note. SI = suicidal ideation. *$p<0.05$, **$p<0.01$

4.4.1 Hypothesis 1 – Entrapment would at least partially mediate the relationship between cognitive reactivity and suicidal ideation.

Figure 4.1 (Panel A) illustrated that cognitive reactivity was positively associated with entrapment (Path a: b = 0.137, t = 9.036, 95% CI = 0.107 to 0.167, p < .001), and entrapment was positively associated with suicidal ideation (Path b: b = 0.221, t = 4.456, 95% CI = 0.123 to 0.318, p < .001). The total effect of cognitive reactivity on suicidal ideation was significant (Path c: b = 0.057, t = 4.513, 95% CI = 0.032 to 0.082, p < .001), but was reduced to non-significance when entrapment was included in the model (Path c': b = 0.027, t = 1.930, 95% CI = - 0.001 to 0.055, p = 0.055). The indirect effect via entrapment was significant (b = 0.030, SE = 0.009, 95% CI = 0.014 to 0.051), indicating full mediation with a modest magnitude of effect and confirming our first hypothesis. Furthermore, the

sensitivity analyses yielded consistent results, thereby supporting the robustness of the mediation effect (Appendix 11).

4.4.2 Hypothesis 2 – The strength of the cognitive reactivity-to-entrapment pathway and/or the entrapment-to-suicidal ideation pathway would vary at different levels of mindfulness, with a stronger association expected at lower levels of mindfulness.

As illustrated in Figure 4.1 (Panel B and C), the cognitive reactivity-to-entrapment (Path a: b = 0.100, t = 6.544, 95% CI = 0.069 to 0.127, p < .001) and entrapment-to-suicidal ideation (Path b: b = 0.176, t = 3.170, 95% CI = 0.067 to 0.285, p < .01) pathways remained significant when mindfulness was added as a moderator in both respective models. However, the interaction terms for moderation were non-significant: the strength of the cognitive reactivity-to-entrapment path did not vary across the levels of mindfulness (b = -0.000, t = -0.224, 95% CI = -0.003 to 0.003, p = .823), nor did the entrapment-to-suicidal ideation path (b = -0.004, t = -0.745, 95% CI = -0.014 to 0.006, p = .457). As such, our hypothesis that mindfulness would moderate the indirect pathway from cognitive reactivity to suicidal ideation via entrapment was rejected. Sensitivity analyses excluding the suicide-related items and the HOP subscale from the LEIDS-RR yielded consistent results (Appendix 12).

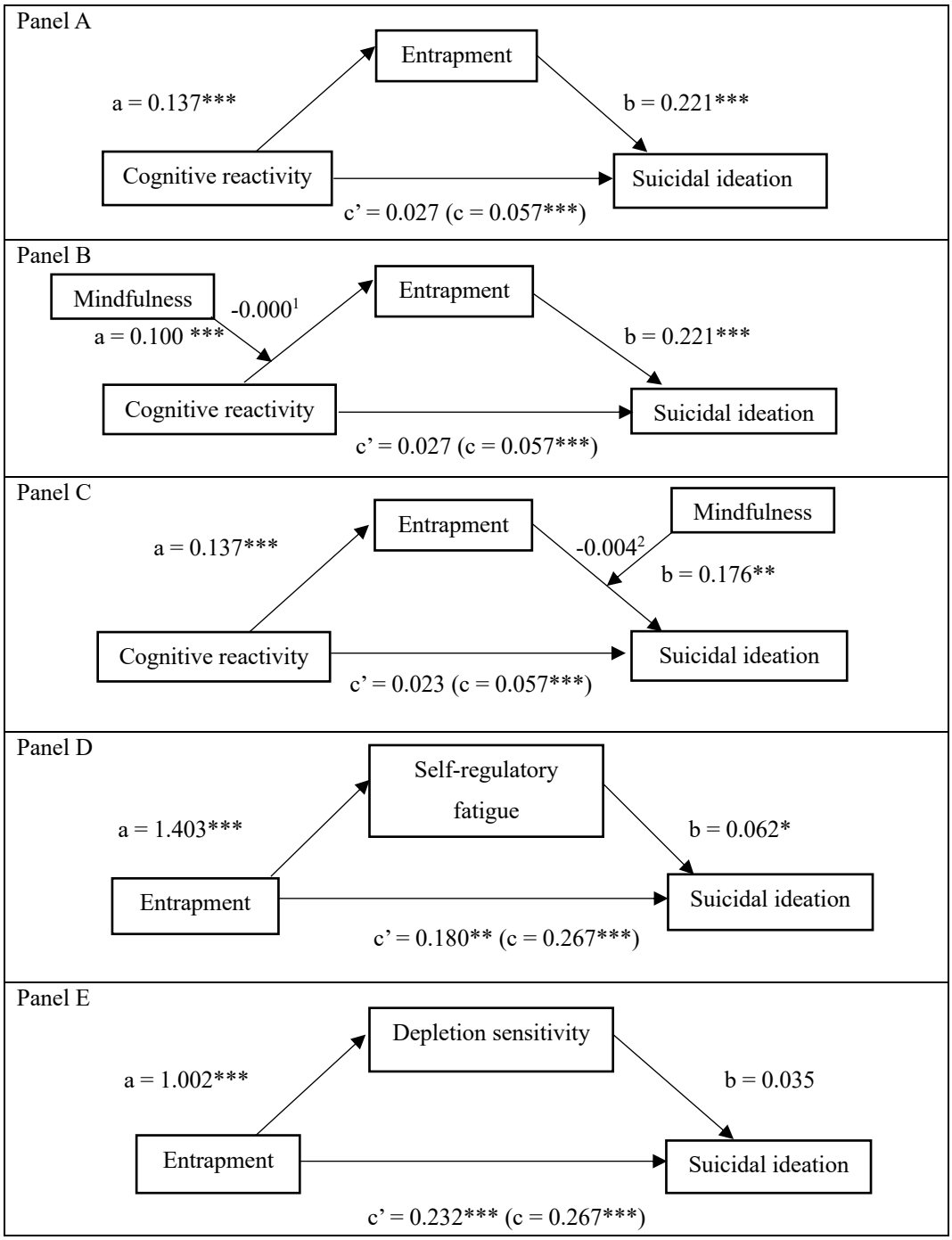
4.4.3 Hypothesis 3 – Ego depletion would at least partially mediate the relationship between entrapment and suicidal ideation.

The first analysis investigated self-regulatory fatigue as a mediator (Panel C, Figure 4.1). Entrapment was significantly associated with self-regulatory fatigue (Path a: b = 1.403, t = 13.418, CI = 1.198 to 1.609, p < .001), and self-regulatory fatigue significantly predicted suicidal ideation (Path b: b = 0.062, t = 2.451, CI = 0.012 to 0.112, p = 0.015). The total effect of entrapment on suicidal ideation (Path c: b = 0.267, t = 6.128, 95% CI = 0.181 to 0.352, p < .001) was reduced but remained significant when self-regulatory fatigue was included (Path c': b = 0.180, t = 3.225, CI = 0.070 to 0.290, p = .001). The indirect effect was also significant (b = 0.087, SE = 0.037, CI = 0.014 to 0.159), indicating that self-

regulatory fatigue partially mediated the relationship between entrapment and suicidal ideation.

The second model tested depletion sensitivity as the mediator (Panel D, Figure 4.1). Entrapment significantly predicted depletion sensitivity (Path a: b = 1.002, t = 7.834, CI = 0.750 to 1.253, $p < .001$); however, contrary to our hypothesis, depletion sensitivity was not significantly associated with suicidal ideation (Path b: b = 0.035, t = 1.696, CI = -0.006 to 0.076, p = .091). Although the total effect of entrapment on suicidal ideation was slightly reduced (Path c: b = 0.267, t = 6.128, 95% CI = 0.181 to 0.352, $p < .001$; Path c': b = 0.232, t = 4.812, CI = 0.137 to 0.326, $p < .001$), the indirect effect was non-significant (b = 0.035, SE = 0.022, CI = -0.008 to 0.080). Taken together, these findings partially support our hypothesis that ego depletion was a mediator between entrapment and suicidal ideation. Specifically, only self-regulatory fatigue, not depletion sensitivity, functioned as a significant mediator, with a small effect (b = 0.087).

Figure 4.1 *A series of mediation and moderated mediation models*



Panel A – Mediation analysis of entrapment on the relationship between cognitive reactivity and suicidal ideation (N = 269), Panel B – Moderated mediation analysis of entrapment on the relationship between cognitive reactivity and suicidal ideation, with mindfulness as a moderator between the path a (N = 269), Panel C – Mediation analysis of entrapment on the relationship between cognitive reactivity and suicidal ideation, with mindfulness as a moderator between the path b (N = 269), Panel D – Mediation analysis of self-regulatory fatigue on the relationship between entrapment and suicidal ideation (N = 269), Panel E – Mediation analysis of depletion sensitivity the relationship between entrapment and suicidal ideation (N = 269). Unstandardised beta reported, $*p < .05$, $**p < .01$, $***p < .001$. [1] Cognitive reactivity × mindfulness interaction. [2] Entrapment × mindfulness interaction.

4.5 Discussion

Grounded in the IMV model, this study offers novel insights into the well-established relationship between entrapment and suicidal ideation by incorporating the differential activation hypothesis and self-regulation theory. As predicted, entrapment fully mediated the relationship between cognitive reactivity and suicidal ideation, though with a small effect; contrary to our hypothesis, this mediation was not moderated by mindfulness. Partially consistent with our prediction, ego depletion, specifically self-regulatory fatigue rather than depletion sensitivity, partially mediated the relationship between entrapment and suicidal ideation with a small effect. The following section discusses these findings, along with their implications and limitations.

4.5.1 The role of cognitive reactivity as a cognitive mechanism for entrapment and suicidal ideation

Drawing on the DAH (Teasdale, 1988) and the arrested flight theory (Gilbert & Allan, 1998), the repeated activation of negative (especially suicide-related) cognitive patterns established in previous depressive episodes closely interweave with a range of information processing biases associated with suicide risk (Lau et al., 2004). Each reactivation strengthens the relationship between the holistic suicide-related cognitive patterns and the internal and external stimuli (such as mild negative mood, fragments of memory, bodily sensation etc), which, in turn, is likely to provoke a profound sense of entrapment (Williams et al., 2005b). To our knowledge, this study provides the first direct support for this conceptual framework, indicating that cognitive reactivity is associated with greater severity of suicidal ideation, through the experience of entrapment. Moreover, sensitivity analyses revealed that entrapment continued to mediate the relationship between cognitive reactivity and suicidal ideation, even when suicide-related items (i.e., the suicide reactivity items or the entire HOP subscale) were excluded from the total score. This finding implies that not only the repeat activation of suicide-specific cognitive patterns contributes to suicidal ideation through entrapment, but also the reactivation of broader depressive thinking patterns can lead to entrapment, thereby increasing the severity of suicidal ideation.

Taking a deeper look at cognitive reactivity raises two important considerations that help to makes sense of its potential working mechanism on influencing entrapment and suicidal

ideation. The first is understanding *why* negative cognitive patterns are more spontaneous for some individuals. According to Lau et al. (2014), once negative cognitive patterns giving rise to suicidal ideation are established during previous depressive episodes, they become closely intertwined with the depressed mood within each subsequent episode. With repeated activation, this process would lower the threshold for the occurrence of suicidal ideation (e.g., requiring fewer triggers, see Hammen, Henry, & Daley, 2000 for an example of depressive reaction to stressors) when experiencing a negative emotional state, which is similar to *cognitive sensitisation* – a psychological mechanism used to explain the recurrence of suicidal behaviour (Beck, 1996; Joiner, 2002). For example, Joiner and Rudd (2000) demonstrated that the relationship between negative events and severity of suicidal ideation was only heightened among individuals who had never attempted suicide or had attempted it only once, while no such relationship was observed among individuals who had attempted suicide multiple times.

The second is understanding *when* (i.e., experiencing mild mood deterioration) these thoughts come to mind. Suicide-related cognitions can be reactivated merely by a sad mood, as well as during periods of severe emotional distress or following devastating events. One of the most influential seminal paradigms for depression, *learned helplessness* (Seligman, 1972), may shed some light on this puzzle. Learned helplessness is essentially a coping deficit in negative but avoidable situations, where individuals exhibit a passive behavioural pattern without putting up a fight that is 'learned' from previous failed coping experiences. The perception of uncontrollability of aversive stimuli is critical in the development of learned helplessness (Vollmayr & Gass, 2013). Suicidal ideation, on the other hand, has been found to be a coping mechanism for regulating negative emotions (Coppersmith et al., 2023; Kleiman et al., 2018; Van Wyk & Gibson, 2022) and for regaining a sense of self-control (Crocker, Clare, & Evans, 2006; Siegel & Meyer, 1999). Nevertheless, it is plausible that while these negative thinking patterns that can be easily reactivated may provide individuals with a temporary sense of relief, they ultimately lead to a deep sense of defeat and entrapment over time (Lau et al., 2004, Williams et al., 2005).

4.5.2 The role of mindfulness in the relationship between cognitive reactivity and suicidal ideation

According to Williams et al. (2006), when facing a mild negative mood, individuals with a history of suicide would rapidly become dominated by a suicidal mode of mind comprised

of a constellation of suicide-related cognitions, feelings, and bodily sensations. Treatment incorporating mindfulness-based skills can interrupt this automatic activation before it intensifies feelings of hopelessness and entrapment, thereby preventing it from spiraling into to another suicide episode (Forkmann et al., 2014). Our finding that mindfulness failed to moderate the mediated relationship between cognitive reactivity and suicidal ideation through entrapment is therefore unexpected. This may, however, be partly due to the moderate-to-strong correlations between these variables, which can make it challenging to disentangle their individual effects. Specifically, the correlation between mindfulness and entrapment ($r = -0.526$, $p < .01$) was stronger than that between cognitive reactivity and mindfulness ($r = -0.347$, $p < .01$), and between cognitive reactivity and entrapment ($r = 0.484$, $p < .01$). Moreover, the entrapment score was not strictly normally distributed within the suicidal group, demonstrating a potential ceiling effect ($M = 10.42$, $SD = 4.56$, range = 0 to 16, Skewness = -0.510, Kurtosis = -0.770). This may limit the variability in the entrapment score and thus reduce the likelihood of detecting the anticipated moderating effect. Similarly, a large randomized controlled trial found no overall benefits of mindfulness-based interventions and even suggested potential adverse effects on adolescents' mental health and well-being. These findings suggest that mindfulness may be a developmentally sensitive construct, with its effectiveness dependent on cognitive capacities such as sustained attention and metacognitive ability (Kuyken et al., 2022; Montero-Marin et al., 2022).

Another possible explanation for this non-significant moderated mediation effect could be that the relationships between cognitive reactivity, entrapment, and mindfulness in the context of suicidal ideation are more delicate than they appear. Previous studies have shown that cognitive reactivity mediated the relationship between the Mindfulness Based Cognitive Therapy group (compared to the treatment-as-usual group) and decreased depressive symptoms (Cladder-Micus et al., 2018). Furthermore, Raes and colleagues (2009) found that MBCT (compared to the waiting list group) reduced the cognitive reactivity through increased mindfulness. However, the reversed model, where cognitive reactivity was examined as the mediator between MBCT/waiting list and mindfulness, was not significant. These findings suggest that the effectiveness of MBCT in mitigating adverse mental health outcomes may stem from either increasing mindfulness or reducing cognitive reactivity. Therefore, the relationships between cognitive reactivity, mindfulness, and mental health outcomes might be more appropriately examined through mediation rather than moderation.

4.5.3 The role of diminished self-regulatory resources in the relationship between entrapment and suicidal ideation

Entrapment has long been known to be a crucial psychological factor in understanding the aetiology of many mental health problems and has been found to be associated with various risk factors for suicidality, such as defeat, ruminative thinking, disturbed sleep and decreased positive future thinking (O'Connor & Portzky, 2018). Building on existing knowledge, this study found that during periods of mild negative mood, the ease with which holistic negative thinking patterns are reactivated can lead to a heightened perception of being trapped. Considering the IMV model and Escape model of suicide together, experiences related to the driving factors of entrapment (i.e., defeat/humiliation and threat to self-moderators) take their toll on individuals' mental resources, undermining psychological wellbeing and hindering successful coping over time. As a result, individuals fall into a desperately trapped state as they perceive that the unbearable mental pain will never end. The hypothesised process leading to entrapment implies two important pre-conditions regarding the possibility of the gradual depletion of self-regulatory resources. First, the overwhelming emotional pain individuals experience in a trapped state adds an extra layer of ego depletion that has already been exhausted by accumulated 'entrapment-evoking' factors. Second, the concept of entrapment inherently implies that multiple attempts to escape have been tried in the past but failed to find a way out, which in turn leads to a profound sense of hopelessness and fear of being out of control.

By incorporating the self-regulatory model of suicide (Vohs & Baumeister, 2000), the pathway leading to entrapment as well as being in the trapped state heighten individuals' aversive self-awareness, along with an intense feeling of distress by perceiving the salient discrepancy between personal expectations and actual current states. These psychological processes deplete self-regulatory resources by regulating emotional distress and narrowing attentional focus to lower-level, concrete, and meaningless stimuli, in an attempt to avoid negative self-evaluation and emotions. Moreover, with every exertion of self-regulation, individuals become less likely to successfully manage subsequent emotional distress and aversive self-awareness, especially when most previous attempts have failed, eventually progressing to a point where suicide is perceived as the only escape.

Our finding that self-regulatory fatigue mediated the relationship between entrapment and suicidal ideation provides preliminary evidence for the conceptual framework proposed by

Vohs and Baumeister (2000). However, the relationship between entrapment and suicidal ideation was not mediated by sensitivity to ego depletion. While our previous study (Chapter 3) found both self-regulatory fatigue and depletion sensitivity were associated with increased suicidality, the discrepancy observed in the present study highlights the nuanced relationship between different aspects of ego depletion and suicidal ideation and mental wellbeing in general. It suggests that it is the depleted state resulting from exerting self-regulatory resources, rather than a trait-like susceptibility to ego depletion, that underlies the relationship between entrapment and suicidal ideation. Nevertheless, the partial mediating effect with a small effect size suggests that other processes, such as hopelessness and emotional pain (Holler et al., 2022; Li et al., 2018; Littlewood et al., 2016) are involved in explaining the relationship between entrapment and suicidal ideation.

4.5.4 Implications

4.5.4.1 Theoretical implications

This study provides preliminary support for the role of cognitive reactivity and ego depletion in the motivational phase of the IMV model. The findings enhance our understanding of the entrapment-to-suicidal ideation pathway by exploring possible cognitive mechanisms and offering a new perspective on how entrapment confers risk of suicidal ideation beyond our current understanding through hopelessness and emotional pain. First, this study supports the "holistic entrapment schema", through which cognitive reactivity increases the risk of suicide (Lau et al., 2004; Williams et al., 2005b). Notably, the significant mediating effect observed in our study was not affected by the exclusion of suicide-specific items from the measurement of cognitive reactivity. This suggests that the reactivation of the general depressive cognitive patterns can lead to feelings of entrapment, thereby increasing suicidal ideation.

Furthermore, previous research showed that cognitive reactivity was associated with less effective problem solving in depressed individuals with a history of SI, with this effect being more pronounced in those with over-general autobiographical memory (Williams et al., 2005a). Both problem-solving and memory biases are conceptualised within the IMV model as Threat to Self-Moderators in the pathway from defeat/humiliation to entrapment. Overall, these findings may suggest that cognitive reactivity, akin to the roles of defeat and humiliation, is likely to increase suicide risk by influencing TSMs and leading to entrapment.

Additionally, this study presents empirical evidence supporting the self-regulatory model of suicide (Vohs & Baumeister, 2000). Results highlight that the state and dispositional aspects of ego depletion may play different roles in predicting suicidal ideation. Hence, it raises an important consideration regarding which aspect of ego depletion, sensitivity or aftermath, is of greater significance in understanding suicide or broader mental health wellbeing.

4.5.4.2 Clinical implications

The significance of cognitive reactivity in predicting suicide-related outcomes implies that, for some people, even a mild negative mood has the potential to activate a whole set of dysfunctional cognitions, thereby increasing the risk of suicide. Understanding cognitive reactivity as a cognitive vulnerability to suicide has significant implications in clinical interventions. Recognising individual patterns of dysfunctional thoughts and behaviours in response to a sad mood enables the development of early interventions to prevent the holistic negative patterns from snowballing into a full-blown suicide episode. As the reactivation of these patterns over time give rise to a sense of being trapped, the mood-to-suicidal mind connection becomes more closely linked to each other with each activation. While negative emotions are inevitable to experience in daily life, the way individuals interpret and respond to them can be altered adaptively. This suggests that Cognitive Behavioural Therapy (CBT) is well-suited for addressing this cognitive vulnerability to suicide. By examining negative automatic thoughts associated with a sad mood and identifying cognitive distortions embedded in these thoughts, patients can reconstruct more balanced and rational thinking, which helps prevent the negative downward spiral into entrapment and suicidal ideation.

From the perspective of self-regulation, suicidal ideation and behaviours can be understood as part of a progressive cyclic trajectory involving energy spending, conservation, and replenishment. In light of this, interventions could benefit from helping patients identify life events or circumstances that leave them feeling emotionally drained, as well as activities that can recharge them. Applying the self-regulation model to suicide offers a “neutral” interpretation of the suicidal crisis. Suicidal thoughts can be seen as an alert for a severely depleted inner energy system, which signifies unmet inner needs and an overloaded mind. This perspective views the suicidal crisis as a temporary state that will ride out as self-regulatory resources become replenished again. However, it is crucial to develop strategies to prevent the harm caused by cognitive deconstruction and ensure individuals remain safe until the crisis subsides. Effective treatments should also address unfavourable self-comparisons and negative self-attributions, which undermine the ego and self-worth and lead

to suicidal ideation as an escape. This can be achieved by helping patients set rational and achievable standards and goals, and by providing training on mindfulness and self-compassion.

4.5.5 Limitations

Given this was a cross-sectional online survey with a modest, predominately White female sample recruited using opportunity sampling , the findings should be considered preliminary and require replication. Suicidal ideation was measured using a composite score based on frequency, duration, and intensity parameters rather than a standardised tool such as the Beck Scale for Suicide Ideation (BSSI; Beck, 1979), which may compromise the validity of the findings. The small sample size limited the ability to examine the potential differential effects of the sub-dimensions within each construct explored within the study. Although this study met all statistical assumptions required for mediation analysis to be conducted, the cross-sectional design prevents temporal relationships from being confirmed, therefore causal effect could not be inferred. Nevertheless, in light of the novelty of these examinations, the positive findings observed in the cross-sectional analyses highlighted the need for longitudinal research. Finally, the extent to which our findings generalise beyond the study sample, particularly to clinical populations, remains uncertain.

4.5.6 Future research

Given the limitations outlined above, our findings need to be replicated in studies with larger sample sizes using a prospective design. A detailed examination of the subscales of cognitive reactivity in future research could shed light on the specific cognitive pattens linked to the severity of suicidal ideation through entrapment. Additionally, further investigation is needed to explore the relationship and between cognitive reactivity and risk factors proposed within the IMV model, such as defeat, humiliation, and rumination. In addition, previous studies have suggested that ego depletion is associated with problematic behaviours due to diminished impulsive control and mental passivity (Osgood & Muraven 2016; Vonasch et al., 2017), such as alcohol consumption (Muraven, Collins, & Nienhaus, 2002), impulse buying (Vohs & Faber, 2007), aggressive behaviours (Stucke & Baumeister, 2006). It would also be valuable to examine whether ego depletion increases the risk of the transition from suicidal thoughts to behaviours. Using ecological momentary assessment, Hofmann, Vohs, and Baumeister (2012) have found substantial conflicts between daily desires and personal

goals, and that resisting a desire earlier in the day is associated with less successfully resisting any other subsequent desires. Future studies could benefit from employing short-term longitudinal design to examine whether ego depletion is associated with later occurrences of suicidal ideation or attempts.

4.5.7 Conclusions

This study improved our understanding of the well-established relationship between entrapment and suicidal ideation through investigating the cognitive mechanism underlying entrapment and the pathway through which entrapment may increase risk of suicidal ideation. Overall, our results highlight the importance of understanding cognitive reactivity as a cognitive vulnerability to suicide as well as the value of understanding suicide through a self-regulation perspective. These results are preliminary given the cross-sectional nature of this study, necessitating further replications using larger samples and prospective research designs.

Chapter 5: The Experiential Features of Fluctuations in Suicidal Ideation: An Interpretative Phenomenological Analysis

5.1 Abstract

Background: The neglect of short-term fluctuations in suicide risk has become an increasingly recognised limitation in the literature. In response, a growing number of short-term longitudinal studies in the recent years have shown that suicidal ideation can vary significantly over hours and days. However, how individuals experience and perceive these fluctuations in the context of daily life remains largely unexplored.

Aim: This study aimed to explore the lived experience of suicidal ideation, with a particular focus on its experiential features and how individuals make sense of its fluctuations in daily life.

Methods: One-to-one semi-structured interviews were carried out with a sample of ten adults from the general UK populations who had experienced suicidal ideation within the past 12 months (6 females, 4 males; M_{age} = 28 years, range = 20 to 36 years). Interviews were audio recorded, transcribed verbatim, and analysed using Interpretative Phenomenological Analysis.

Results: Four group experiential themes were identified. An overarching theme, 'Fluctuating Suicidal Ideation', captured a shared recognition of the dynamic nature of suicidal ideation. Three additional group themes reflected how individuals made sense of these fluctuations: 'From Whisper to Scream' described variations in intensity and duration; 'Whole vs. Part: Timescale and Perspective' illustrated how timescale and perspective shaped the perceptions of fluctuations; and 'Breaking the Balance' depicted circumstances that disturbed psychological equilibrium, leading to greater emotional distress and vulnerability.

Limitations: The relatively narrow age range of participants limits the generalisability of the findings to the broader population.

Conclusions: Suicidal ideation is a fluctuating process potentially shaped by individuals' reflections on the role of distraction and their personal meaning-making processes, which are influenced by subjective interpretations formed through personal construct relativism. Future research would benefit from investigating the role of exhaustion in suicide risk and identify core components of effective coping strategies.

5.2 Introduction

Suicide is a major public health concern worldwide, with approximately 720,000 people dying by suicide each year (World Health Organization, 2025). In recent decades, substantial research efforts have been devoted to improving our understanding of suicide by integrating theoretical frameworks with empirical investigations into why people end their life and the risk factors associated with suicidal thoughts and behaviours. Despite these efforts, our current understanding remains insufficient for accurately predicting suicidal ideation and behaviours, thereby limiting our ability to effectively address this pressing public health issue. For example, a meta-analysis of 365 studies conducted over the past five decades revealed that the predictive accuracy of existing suicide risk factors is weak, with minimal improvement observed over the decades (Franklin et al., 2017). One of the important limitations that have been increasingly acknowledged in the literature is that most studies conceptualise suicidal ideation as a stable and enduring state, thereby dismissing the temporal dynamics of suicide risk (Jobes et al., 2024; see Kivelä et al., 2022 and Rabasco & Sheehan, 2022 for systematic reviews). This is evident in the predominance of cross-sectional research and longitudinal studies with extended follow-up intervals. They often have intervals spanning between months or even years, which potentially assume that suicidal ideation measured at a single time represents an individual's experience over that entire period. In light of this limitation, a growing number of researchers advocate for a dynamic approach to understanding suicide risk, emphasising the importance of more frequent assessments of suicidal ideation (i.e., short-term longitudinal designs) to capture its momentary variability and facilitate more accurate assessment of suicide risk.

Indeed, an increasing number of short-term longitudinal studies utilising ecological momentary assessment (i.e., multiple assessments per day) and daily diaries (i.e., single assessment per day) have consistently shown considerable variability in suicidal ideation (Czyz et al., 2019; Hallensleben et al., 2017; Hadzic et al., 2020; Kleiman et al., 2017; Witte et al., 2006). As a result, various psychological factors have been investigated in relation to

the dynamics of suicidal ideation, including interpersonal factors such as perceived burdensomeness and thwarted belongingness, among many others (e.g., hopelessness, impulsivity, coping strategy, and sleep disturbances, etc.). Taken together, research adopting a dynamic perspective on suicide has yielded fruitful results, significantly advancing our understanding of the dynamic nature of suicidal ideation.

Another ongoing concern in suicide research is the over-reliance on quantitative approaches (Hjelmeland & Knizek, 2010). By focusing solely on quantitative data, researchers cannot fully understand how individuals interpret the occurrence of suicidal ideation in the context of daily lives or what this experience feels like to them. Additionally, as noted by Franklin et al. (2017), the suicide risk factors examined in previous studies have been homogenous and generic, which, in part, has limited progress in improving predictive accuracy. In light of this, an in-depth qualitative exploration of the lived experience and sense-making of individuals offers valuable insights into understanding the dynamics of suicidal ideation. Such an approach also allows for the identification of emergent themes that may not have been sufficiently addressed in existing quantitative research.

There are many variations in the collection and analysis of qualitative data. One of the most commonly used qualitative data collection methods in psychology is the semi-structured interview, primarily due to its flexibility and compatibility with a range of data analysis approaches. Other methods include participants observations, diaries, focus groups, internet-based source (e.g., blogs, chat rooms, web-pages, etc.), and visual methods (e.g., photographs) (Willig, 2013). Researchers suggested that the popularity of using semi-structured interviews lies their interactive dialogue format, which not only allows interviewees the freedom to highlight topics significant to their experiences but also enable interviewers to probe deeper into specific aspects and clarify contradictions within the accounts (Horton, Macve, & Struyven, 2004; p.340). Moreover, the presence, involvement, and responsiveness of the interviewer plays a fundamental role in ensuring the quality and depth of collected data, offering advantages over other asynchronous forms of data collections (Smith, Flowers, & Larkin, 2022; p. 54).

A wide range of qualitative methods is available for data analysis. Based on the procedural focus of data analysis, Madill and Gough (2008) classified common qualitative approaches into four categories. Discursive methods (e.g., discourse analysis) focus on the use of language in constructing phenomena; Thematic methods (e.g., thematic analysis, interpretative phenomenological analysis), emphasise coding data according to similar

experiences across cases, thereby identifying patterns or themes; Structured methods (e.g., content analysis), rely on pre-defined rules for data coding and may involve transforming qualitative data into numerical form by counting the occurrence of specific concepts, and; Instrumental methods (e.g., ethnography, phenomenological methods) are guided by a research ethos or philosophical perspective and typically integrate various methodologies within an overarching commitment to a broader research goal. Among these, phenomenological method (including interpretative phenomenological analysis) and thematic analysis have emerged as commonly used qualitative methods in clinical psychology (Carrera-Fernández, Guàrdia-Olmos, & Peró-Cebollero, 2014).

The interpretative phenomenological analysis (IPA) is a phenomenologically-oriented qualitative approach, aiming to explore the individuals' lived experience as closely as possible to their own perspective, minimising the influence of existing psychological theories or researcher's preconceptions (Smith et al., 2022). In contrast to thematic analysis, which focused on identifying, analysing, and interpreting patterns within data, IPA seeks to generate rich and detailed experiential account from individuals as opposed to identifying the objective events itself (i.e., a phenomenological focus). IPA is also distinct in its idiographic commitment, focusing on an in-depth, case-by-case analysis to highlight both convergences and divergences within individuals' experiential accounts. Additionally, it stresses the active role of the researcher in interpretating and making sense of individual's meaning-making processes (Smith, 2017). Taken together, these three theoretical underpinnings, phenomenology, idiography, and interpretation/hermeneutics, make IPA particularly well-suited for exploring how individuals make sense of major life experiences, especially those of existential significance.

To our knowledge, no published qualitative research has specifically investigated the dynamics of suicidal ideation and its associated factors, which was characterised by inherent short-term fluctuations in the frequency, duration, and intensity of suicidal ideation, reflecting their adaptive nature in response to the complex interplay between internal and external factors. Therefore, the current study aimed to bridge this research gap in the literature, with a focus on providing a detailed experiential description of suicidal ideation and how individuals relate it to their daily lives. To this end, this study employed interpretative phenomenological analysis (IPA), a widely used qualitative methods in psychology, which enables a thorough and nuanced exploration of individuals' lived experiences (Smith, 2011). This study set out to address the following research questions:

Q1: How do individuals make sense of their suicidal ideation in the context of daily life?
Q2: To what extent are people aware of the dynamic nature of suicidal ideation?
Q3: Do people have a sense of what influences the frequency, duration, and intensity of suicidal thoughts?

5.3 Methods

This study implemented a qualitative design utilising semi-structured interview, guided by an interpretative phenomenological analysis (IPA) approach (Smith, Flowers, & Larkin, 2022). The study protocol, entitled "An Exploration of the Dynamics of Suicidal Ideation Using Interpretative Phenomenological Analysis", was approved by the University of Glasgow's Medical, Veterinary and Life Sciences Ethics Committee (Project No: 200220273)

5.3.1 Participants

Given the in-depth nature of IPA, which enables a thorough exploration of each individual's lived experiences, a small number of participants is sufficient to provide an exhaustive idiographic analysis to the research topic (Smith, Flowers, & Larkin, 2022). Hence, the research sample consisted of ten adult participants from the general UK population who had experienced suicidal ideation within the past 12 months. For ethical and safety concerns, individuals were excluded if they (a) were at imminent risk of suicide at the time of screening (defined as a desire to live score of 3 or lower on a 0-10 scale or the presence of a current suicide plan), (b) were experiencing a psychotic episode at the time of recruitment, or (c) had a learning disability or cognitive impairment. Additionally, individuals who lacked proficiency in English were excluded to ensure the depth and quality of interview data. A total of 17 individuals responded to the research advertisement. Of these, 15 completed the screening call via Zoom video conferencing, with no webcam required. Five individuals were excluded due to insufficient proficiency in English (n = 4) or experiencing suicidal ideation more than one year ago (n =1). The remaining ten participants were eligible for participation, comprising six females and four males, with a mean age of 28 years. Participants characteristics were detailed in Table 5.1, with pseudonyms assigned to protect confidentiality.

5.3.2 Procedure

Potential participants were recruited through convenience volunteer sampling via a research advertisement circulated to the University of Glasgow Psychology participant pool, MQ Mental Health Research (a UK-based mental health research charity), the Suicidal Behaviour Research Laboratory (SBRL) website, and social media platforms (i.e., Twitter, Facebook, Reddit) between June and August 2023. Interested individuals contacted the lead researcher via email and received the participant information sheet, privacy notice, and a list of mental health support organisations before the screening interview. To determine eligibility, all potential participants completed a 15-minute verbal screening questionnaire via Zoom, during which they had the opportunity to ask any questions about the study. Eligible individuals then scheduled their interview, choosing to attend either in-person at an interview room within the School of Health and Wellbeing or online via Zoom, based on their preference. Conducting both in-person and online interviews primarily afforded enhanced geographical flexibility and convenience for participants. Each semi-structured interview lasted for approximately 45 minutes. At the beginning of the interview, participants attending in person provided written consent and completed a background information questionnaire covering demographic information and mental health history. For those interviewed via Zoom, verbal consent was audio-recorded, and responses to the background information questionnaire was collected verbally and manually entered into an Excel spreadsheet by the lead researcher. The use of a webcam during online interviews was left to each participant's discretion; however, the researcher's webcam remained on throughout the conversation unless the participant requested otherwise.

The interview schedule, initially drafted by the lead researcher and finalised by the supervisory team, was designed to explore the experience of suicidal thoughts, with particular emphasis on their fluctuating nature, if applicable. It comprised four main open-ended questions: (1) Can you tell me about your most recent experiences of suicidal thoughts and feelings? (2) Some people talk about their suicidal thoughts as fluctuating or waxing and waning. Does this make sense to you? (3) Do you have any sense about what things may influence how often/ how intense/ how long you experience suicidal thoughts? (4) For many people, suicidal thoughts tend to come and go. Can you think of a time in your life when you stopped experiencing suicidal thoughts and feelings? The interview schedule was followed flexibly, with no fixed sequence, to foster natural conversations. During the interview, the role of the researcher was an active listener with minimal preconceptions, encouraging

participants to speak freely and reflectively. The interview schedule was piloted with experienced SBRL researchers to assess the feasibility and sensitivity of the questions. Upon completion of the interview, a suicide risk assessment was carried out, and participants currently experiencing suicidal thoughts were encouraged to follow a safety plan. Participants who completed the interview received a £25 Amazon e-voucher as compensation, and those who attended an in-person interview were reimbursed up to £15 for travel expenses.

5.3.3 Qualitative Analysis

The interviews were audio-recorded with participants' consent and transcribed verbatim by Appen, a known company specialised in confidential transcription. All personally identifiable information was redacted from the transcripts, which were then analysed case-by-case in accordance with the IPA procedures (Smith et al., 2022). A core feature of the IPA approach is the double hermeneutic process, wherein the analyst seeks to make sense of the participants' meaning-making regarding a lived experience of existential significance. Accordingly, the narrative account entails an interaction between analytic commentaries and transcript extracts, embodying both the interpretative and phenomenological dimensions of IPA. To facilitate a rich and rigorous analysis, the process unfolded across several stages: (a) Exploratory noting, which involved detailed, interpretative yet exploratory comments; (b) Forming experiential statements, which provided concise and analytical summaries capturing the experiential core of each participant's account; and (c) Constructing personal experiential themes, which involved organising experiential statements into coherent, person-specific narratives. Following the individual-level analysis, a cross-case analysis was conducted to identify patterns of convergence and divergence across participants' personal experiential themes. From this, (d) Group experiential themes were developed to represent shared experiences across the sample, while preserving the uniqueness of individual narratives. Repeated close readings of each transcript was undertaken to consolidate those experiential themes, making sure they captured the most salient and authentic elements of participants' lived experiences. Group experiential themes were constructed only if they were evident in at least half of the individual transcripts. To aid interpretation, group themes and sub-themes were also presented graphically, illustrating their hierarchal structure and the interrelationships among themes.

5.3.4 Transparency

The screening calls and study interviews were conducted by the lead researcher, a female, non-native English-speaking PhD student with a bachelor's and master's degree in psychology, and one year of experience providing psychotherapy to outpatients in a non-UK country. During the interview phase, the supervisory team and two doctoral researchers from the Suicidal Behaviour Research Laboratory (SBRL), who had expertise in qualitative interviewing, were consulted as needed and provided debriefing support when appropriate. Upon reflection, no significant differences were observed between in-person and online interviews in terms of the interview schedule or the lead researcher's conduct that could have introduced bias into the interview dynamics. The only notable difference was the occasional disruptions in the flow of some online interviews due to intermittent internet connectivity, which at times required participants to repeat their responses. While this may cause minor frustration, it did not significantly affect the quality or depth of the data collected, as participants remained patient and understanding. Notably, as the study progressed, the interview process became more fluent, with increasingly natural interaction observed in later interviews. Data analysis was conducted entirely on-screen by the lead researcher, following the analytical procedures previously outlined. Group experiential themes were subsequently reviewed by all research authors to ensure their accuracy and representativeness.

Table 5.1 *Participants Characteristics and suicidal histories*

Pseudonyms	Age	Gender	Ethnicity	Marital Status	Education	Sexual Orientation	Mental Health Diagnosis	Parameters of suicidal ideation			Lifetime SA
								Frequency [a]	Duration [b]	Intensity [c]	
Amelia	25	F	White	Single	Postgraduate degree	Straight	Depression, Anxiety, BPD	1 /week	1-4 h	A little mild	≥ 3
Andrew	20	M	White	Single	A-levels	Straight	N/A	Daily	< 1 h	A little intense	No
Charlotte	36	F	White	Single	Undergraduate degree	Straight	Depression, Anorexia	Daily	> 8 h	Intense	No
Daniel	25	M	Black	Single	Undergraduate degree	Straight	Depression, Anxiety	< 1 /week	< 1 h	Mild	No
Eleanor	29	F	White	Single	Undergraduate degree	Gay/lesbian	Depression	2-5 times/week	< 1 h	A little intense	No
Hazel	28	F	Mixed	Single	Postgraduate degree	Straight	Depression, Anxiety	2-5 times/week	< 1 h	Intense	Once
Isabella	28	F	White	Single	Postgraduate degree	Straight	Eating Disorder	2-5 times/week	< 1 h	Moderate	No
Matthew	29	M	Asian	PNA	Undergraduate degree	Straight	Depression, Anxiety	< 1 /week	Seconds or minutes	A little intense	No
Scarlett	31	F	White	Single	Undergraduate degree	Gay/lesbian	Depression, Anxiety, PTSD	Daily	1-4 h	Intense	≥ 3
William	31	M	White	Other	Undergraduate degree	Straight	Depression, Anxiety	Many times/day	5-8 h	Intense	No

Notes. [a b c] Adapted from the Columbia-Suicide Severity Rating Scale. When you have thoughts of wanting to die or killing yourself: [a] how frequently do the thoughts tend to occur; [b] how long do the thoughts last; [c] how intense are the thoughts? F: Female; M: Male; SA: Suicidal attempts; BPD: Borderline Personality Disorder; PTSD: Post-Traumatic Stress Disorder; PNA: Prefer not to answer; N/A: Not applicable

5.4 Results

In exploring the daily experience of suicidal thoughts and feelings, four group experiential themes emerged. Each participant's narrative reflected a universal awareness that suicidal ideation was dynamic and fluctuating, rather than constant. Therefore, 'Fluctuating suicidal ideation' served as the central background for the narrative analysis and is primarily presented as a summary. Additionally, three key aspects that encapsulated the experiential core of these fluctuations were identified: 'From Whisper to Scream', 'Whole vs Part: Timescale and Perspective', and 'Breaking the Balance'. These group themes were further explored through relevant sub-themes, providing deeper insight into the experiential features of suicidal thoughts and feelings (see Figure 5.1 for a graphical presentation of the groups themes).

Figure 5.1 *Structure of group experiential themes (bold) and related sub-themes (italic)*

5.4.1 Fluctuating Suicidal Ideation

All participants (n=10) explicitly described their suicidal thoughts and feelings as fluctuating, which was evident at both the momentary and episodic levels. For example, as Isabella noted, "It definitely does not feel like a constant, it does just go very up and down". Amelia echoed this experience, saying, "I just have to ride it out and I know that it will go away". Charlotte provided an example of episodic fluctuations, explaining, "On this occasion, there was just one very short episode, where they appeared and then they did not come back because there was a very specific reasons that I was having these thoughts".

5.4.1.1 Unpredictability

The unpredictability in the waxing and waning of suicidal ideation was emphasised by the majority of participants (n = 7). These fluctuations were often described as "random" (Haze, Andrew) or "inconsistent" (Daniel), with some noting a lack of "rhythm or patterns" (Matthew, William). For Scarlett, the fluctuations were perceived as a transitional phase between passive and active suicidal ideation, with a deep concern about the sudden onset of intense thoughts that might go undetected before escalating into actions:

> *"When we had the screening interview we talked about passive and active suicidality and, I suppose, I view it that way and then, in between them was a transition period. So, I can move from being passively suicidal into being actively suicidal and just go backwards and forwards between that all the time […]. The completely overwhelmed feeling that I cannot go on and it is really sudden, then I am much more at risk because I might just do something immediately in the moment that somebody might not have realised, or I do not have warning signs or a long-term pattern that people can pick up." (Scarlett)*

Similarly, the unpredictable nature of suicidal thoughts gave rise to a deep sense of vulnerability in Isabella's narrative, which was further emphasised by her soft and faint voice:

> *"If there was a clear pattern of up and then down, it is almost like you could plan for how to cope with that and you would know when you will feel like that. But because it is quite unpredictable, it feels more difficult to deal with because you just, yeah, I might feel fine now, but I do not know if later (shy laugh) I might feel worse or I might feel better. So that is why I think it is feels harder in a way." (Isabella)*

This extract highlights the challenge of managing suicidal thoughts, where a lack of identifiable patterns may evoke feelings of helplessness and powerlessness. The shy laugh here may suggest an unconscious attempt to soften the deep emotional distress, making it less overwhelming for both herself and the interviewer. Notably, the shy laugh was a recurring nonverbal cue throughout Isabella's transcript, often used when discussing emotionally significant topics or expressing uncertainty about how others might perceive her (possibly due to her struggle with low self-esteem).

5.4.1.2 Integrated experiences

All participants described their suicidal thoughts and feelings as coming and going, which most (n = 9) said made it difficult to quantify experiential dimensions such as frequency, duration, and intensity. Participants often struggled to separate the factors that influenced the frequency, duration, and intensity of suicidal thoughts, instead perceiving them as closely intertwined (n = 10). This was evident in participants' recurring references to their prior responses. To avoid redundancy, only the most direct demonstrations of overlapping accounts of influencing factors were presented here: "Again, it will come back to the thing I keep saying" (Eleanor), "How long my thoughts lasted was also influenced by nearly the same things" (Daniel), "I guess it is similar to the earlier answers of the different internal and external factors" (Scarlett), and "Things or problems that I am going through can definitely exacerbate or cause these thoughts and feelings to appear" (Matthew).

Moreover, the dimensions of suicidal ideation were sometimes perceived as overlapping aspects of one continuous experiential process rather than separate categories. Participants did not always have a distinct perception on the frequency, duration, and intensity of suicidal ideation in their own narratives, suggesting a more coherent and integrated understanding of the experience as a whole. The representative transcript extracts of three participants were provided here. For William, the intensity of his suicidal thoughts was closely tied to the frequency of getting trapped in a negative feedback loop of unfavoured internal dialogue and the duration of dwelling on these thoughts:

> *"When you are at your deepest, darkest and you are really thinking about it, the intensity is just how often are you feedbacking into your…[negative loop]. Basically, if there is nothing to kick you out of it, then the longer you linger on it…or, there was*

one time I let someone down, I did not meet up with someone, when I was feeling bad. Again, and then that just adds to it, so the longer you linger on it and, if anything bad adds on top of it, it gets even more intense because you tell yourself, 'Well, you idiot. You should have just went out and met them.' Or, 'You should have just done that thing. You should not have been late.' There is yeah, a lot of guilt, I think is involved with it." (William)

Amelia thought that the intensity of suicidal thoughts and feelings were associated with how long they last.

"Yeah, like the duration [influencing how intense the suicidal thoughts were]? If it is a shorter period of blackness, feeling like that, then it gets worse or if I have not kind of stopped and like gone into that mode, or trying to look after myself like fast enough?" (Amelia)

At times, accounts of one dimension of suicidal thoughts could move seamlessly into descriptions of another, suggesting the interconnected nature of these experiential features of suicidal ideation. The quote below highlighted a shift in focus from the intensity to the frequency of suicidal thoughts, demonstrating that the intensity of such thoughts were influenced by the circumstances in which they arose.

"I think what affects how intense the thoughts are, is if there is something going on in my life that I feel, 'I am just not good enough. I need to try harder. If I tried harder, if I could do better at this job, then it would not be so bad, but, clearly, I am just rubbish at this job, I am a rubbish doctor. I am just an idiot. What is the point? I cannot do anything right.' So, it tends to be if there are situations where I feel like I am not good enough, then that makes the thoughts really intense […]. So, yeah, situations where I feel like I am failing in myself. Those tend to be when the suicidal thoughts happen." (Charlotte)

5.4.2 From Whisper to Scream

Participants described their suicidal ideation as varying in intensity and duration, which resulted in different experiential qualities.

5.4.2.1 Subjective experience of fleeting thoughts

While suicidal ideation was sometimes brief, as Daniel described, "It was just a thought…can be less than a minute", and intrusive, as Andrew experienced, "You will just be doing something and then a voice in the back of your head will be like, 'You should kill yourself'", their impact was largely shaped by participants' emotional responses and personal interpretations. For some participants, these fleeting thoughts could be minor and ignorable at times as illustrated by Isabella, Eleanor and Hazel:

> *"Sometimes it can be just very fleeting and just a quick thought. And then I just notice that I had the thought and think, right, I have got to try and distract myself or do something else to take that away." (Isabella)*

> *"There are moments when it is very fleeting, as intense as like nothing more intense than just talking to a friend. It is like, well, it is just kind of flows by, it's fine." (Eleanor)*

> *"Every time I cross a bridge [a past suicidal attempt of jumping from a bridge], that is when the feeling pops up… It was not very strong; it is just like a memory of that moment" (Hazel)*

The echoes of previous suicidal attempts were also mentioned by Scarlett as not being actively suicidal as if "thinking about a television show or what to have for dinner or whatever". Notably, the use of analogies drawn from everyday life, such as "talking to a friend" or "television show and dinner", suggested that these fleeting thoughts and feelings were not overwhelming, often with a tendency of normalisation. For Scarlett, the 'ease' of fleeting thoughts may stem from the perceived control she had over them: "When things in life are pretty stable and okay, I will only tend to have these passive, fleeting thoughts, and they are not permanent. I can think them and then stop thinking them". Additionally, the 'adaptive' nature of these thoughts can provide a moment of respite, serving as a coping mechanism during times of distress, as she described:

> *"Those passive, fleeting thoughts are a relief, something that is really comforting, you know? If I think to myself, "This [indicating any negative situation] is really frightening, I cannot do this." Or it feels overwhelmingly catastrophic, even though it is really small, I can just think to myself, "It is okay because I just always have this*

option." And then, everything starts to feel less overwhelming, and I can just feel like I can breathe a bit and, then, that can almost help me calm down." (Scarlett)

Amelia also perceived brief suicidal thoughts as a form of relief from the constant pressure of striving, experiencing them more as an expression of passive detachment from self-preservation rather than a direct intent to die. She said, "I can have thoughts about suicide or overdosing just for a break and not caring whether it kills me or not, […] but you are not planning it, you are just like indifferent to it, or what if you just stopped swimming."

While fleeting suicidal thoughts could seem ignorable and manageable for some, they do not necessarily indicate an absence of psychological distress. Two participants expressed confusion and distress at the recurrence of these fleeting suicidal ideation in their daily lives. Matthew, for example, had struggled with low self-esteem, particularly regarding feelings of personal inadequacy and thwarted self-worth. In his account, brief suicidal ideation often 'popped up' in response to situations where he experienced a sense of failure or dissatisfaction with himself:

"I do not really understand why that happens and it makes me feel that there is something wrong. I feel like it is not normal and I do not want to have any problem. I do not want to be someone who has a problem, and it feels like flaws? something weakness, and it is something that I do not like…I kind of understand why I might get these kinds of thoughts or feelings when something big happens but why would I get them as fleeting thoughts, you know?" (Matthew)

Matthew's ongoing struggle and emotional distress were clearly evident, particularly in his repeated use of the phrase 'do not'. The inability to comprehend the nature of fleeting suicidal ideation seemed to amplify his mental distress, which was closely tied to his low self-esteem. Similarly, William described the recurring appearance of fleeting thoughts with no clue why they occurred:

"I will be 'Oh, you could just jump off the roof today.' It does not feel like you are actually thinking those thoughts. It is almost like someone just joking with you in the back of your mind. 'You could just …' Why did you have that thought? This is not even a bad day." (William)

William's perception of those thoughts as coming from "someone else", along with his repeated use of the pronoun 'You', highlighted his detached tendency from suicidal thoughts and feelings. Unlike Matthew, Willam did not seem to assign emotional urgency or distress to these fleeting thoughts (at least not on the surface level), as he continued "I just ignore it, I just assume other people have them whenever they see a situation like that [on the roof top], maybe people do not, maybe it is just from a dark sense of humour". In this case, the normalisation of these thoughts acted as coping mechanisms, potentially helping to reduce their emotional impact.

For Charlotte, while suicidal thoughts occasionally appeared as fleeting, they often emerged with a sense of urgency and decisiveness. As she said, "I do not ever have a situation that is kind of rubbish and I am 'Oh, I just want to kill myself', When I do have the thoughts, they are intense. It is usually 'I need to kill myself' […] it was an intense feeling, but it just stopped very quickly because as soon as I thought it, I immediately knew that 'I cannot do that to family'."

5.4.2.2 Lost in mind: drowning in overwhelming emotions

While fleeting suicidal thoughts typically would not significantly disrupt daily routines, all participants acknowledged experiencing intense suicidal ideation that evoked overwhelming emotional distress. These thoughts were overpowering, e.g., "I felt quite immersed in them and could affect my mood for quite a bit of time" (Matthew), and "They are almost debilitating in a way when you feel they are so strong and powerful that you feel that you cannot think about much else or really do much else." (Andrew). The feeling of being dominated by suicidal ideation was expressed by others as well:

> *"You would always have something in the back of your mind or even front of centre mind[…]Sometimes, I was working, and I was looking at the screen. Nothing was going in because my brain was just going on overdrive. Just thinking about everything else and thinking about suicidal stuff". (William)*

Isabella offered a powerful description of how consuming intense suicidal ideation could be, illustrating her use of multiple distractions simultaneously to fully occupy herself:

> *"It feels it takes up all your attention, so you actually cannot think of anything else. And I think that can be quite hard, but one thing that I used to do quite a lot was, this*

sounds a bit weird (shy laugh), but I used to have a jigsaw puzzle. So, I would be doing a jigsaw puzzle, but I would also be listening to a podcast or listening to music. So, it felt like I did not have any space or attention to think of the thoughts because I was physically doing the jigsaw puzzle but also listening to a podcast or something else. So, it was almost like yeah, my brain had no space to (shy laugh) think of anything. […] But even I often will try and watch something on Netflix or just YouTube or something. Sometimes I feel that is not distracting enough. The thoughts keep coming back so I think it has to be something that is really engaging and really taking up all my attention and energy." (Isabella)

The desperate need to be mentally and physically occupied may be driven by a sense of hopelessness for Isabella. The following quote described how an overwhelming suicidal crisis clouded all other possible alternatives, trapping her into a state of hopelessness:

"I was just feeling really bad about myself and feeling quite hopeless. So, I guess I just thought there is just no, yeah, in that moment I just felt there is no hope for the future. So yeah, I might as well just not be here. But if I think about it rationally, I feel sometimes I can be like, "Okay, no, there is some hope." But (shy laugh) then in those moments I just feel, no, nothing will get better." (Isabella)

The information and insights conveyed by this extract were subtle and required delicate interpretation. First, the deliberate emphasis on 'in that moment' highlighted that the feeling of hopelessness was not a constant but emerged specifically during moments of emotional overwhelm. Additionally, the pause, followed by a brief shy laugh immediately before expressing her intense thoughts and feelings, may reflect Isabella's hesitation or vulnerability when confronting such intense hopelessness and suicidal ideation.

A similar experience was shared by Scarlett. When emotional pain became all-encompassing, she found that there were no other possibilities, only a profound sense of hopelessness. This moment marked a critical turning point, where her passive suicidal ideation escalated into more active and intense thoughts.

"So, yeah, there has to be a bigger factor that almost confirms the little thoughts. So, the little thought might be, oh 'Everything is hopeless.', but the bigger factor, being depressed or being totally exhausted with burnout, or everything just being horrendous in life, that bigger factor, it holds the hopelessness and, then nothing else

exists, just the hopelessness and, so, there isn't a way to just say, 'Oh, it is alright because I can always kill myself.' Because that thought means that I am thinking it might get better, or it will get better. But, when I am depressed or when there is this bigger factor, then that possibility does not exist anymore. […]There is no future where it will be okay. It will just always be bad, and it will always be terrible and there is no hope for anything changing." (Scarlett)

The phrase "nothing else exists, just the hopelessness" conveyed the all-encompassing nature of her despair, where her mind was entirely overtaken by hopelessness, leaving everything else devoid of meaning. Even (passive) suicidal ideation, which had previously provided a sense of control and relief, no longer served that purpose. Instead, they were overshadowed by the only rational option that is of suicide. Her moment-by-moment survival strategy further underscored the deeply distressing nature of another type of suicidal thoughts she experienced, the compulsion to die, which she described as "the feeling that I have to kill myself, even if I do not want to":

"I suppose the way that I cope with that is I break the whole day down into really small chunks, you know? If it is not as bad as, 'Oh, I will get through today.' But, if it is really bad, then it is, 'Okay, I will get through this hour, or I will get through this minute. If I can get through this minute, then I will just get through the next minute and then …' Just one minute at a time, so that it does not feel as overwhelming. 'You only have to live for another minute.' So, it does not feel as bad." (Scarlett)

This quote reflected the extreme difficulty of enduring the emotional distress caused by compulsory suicidal ideation, which was further explored in Section 5.4.4.2 *Losing control*.

As distress deepened, the intensity of suicidal thoughts was sometimes reflected by the involvement of imagined suicide scenarios or even specific means of suicide, though this did not necessarily indicate an intent to die, as reported by four participants (Andrew, Charlotte, Amelia, and Eleanor). The following quote was selected for its powerful portrayal of the emotional intensity conveyed by the participant.

In a flat and blurred voice:

" So yeah, that is one of the daydreams I get is I go up to a mountain, because that is what I do, I do mountaineering. I do not take any stuff with me, no rucksack, no

anything, no nothing. And you just walk just far into the (inaudible) you can, beyond help and then just till you drop dead, I guess, is sort of the thought I have." (Andrew)

In Andrew's narrative, the pursuit of depth in emotional pain served as a form of escapism from a pervasive sense of emptiness, which is the essence of his chronic suicidality. His description of an imagined death scenario conveyed a profound emotional melancholy and detachment, underscored by the contrast between his emotional anguish and the emotionless, flat tone of his voice. Furthermore, the expression 'no rucksack, no anything, no nothing' powerfully reinforced his indifference to death and the complete abandonment of hope during that moment of imagined despair.

For both Hazel and Charlotte, intense suicidal ideation was often accompanied by a powerful urge to release accumulated emotional burdens from their past. For Hazel, this emotional release typically manifested through intense episodes of crying. In contrast, Charlotte's emotional release was intertwined with a strong desire for physical escape. As she described, "I needed to get my thoughts out [wrote 'I just cannot do it anymore' on phone]…I need to get out of this room, get out of this flat, I need to be outside […] Get out of this town, away from family and just go."

5.4.3 Whole vs. Part: The Role of Timescale and Perspective

While the previous group themes demonstrated key experiential features of fluctuations in suicidal thoughts and feelings, somewhat unexpected findings emerged from the transcripts, offering insights that were rarely addressed in conventional discussions of fluctuations. Specifically, for some individuals (n = 6), suicidal thoughts, although acknowledged as fluctuating, were perceived as deeply ingrained in their daily lives. Additionally, the role of distractions played a crucial role in shaping how fluctuations were experienced (n = 10), at times even creating the 'illusion' of fluctuation. This group theme delved into participants' narratives, exploring the fluctuating nature of suicidal ideation and examining how these seemingly contradictory experiential features contributed to a more nuanced understanding of their lived experiences.

5.4.3.1 Being suicidal feels like a part of existence

Six participants contributed to this sub-theme. Scarlett's long history of suicidality, rooted in past traumatic experiences and ongoing living challenges, led to the perception of suicidal ideation (particularly passive ones) as a constant state of existence.

> *"I do not personally really identify passive suicidality as being suicidal because, generally, just thinking about suicide or thinking, 'Oh, I could kill myself if I wanted to.' Or just ruminating over suicide, to me is not being suicidal because it is just like a constant state. Because it has been part of my life for such a long time, it just exists with me, so it is not a state of being. I am not within suicide. I am just alongside it. If that makes sense." (Scarlett)*

Scarlett's passive suicidal thoughts appeared to be self-reinforcing, offering a sense of relief and comfort (as discussed in Section 5.4.2.1). In this way, they fulfilled a psychological survival need for her, such that she did not perceive them as requiring active coping. As she stated, "When it is just passive ones, I do not need to cope, really, because they are not usually very distressing."

In comparison, Amelia's narrative reflected a deeper sense of resignation, as she described her suicidal ideation as having become a "learned habit" or a "brain pattern". Amelia had a complex traumatic history, and she believes that her experiences have reshaped her stress responses, embedding suicidal ideation into her psychological coping mechanisms.

> *"So now, it is not directly, this happens a lot, this is just how I am. So, it is not 'oh I have broken up with someone' or 'oh I have lost my job'. Like it is not like that for me. It can just happen cause sometimes when it has happened, people have pointed to 'oh well is this thing stressing you out?', I am like 'no', because there is always something. I can deal with bad stuff and not get like that as well. So, it is not necessarily always brought on by something particularly stressful. But in saying that, I have had a lot of trauma in my history. I know that is why I am like this but that is just who I am now. It is not brought on now by anything." (Amelia)*

Amelia highlighted that her vulnerability to suicidal thoughts and feelings (arising without clear triggers) was deeply rooted in her traumatic history. Overtime, this led her to accept being suicidal as an integral part of her identity. In the following quote, she further elaborated

on how the long-term impact of growing up in a harmful environment continued to shape her current lived experience:

> *"As a child, in that environment, it is really exhausting, it is really hard, and I actually like just going to sleep and like not being here to deal with it anymore is a better alternative. It is a rational choice. Yeah, whereas now as an adult, I know, I am not in harm anymore, I am safe, I have got control over my own life, nothing bad is going to happen and those feelings do not last forever. So, I know now that I just need to sit them out, but I also know that, yeah, they probably just happen because I am quite damaged and that is my history[…]. It is almost like you are being held to a fire and it is burning, and you are like, well, I do not like burning, so I would rather kill myself and then once you remove them from the fire, they are like, oh, okay. Like, you do not need to do that anymore. But yeah, it is hard once you have kind of developed that response to stress to kind of rewrite it." (Amelia)*

Even with an improved living environment and greater control over her life, Amelia recognised that suicidal thoughts remained an ingrained response pattern rooted in past trauma, accompanied by a profound sense of resignation. The fire metaphor she used powerfully illustrated how repeated exposure to threatening situations had conditioned her to respond with an automatic urge to escape from anything resembling a threat, mirroring a learned survival mechanism. Importantly, her reflections demonstrated the relationship between the 'whole' and the 'parts'. Specifically, while suicidality had become a part of her identity (the 'whole'), she also acknowledged that these feelings were temporary in nature (the 'parts').

For Hazel and Matthew, who both reported suicidal thoughts being experienced as arising without specific reasons at times, the perception of enduring suicidality was possibly linked to ongoing struggles with self-esteem. Hazel described her suicidal ideation as "something that just went through my life", with a sense of helplessness and emotional exhaustion. She continued, "I always have had a low self-esteem, maybe, from my childhood so that is kind of thing I was carrying during my life. So it is not like something really bad happened to me just little things here, little things there, little things this year and the other year, another thing happened and just things that, in a long time it gets worse". In this account, the 'whole' and the 'parts' were again interwoven in shaping Hazel's perception of her suicide trajectory. Specifically, the accumulation of negative events (the 'parts'), possibly associated the development of low self-esteem, appeared to contribute to a more pervasive and prolonged

experience of suicidality (the 'whole'). Similarly, Matthew stated, "I just feel like they just come…there is no actually specific reason for them sometimes, […]. So, it feels like these kinds of thoughts of things have become kind of part of me and then they spike up when something major happens". Although Matthew did not explicitly associate his suicidal ideation with low self-esteem, recurring themes of perceived personal inadequacy and low self-worth were evident in his narrative. For example, he stated "there is a deficiency in me because I am not able to maintain a good relationship", and when referring to anxiety around academic presentations, he added, "It makes me feel ashamed, and that is another weakness in me".

Eleanor, whose ongoing life stressors were largely tied to her transgender identity, also described a persistent sense of suicidality despite occasional periods of improvement. She stated, "I think I stopped when things got better for a while. Sometimes it is just like, never really have I not had them. Basically, I have had suicidal feelings for as long as I can remember, really."

Similarly, Andrew, who began experiencing suicidal thoughts and feelings at the age of 13, had never sought professional help and struggled to make sense of his suicidal ideation: "I just sort of do". This difficulty in identifying a clear source contributed to a sense of resignation, as he said, "I guess my brain is just wired that way".

> *"They [suicidal thoughts] are not really a cause of bad feelings, they are more of a symptom of, I guess quite an intense melancholic kind of state where you feel, you have a constant ache that you have got all day, every day. So, a kind of dull ache in the pit of your stomach. You wake-up and that is the first feeling you have. You are cooking dinner, and it is still there. But you are walking to the train station or whatever, and it is kind of your default emotion, you do not, well, for me, I never have times where I just do not really feel anything at all or just kind of feel content. I would say it is pretty omnipresent in my life that you just have a baseline level of emotional pain that you have pretty much all the time." (Andrew)*

Andrew's suicidal thoughts and feelings were profoundly intertwined with a deeper, melancholic emotional pain that held an overwhelming presence in his life. As highlighted in his earlier quote, a pervasive sense of emptiness and meaninglessness ran through his narratives. This emotional void added complexity to how he perceived, and even sustained, his suicidal thoughts, which he described as a state of deep emotional melancholy:

"When you are in a deep, state of deep emotional melancholy or like that, you are feeling something that is really intense and is really powerful and it is really real. And I guess that can be addicting in some ways, you get addicted to feeling really, really miserable and having those sorts of thoughts." (Andrew)

Despite his suffering, the intensity of suicidal thoughts offered a sense of depth and significance that contrasted to the 'dull ache' of his everyday existence.

5.4.3.2 Turning attention away: temporary relief or true change

All participants mentioned the use of distractions as a coping mechanism, which provided temporary relief from suicidal thoughts and feelings by helping them "not think much of the thoughts" (Daniel). As Hazel stated, "The thoughts were there most of the time, sometimes I just ignore them, or I just try and go other things". For most participants, keeping their minds occupied with other activities disrupted the inertia of suicidal thoughts, thus "shortening these thoughts and feelings" (Matthew) because "you will not have much time to dwell on it" (Andrew). However, many participants acknowledged that diverting attention away was merely "thinking that you are not thinking about it" (William) and viewed it as "very unhealthy" (Eleanor) in the long term, contributing to uncertainty about the nature of fluctuations in their experiences.

Although distraction may provide temporary relief, suicidal ideation inevitably resurfaced. Isabella's reflection on the effectiveness of distraction in coping with suicidal ideation, while insightful, allowed a sense of powerlessness to seep through.

"I am really not sure whether sometimes distracting myself, it is in that moment, it is alleviating them for now, but I know they will come back. So, I guess one thing is alleviating them in the moment and then I also think, but am I really dealing with them (shy laugh) or am I just pushing them away? But then they will just come back. And I guess I am not sure if it is possible to fully get rid of them or fully alleviate them." (Isabella)

This iteration of reflection demonstrated a highly reflective thought process for Isabella. She considered suicidal ideation within a broader timescale, recognising that distractions could only alleviate these thoughts temporarily (the 'parts'), rather than offer fully resolution (the 'whole'). Furthermore, she probes more deeply into the 'parts', questioning whether the

seemingly reduced suicidal thoughts at the moment stemmed from genuine resolution or mere avoidance. This reflective process likely contributed to a growing sense of powerlessness when confronting the emotional darkness and a seemingly purposeless future, given she already struggled to find a sustained sense of purpose, especially beyond academic achievement, which she believed was crucial in managing her suicidal ideation.

William made a strong statement: "When you are in it, you are in it and the fluctuating just seems to be distractions." He elaborated further with a 'graphical' explanation: "if it is a graph, the line goes up and you sit up there and you are feeling really, really crappy and use distractions to dip down, but they will fluctuate back up." His experience of intense self-criticism after using drinking as a distraction may help to understand his position:

> *"The little dips I would say, a lot of the time, they were distractions, which would actually, probably, make it worse. So, for example, I have got a bit of a drinking problem, I would distract, I would feel great because I was drunk, but the next day you are hungover and you feel even worse and that only adds to the fuel of being, 'Look, you are a crap person. You are hungover. You are supposed to be working today. You are lucky you get to work from home because you are hungover at home. People are not seeing you.' And, so, these distractions just make it worse, but in the short term, in my mind, yeah, they count as little dips." (William)*

The intense negative self-awareness William experienced in the next day reinforced his perception that these 'dips' were not genuine meaningful fluctuations but rather distractions that intensified his self-criticism.

Eleanor described turning her attention away from suicidal ideation as 'putting them in a box', indicating a form of suppression, which ultimately caused these thoughts to resurface.

> *"I think the trouble with…it is wax and waning, but it is also paying attention to them and not paying attention to them, in my case. Like, a lot of them they can be quite constant, but it depends on like how much attention I pay those feelings and emotions. It is a very, very terrible way of actually dealing with things but it is like you put it in a box and say, like, okay, just leave it in the box, easy. But then when I am left with my thoughts, unfortunately, those thoughts surface." (Eleanor)*

This extract demonstrated how shifts in perspective, from viewing suicidal ideation as waxing and waning to recognising the role of attention in shaping their presence or intensity, affected how the experience was perceived. Eleanor continued to offer a nuanced understanding of her experience with fluctuations in suicidal thoughts:

> *"While I do think that is probably there is a lot of like wax and waning in some ways, I am not sure if that is a true representation of the underlying, at least, feelings I would have. […] It is more about how well I can be able to refute those ideas at the time. […] It is a constant battle with you have a certain level of maybe suicidality that obviously ebbs and flows somewhat, but really, it is a balance of like how much you have failed mental fortitude you have at that time." (Eleanor)*

The importance of varying levels of mental strength was emphasised in Eleanor's narrative, highlighting the ongoing internal struggle between emotional distress and the ability to refute suicidal thoughts, which depended on her mental strength at any given time. Importantly, while she acknowledged that distraction was an "unhealthy" coping strategy, she found it worthwhile because it helped replenish her mental strength. As she described, "It is usually giving myself something else to do, that usually gives me some joy and is complicated enough or just, to give me that kind of rush of excitement like, ooh, this is fun and usually that kind of then builds back up my mental fortitude". Echoing this point of view, other participants shared similar perspectives: "It is simply a matter of getting through them" (Scarlett), and "Quite often help to stop it before it gets that bad, […] help to kind of like circumvent it or like help me ride it out" (Amelia). These reflections suggested that while distractions did not resolve the issues underlying their suicidal ideation, they provided surviving benefit in the moment.

5.4.4 Breaking the Balance

Across the participants' narratives, suicidal thoughts and feelings often emerged or intensified in specific circumstances where their emotional and psychological equilibrium seemed to unravel. This overarching theme captured the lived experience of reaching a tipping point, where individuals felt increasingly overwhelmed, leading to greater emotional distress and vulnerability.

5.4.4.1 Exhaustion

Nearly all participants (n = 9) described mental or physical exhaustion as either a precursor to or a consequence of experiencing suicidal ideation.

> *"My suicidal thoughts and feelings usually come about if I feel that I am in a situation where I am trapped and there is no way out. And, particularly, if what it is that I am worried about is on my mind constantly. It is very exhausting to be worrying all the time about the future and about the worst-case scenario, whatever that might be. So, I think that the suicidal thoughts and feelings come about just as a result of complete mental exhaustion. I am exhausted thinking this way, I am exhausted feeling this way. I just do not want to think anymore. I do not want to feel anymore. If I was not here, then this could all just end." (Charlotte)*

This quote compellingly illustrated Charlotte's despair and psychological pain caused by mental exhaustion and persistent sense of entrapment, with suicidal ideation emerging as a perceived resolution to end all these pains. She continued to reflected on how emotional suppression was deeply ingrained in her upbringing. "We do not talk about the problems, we just pretend they not there," she recalled. "That means you then have to internalise it and pretend that everything is okay. […] I have always been taught 'Don't cry, it will upset people'". The psychological suppression shaped how Charlotte navigated the adult world, leading to the accumulation of emotional distress and burden. Eventually, this built-up tension reached a breaking point, with Charlotte describing the onset of her major suicide episode as "the last straw". After enduring and internalising for an extended period without seeing any way out, suicidal thoughts appeared as a way of rescue or an end to the profound mental exhaustion. She continued:

> *"The weird thing about the thoughts were, as soon as I thought, "I could just kill myself and then this would all be over." It was the first time in years that I actually felt so calm and so at peace and almost happy because I was, "I have a way out. I have figured it out. I have got the solution to the problem. I just end my life and then none of these thoughts will be here anymore. I will not be sad anymore. I will not be angry anymore. Oh, why have I not thought about this before? It is so obvious." (Charlotte)*

The paradoxical emotions conveyed in this quote were profoundly clear, extending beyond the literal expression – Charlotte was emotional, with a raised voice of excitement, yet almost bursting with tears at the same time. This highlighted the complex emotional turmoil underlying suicidal ideation. While these thoughts were perceived as a relief from prolonged mental exhaustion, there was an undertone of sadness that was subtle but profound.

For Hazel, the gradual accumulation of emotional exhaustion was intertwined with the emotional distress she had experienced grown up, as detailed earlier in Section 5.4.3.1 *Being suicidal feels like a part of existence.* She recounted a triggering event (a recent relationship break up) that compounded a long-existing emotional burden, making life particularly hard to bear at that time. She said, "I had a relationship, and I broke up with my boyfriend and it was really difficult. Some situations, it was not like just something that happened, something that I was carrying from a long time ago, so everything was just so difficult. And then it finally ended up and I was feeling so, so down when that happened".

Eleanor described how her suicidal ideation often "crept up" in her in a work setting, where she felt the discrepancy between her outward appearance and her internal reality. As she monitored patients who appeared outwardly more vulnerable than herself, she questioned: "'Am I the right person to sit here?' I am not sure. I feel like we should change places. I think they are doing better than me, but obviously outside it looks like I am doing better". The unique work contexts created a dissonance, where she was responsible for providing care and being attentive to patients, despite her own psychological need remaining unmet. Over time, this perceived discrepancy may become more pronounced, leading to mental depletion, as she continued with a resigned tone, "It used to be better, but at least lately I have noticed I have been getting … I think I have worn down my mental reserves completely."

This resonated closely with William's experience of "putting on a brave face". He explained that, in most social situations, "70% of your brain is thinking about these [suicidal] thoughts and the other 30% is just trying to keep up a façade to not worry anybody". Maintaining a socially acceptable appearance while mentally fixated on suicidal ideation vividly illustrated the overwhelming cognitive and emotional burden he experienced when suicidal ideation was intense. This 'silent suffering' appeared to have become his way of coping, until it eventually led to a complete breakdown from the inside out:

> *"You could pretend enough and distract yourself enough to get through and most people would not notice, and it was only when it gets really, really, really bad. I was*

just lying on the floor in my study, not working, just … the best way I can explain this … almost like my brain had blue screen with how much destructive thoughts I had and [a significant other] came in, 'What are you doing?' You are just lying down thinking. And, that was the first time I told her, 'Something is not right.' […] So, it does not affect your life too much for everyone else, but for you it is crippling you mentally…" (William)

The "blue screen" metaphor vividly illustrated the complete mental and physical exhaustion that resulted from a sheer amount of mental distress, burden, and internal conflict that had been overloaded in his mind for a long time. It was only at this breaking point of mental collapse, which completely deprived his energy and willingness to cope (lying down on the floor), that William's emotional pain and inner struggles were finally visible to his significant others, even if it was just the 'tip of iceberg', as he lightly said, "something is not right".

Andrew's suicidal ideation was often exacerbated after particularly engaging or fulfilling experiences. While this might seem paradoxical, these moments of emotional fulfilment were often followed by a profound mental crash when he returned to the emptiness of mundane reality of everyday life. As he explained, "I was living with quite a big emotional high for quite a long period of time. I do notice a sort of crash mentally when you have been up here for so long and then you get back to reality the next, kind of a sudden crash." Reflecting on his most fulfilling hikes, he recalled: "I just remember coming home on the Monday from that and just could not get out of bed, did not go to uni, […].Yeah, just completely emotionally drained".

For some participants, the experience of exhaustion emphasised the aspect of energy depletion.

"I do not want to do anything else, I feel quite fatigued." (Mattew)

"I guess instead of thinking about them too much, I just try to just distract myself. […] I really enjoy cooking and baking, but I think I do not feel I can do those things to distract myself because it is just having the thoughts just takes away the energy to do those things. So, it feels like I can only do very basic distractions." (Isabella)

"I really struggle to deal with all the fake polite stuff that we do because that is what society does; I cannot do that when I am not okay. I am just like, I do not care, I am

sorry. But I am not sorry. Like I do not want to talk to you, I do not want to say good morning and that is really hard because I just feel really like hopeless and detached from everything. So yeah, it probably makes me into a really horrible person, and I am not trying to be, like nothing matters." (Amelia)

These quotes highlighted the difficulty of engaging in daily activities and maintaining social functioning when overwhelmed by suicidal thoughts and feelings, reflecting a deeply drained inner energetic system. For Amelia, her feelings of exhaustion relating to childhood trauma were detailed in Section 5.4.3.1 *Being suicidal feels like a part of existence* and thus were not repeated here.

5.4.4.2 Losing control

Many participants (n = 6) described how losing control disempowered them, leading to intense feelings of powerlessness and hopelessness, which ultimately made them more vulnerable to suicidal ideation.

Having a sense of control played a key role in Scarlett's experience of suicidal ideation. When she was unable to envision or hold onto the future, either due to feeling trapped or overwhelmed by unpredictable changes, it quickly spiralled into a suicidal state as a means of regaining a sense of safety and control.

"If something changes with that [future plan], then my future does not exist anymore.[…] If I do not have this really firm grasp on my future, then I just immediately become suicidal. I think it probably relates to feeling very unsafe because I do not feel like I have everything under control." (Scarlett)

The phrase 'firm grasp' underscored the vital role that her sense of future played in maintaining psychological safety and mental well-being. Additionally, the use of the word "immediately" indicated the fragility of her psychological state, where a perceived loss of control could instantly transition her into a state of overwhelming despair and vulnerability. What made Scarlett feel completely disempowered, however, was the compulsion to die without a logical reason, a state she described as "being forced to kill myself", which was further amplified by the internal conflict, as she noted, "You are fighting with yourself, but you are not even really sure why".

"I just cannot work it out. I am not sure what it is. It feels like being possessed, of having to kill myself, or having to harm myself. And that is really difficult because I have never really encountered … the mental health service and stuff, they just do not understand if you say, "I am going to kill myself, but I do not want to." They are, 'Well, if you do not want to, then do not do it.' And it is, 'Yeah, but I do not feel like I am in control. I do not feel like I have an option'." (Scarlett)

The phrase "being possessed" was a potent expression that signified a complete loss of autonomy and a dissociation between her conscious mind and unresolved internal conflict (possibly underlying her chronic suicidality). This frightening state of suicidal ideation felt not only alien to her, but also misunderstood by mental health professionals, leaving her feeling helpless and unheard.

Daniel's suicidal ideation was intertwined with emotional numbness, emerging as "a way to hide whatever was happening at that time in life". This period was marked by excessive substance use, which had a devastating impact on his life, particularly on his self-awareness and sense of purpose. His loss of control was reflected not only reflected in the compulsion of addiction but also in the abrupt, major changes that occurred in his life during this time.

"And so that mixture of emotions of how my parents will react, because all this time I was in school, I was lying and giving excuses as not to go back home. And I will just call them, and no one knew what was happening, they would just send me money. And I was taking part of my money, my rent money, my food money and buy drugs. And within a very short time I had lost a lot in my life, that is what made me feel so anxious, fall into depression. And that is when the thoughts started kicking in that I had messed up big time." (Daniel)

The phrase "within a very short time I had lost a lot in my life" conveyed a sharp sense of rapid deterioration and overwhelming loss. As Daniel explained, "You do not have any meaning of life" and "You do not do what normally you should be doing" (e.g., quitting school, isolating from family and friends). His inability to control the cascade of negative consequences led him to feel despairing, ultimately giving rise to suicidal ideation.

For Matthew and Charlotte, it was the downward spiral of negative thoughts that became uncontrollable, gradually escalating into overwhelming emotional distress. Matthew's suicidal ideation emerged when perceived failures (e.g., perceived underperforming during

a presentation) triggered intense negative self-dialogue, e.g., “I did not think I did well and it just feels like another weakness I have, […] It made me feel real bad about myself, […] What is even the point of working hard, and what is the point of just keep trying to do well in life”. This reflected a spiralling sense of helplessness, where a single perceived failure compounded feeling of worthlessness, ultimately leading to a deeper sense of hopelessness. For Charlotte, the downward spiral of negative thoughts was fuelled by excessive worrying. Her suicidal ideation often occurred in situations where she was expected to hold back her emotions when she deeply upset. Recalling a recent suicide episode triggered by work, she said: “I was so unhappy with work I just wanted to scream, but I could not because then you would get into trouble, […] I think that I tend to catastrophise and think about the worst-case scenario, and it spins out of control in my head. So, yeah, I would say any situation where I feel like there is no way out or I do not really see it getting better.” The need to maintain self-control through emotional suppression intensified her internal distress, allowing catastrophic thoughts to spiral out of control. These thoughts served as a kind of ‘internal scream’, ultimately contributing to a profound sense of entrapment and hopelessness.

Isabella’s feelings of helplessness and powerlessness in certain life situations led to suicidal thoughts as a means of regaining control over her life. Notably, her experience of losing control was expressed more implicitly:

> *“I think it has recently been relating to just recovering from having an eating disorder and the process of that and having to gain quite a lot of weight back. I am just finding that difficult in terms of feeling really bad about myself and feeling just quite negative about, yeah, about just lots of areas in my life, feeling quite negative about I am not achieving much, feeling like I am having to kind of recover from having an eating disorder, but not really having other coping mechanisms to deal with feeling low or feeling bad about myself if that makes sense.” (Isabella)*

The repeated use of ‘having to’ implied a lack of control over the recovery process from eating disorder and conveyed a sense of emotional vulnerability. It suggested that her autonomy had been stripped away, leaving her with an overwhelmed helplessness. Within this state, she thought “I could end my life, if I want to” appeared as a way to reclaim some sense of control.

5.5 Discussion

This study explored individuals' lived experiences of suicidal ideation in daily life using Interpretative Phenomenological Analysis, an in-depth qualitative method that emphasises both the phenomenological nature of experience and the process of individual meaning-making. Through analysis of semi-structured interview transcripts from ten participants, four group experiential themes with respective sub-themes emerged. Suicidal thoughts and feelings were commonly experienced as fluctuating rather than constant across individual accounts. As such, 'Fluctuating Suicidal Ideation' was identified as the central group experiential theme, with the remaining three group themes, 'From Whisper to Scream', 'Whole vs. Part', and 'Breaking the Balance', capturing salient experiential features within and about these fluctuations.

5.5.1 Main findings

When asked about the waxing and waning of suicidal thoughts and feelings, all participants indicated that this closely aligned with their daily experience. They described their ideation as unpredictable, lacking a clear rhythm or identifiable patterns in their presence and progression. This feature was also observed in previous quantitative studies examining the dynamics of suicidal thoughts, which illustrated a non-linear trend with random rises and falls in individual time-series plots (e.g., Czyz et al., 2022; Wang et al., 2021). Some participants noted that this unpredictability could be distressing and heighten their sense of vulnerability and powerlessness, as it was difficult to cope when warning signs were not consistently perceptible. While quantitative studies often examined the parameters of suicidal ideation separately (i.e., frequency, duration, and intensity), our findings suggested that these parameters frequently overlapped and interconnected as an experiential wholeness. Notably, this by no means diminished the scientific value of analysing these elements independently; rather, the intuitive convergence highlighted an inherent construal process that fosters meaning-making, suggesting that suicidal ideation becomes a meaningful phenomenon in the experiential world only when all three parameters are encompassed. In fact, this notion aligns with the findings of Chapter 3, which found no clear patterns among the investigated predictors of frequency, duration, and intensity. Additionally, this integrated perception on the dimensions of suicidal ideation was further reflected in the group theme, 'From whisper to scream'. There was considerable variation within individuals in the extent

to which suicidal ideation negatively affected daily functioning. Fleeting thoughts, typically brief in duration and low in intensity, often had minimal impact on daily routines. At other times, however, suicidal ideation became overpowering, characterised by intense psychological pain and profound hopelessness, lasting for an extended time. The experience of fleeting suicidal ideation was subjective in that participants differed in how they made sense of and reacted to these thoughts. Some perceived fleeting thoughts as mild and manageable through distraction or normalisation, while others experienced distress due to the inability to comprehend their presence or the intense emotional decisiveness that sometimes carried.

For some participants, fleeting suicidal ideation were even comforting, functioning as a coping mechanism in difficult situations. The seemingly 'adaptive' function of suicidal ideation has been documented in previous studies, suggesting its potential to offer a sense of comfort (Crane et al., 2014) or serve as a form of negative reinforcement through emotion regulation (Coppersmith et al., 2023; Kleiman et al., 2018). In contrast, when experiencing intense suicidal ideation, it could dominate an individual's mental space, inducing a sense of 'tunnel vision' in which alternatives were no longer visible. Participants described feeling entirely consumed by despair, often within the context of a distressing situation in which suicide was perceived as the only escape. This trapped escape was well-documented in suicidology and features prominently in theoretical frameworks such as the Cry of Pain Theory of Suicide (William, 2001) and the Integrated Motivational-Volitional Model of Suicidal Behaviour (O'Connor & Kirtley, 2018), both of which affording important insights into understanding the psychological mechanisms leading to suicidal ideation. Taken together, the experiential features outlined in the first two group themes provided qualitative support for the key premise of the Fluid Vulnerability Theory (Rudd, 2006), which posits that acute suicidal states exist only temporarily, with fluctuations in suicide risk reflecting constant interactions between several internal and external factors.

Perhaps the most thought-provoking, yet not entirely anticipated, finding was how the perspective shift between the 'whole' and the 'parts' shaped participants' perceptions and sensemaking of the fluctuating nature of suicidal ideation. The key point was that while suicidal ideation was waxing and waning, it often remained as a constant undercurrent, lingering in the background. This was highlighted by the two sub-themes, such that some participants perceived suicidal ideation as a constant state of being *(Being suicidal feels like a part of existence)*, while fluctuations seemed to be an 'illusion' created by distractions *(Turning attention away: temporary relief or true change).* Observing participant

characteristics suggested that ‘chronic’ suicidality often co-occurred with a history of suicide attempt, trauma, and certain personality traits (e.g., low self-esteem and melancholy). Research evidence has shown that greater fluctuations in suicidal ideation were associated with a history of multiple suicidal attempts (Byran et al., 2018; Joiner et al., 2000; Witte et al., 2006). Furthermore, a well-established link exists between childhood trauma and increased suicidality (for reviews, see Angelakis, Gillespie, & Panagioti, 2019; Miller et al., 2013), which may further contribute to the complexity of the suicidal trajectory, particularly for individuals with repeated attempts.

Therefore, individuals with a history of multiple suicide attempts may experience suicidal thoughts as less acutely distressing compared to those with no or only one previous attempt. This may be due to the development of more effective coping mechanisms that help them manage the frequent recurrence of such thoughts. Over time, this may signify a gradual process of psychological adaptation, where suicidal ideation becomes internalised as an integral part of their life, often accompanied by a sense of resignation. Furthermore, when suicidal episodes recur frequently or hold significant meaning within an individual’s experiential world, these discrete episodes may ‘merge’ into a cohesive narrative, leading to the perception that ‘being suicidal is part of who I am’. This reflects a Gestalt perceptual tendency to recognise holistic patterns, enabling individuals to integrate their personal experiences in order to make sense of them and construct meaning. As illustrated in Figure 5.2, the severity of suicidal episodes was represented by the shade and size of each dot, while the gaps between dots indicated periods of alleviation. Only by adopting a holistic perspective could the trajectory become complete, allowing it to convey a sense of meaning that contributes to the development of self-identity and the understanding of their life as a whole (i.e., the circle conveys more meaning than the discrete dots alone). Additionally, participants consistently acknowledged that while distraction, as a form of repressive coping, offered temporary relief from suicidal distress, suicidal ideation inevitably resurfaced, potentially leading to worsening consequences over time. This pattern of short-term relief followed by long-term negative outcomes aligned with findings from previous studies (Geraerts et al., 2006; Woodward et al., 2020). However, it is crucial to note that, in moments of intense suicidal distress, distractions can offer vital survival benefits that serve as a psychological shelter that helps individuals navigate the immediate crisis and restore mental resources needed to cope with future challenges.

Figure 5.2 *An illustrative example of Gestalt perception in the suicidal trajectory*

Taken together, fluctuations in suicidal ideation are shaped by a constant internal referencing process within the interpretative cycle between the 'whole' and its 'parts'. This interpretation process functions similarly to the *dichotomy corollary* postulated in Personal Construct Theory (Kelly, 2003), which suggested that individuals' construct system consists of a limited set of dichotomous constructs, serving as a reference axis to help individuals make sense of their current experience. For example, when comparing emotions along the strong – weak dichotomy, one might perceive the first emotion as strong relative to the second; meanwhile, the second emotion, previously assigned as weak, may be seen as strong when compared to a third emotion. The relativistic nature of construing emotions or constructs was well illustrated by Kelly's (2003, p.12) quote: "Neither our constructs nor our construing systems come to us from nature, except, of course, from our own nature". Therefore, understanding fluctuations in suicidal ideation involves an iterative process of reflecting on one's personal construing system and the reference dimensions they employ. When considering the lifespan as a 'whole', fluctuations in suicidal ideation can be understood as the activation of several discrete suicidal episodes, interspersed with periods of alleviation. When attention is directed within a particular episode, these 'parts' transcend and re-emerge as a subordinate 'whole', comprising fragments of intense suicidal distress, alongside an undercurrent of suicidal thoughts and feelings, which may be alleviated through distractions. Furthermore, when zooming into the moment of distraction (now it emerges as the 'whole'), the perception of fluctuations is then influenced by how frequently suicidal ideation resurfaces in the conscious mind, as well as the individual's attitude towards the distractions, whether through passive avoidance or active coping strategies.

In the ‘Breaking the balance’ section, the substantial emotion toll resulted in profound mental and physical exhaustion, which emerged as a critical tipping point for the escalation of suicide risk for nearly all participants. The metaphors used by participants (e.g., “the last straw” and “blue screen”) vividly illustrated how accumulated emotional burden has reached an unbearable level, precipitating the onset or intensification of suicidal ideation. Many participants noted a discrepancy between their social exterior and internal emotional reality. Over time, maintaining this incongruence became mentally depleting for some, especially when overwhelmed by suicidal thoughts and feelings, mirroring the psychological toll of suppression. The effect of exhaustion on increased suicide risk can be understood through the lens of the Self-Regulatory Theory of Suicide (Vohs and Baumeister, 2002). The prolonged effort required to manage emotional distress can chronically deplete an individual’s self-regulatory resources, increasing their vulnerability to cognitive deconstruction. This disinhibited state is characterised by a narrowing attentional focus, which in turn makes suicidal ideation more likely to emerge due to weakened mental constraints and exhaustion. Another common experiential feature driving individuals towards a suicidal state was the feeling of losing control over life. This theme was also demonstrated in a thematic analysis study by Van Wyk and Gibson (2022) which investigated young people’s suicidal experience during crisis through text message helpline interactions. These experiences were primarily characterised by a perceived loss of autonomy in the face of overpowering negative experiences, closely associated with feelings of powerlessness and hopelessness. In such contexts, suicidal ideation was often perceived as a means of regaining a sense of control. In other cases, the loss of control reflected a cascading stream of self-dialogue that reinforced negative core beliefs, intensifying emotional distress and further fuelling the onset of suicidal ideation.

5.5.2 Clinical implications

These findings offer valuable insights for clinical consideration regarding the fluctuating nature of suicidal thoughts and feelings. The process of suicidal ideation may not follow a clear pattern, and such thoughts were often accompanied by feelings of helplessness and a lack of control. Therefore, it is essential to develop coping strategies not only for moments of crisis but also for everyday use, focusing on emotional regulation and strengthening perceived control. Given that there is substantial variability in individuals’ experiences of suicidal ideation, fleeting thoughts should not be overlooked, as they do not necessarily indicate a low level of suicide risk. These thoughts can escalate into more intense suicidal

ideation, particularly in the presence of saliant life stressors. To prevent the intensification of suicidal distress and ensure safety, the development of a safety plan may benefit from considering the fluctuating nature of suicidal ideation, making it personalised, flexible, and reflective of the effectiveness of handling the unpredictable nature of suicidal ideation. Furthermore, the inertia of suicidal ideation highlighted that, if not interrupted, it tends to carry on with overwhelming emotional distress, This underscores the importance of early intervention targeting emotional distress and rumination. Techniques from Cognitive Behaviour Therapy can be particularly effective in helping individuals identify and address their negative thinking patterns. Fluctuations in suicidal distress may partially reflect the activation of negative core belief about the self and the individual's mental and physical capacity to manage the associated mental pain. Therefore, how to restore mental and physical resources may be an important preventative step to consider. Last but not least, it is crucial to validate the emotional distress and uncertainty associated with the fluctuating nature of suicidal ideation, and to support the development of personal resilience, as individuals often endure significant emotional distress and burden before ultimately reaching out for help.

5.5.3 Strengths and limitations

This study is the first qualitative investigation into the daily experience of suicidal ideation, offering a detailed exploration of its frequency, duration, and intensity, with a specific focus on how these aspects fluctuated over a short time. By employing IPA, this study provided an in-depth understanding of how participants interpreted and made sense of their suicidal ideation and its fluctuations. The qualitative analysis was conducted based on data from ten participants, with a gender-diverse sample (six females, four males), which was considered to be an appropriate sample size for IPA, as it allowed for capturing the variability of individual experiences while maintaining depth in the analysis. However, the sample was recruited through online advertising and had a relatively narrow age range (20 to 36 years old), with an average age of 28 years, which may limit the generalisability of the findings to a broader population. Although all participants reported experiencing suicidal ideation within the past year during the screening interview, the qualitative data primarily reflected their lived experience that held personal significance, rather than a strict representation of their past-year experience. Given the primary focus of the research and the subjective nature of participants' reports, this study examined fluctuations in suicidal ideation through the role of distractions rather than effective coping strategies. Notably, the themes identified in the analysis were not entirely independent; rather, they exhibited a degree of overlap. For

example, the theme of *Being suicidal feels like a part of existence* was often accompanied by the theme *Exhaustion*, suggesting interconnected experiences. Further qualitative studies are needed to strengthen the validity of the findings and to gain a more comprehensive understanding of the fluctuating nature of suicidal ideation. Future research may benefit from examining the role of exhaustion in suicidal distress, an area that has received limited empirical attention. Additionally, it may be valuable to explore the complexity of the relationship between distraction and suicidal distress, considering both short-term and long-term consequences.

5.5.4 Conclusion

This study provides an experiential account of fluctuations in suicidal ideation, revealing the unpredictable and integrated nature of these experiences, which have a varied impact on daily life. Importantly, the way individuals perceive and use distraction as a coping mechanism played a crucial role in shaping their understanding of their experience of suicidal ideation. In light of this, this study offers valuable insights into the fluctuating nature of suicidal ideation, emphasising the importance of recognising the role of personal construct relativism in shaping the perception of these experiences. The findings underscore the critical need for a nuanced, compassionate clinical approach, one that emphasises early and adaptive interventions and acknowledges both the intensity and variability of suicidal distress in order to prevent escalation and support long-term mental resilience. Future research would benefit from investigating the role of exhaustion in suicide risk and identifying the core components that contribute to effective coping strategies.

Chapter 6: General Discussion

This chapter outlines the main findings of the programme of research conducted within this thesis, in response to the overarching aims stated in Chapter 1, Section 1.7.2. This is followed by a discussion of the findings in relation to previous research, along with the theoretical and clinical implications. Furthermore, research reflexivity, the impact of COVID-19 on research, strengths and limitations, and directions for future research are summarised. The chapter closes with concluding remarks regarding the overall findings of this thesis.

6.1 Main findings

This thesis addressed three overarching research questions: (1) To what extent is suicidal ideation a dynamic process? (2) What factors are associated with different patterns of suicidal ideation? (3) With a particular focus on cognitive reactivity and ego depletion, what psychological factors are associated with suicidal ideation and suicide attempts? To gain a comprehensive understanding, these aims were investigated through three distinct studies employing diverse methodologies. Chapter 2 addressed aims (1) and (2) from a quantitative perspective by presenting a systematic narrative synthesis of published articles retrieved through an extensive database search. Chapter 3 examined aim (2) via a quantitative online survey. Additionally, aims (1) and (2) were explored in greater depth from a lived experience perspective in Chapter 5 through semi-structured interviews. Aim (3) was primarily investigated in the quantitative survey detailed in Chapters 3 and 4, with further insights drawn from experiential accounts in Chapter 5. Key findings from each study are summarised in Table 6.1.

Table 6.1 *Summary of key thesis findings*

Chapter/Study	Nature of investigations	Key findings
2/Systematic review	Narrative synthesis of the dynamic nature of suicidal ideation, focusing on dynamic metrics (i.e., persistence, variability, and instability) and the factors associated with different patterns of suicidal ideation.	• Suicidal ideation fluctuates considerably across time frames ranging from minutes to days, characterised by a small-to-moderate positive temporal dependency, a substantial proportion of within-person variability, and small-to-moderate instability. • A variety of cognitive, affective, social-interpersonal, and clinical/sociodemographic factors are associated with suicidal ideation across different dynamic patterns (i.e., concurrent, prospective, and time-invariant). • Concurrent associations between factors and suicidal ideation are more consistent than prospective and time-invariant associations across different assessment time frames. • Greater inconsistency in findings is observed in studies investigating momentary-level associations compared to those focusing on daily and weekly associations. • Both the dynamic metrics of suicidal ideation and the associations between various types of factors and suicidal ideation exhibit substantial individual variability.
3/Cross-sectional online survey (Part 1)	Preliminary quantitative exploration of the effects of cognitive reactivity and ego depletion on suicidality, alongside other psychological factors associated with the parameters of suicidal ideation	A. <u>Differentiating between suicidal history groups</u> *Univariate analysis* • Both cognitive reactivity (total score, aggression, and hopelessness/suicidality) and ego depletion significantly distinguished between all suicidal history groups.

(i.e., frequency, duration, and intensity).	• Affective (negative and positive urgency) and cognitive (lack of premeditation) aspects of impulsivity significantly differentiated between the SI and SA groups. • Entrapment significantly distinguished between the NH and the suicidal groups, but not between the SI and SA groups *Multivariate analysis* • Impulsivity total score (SI vs. SA) and depression (NH vs. SA, SI vs. SA) significantly distinguished between suicidal history groups. B. <u>Predicting the frequency, duration, and intensity of suicidal ideation</u> *Simple regression analysis* • Both cognitive reactivity and ego depletion were significantly associated with more severe patterns of suicidal ideation (i.e., frequent, prolonged, and intense); however not all subcomponents were significant predictors. *Multiple regression analysis controlling for depression* • The factors investigated generally showed a stronger relationship with the intensity of suicidal ideation than with its frequency and duration. • Ego depletion was independently associated with the intensity of suicidal ideation. • Negative urgency was independently associated with the frequency of suicidal ideation. • Entrapment was independently associated with frequency and intensity of suicidal ideation.

		• Hopelessness/suicidality remained a significant predictor for all three parameters of suicidal ideation.
4/Cross-sectional online survey (Part 2)	Exploration of the role of cognitive reactivity and ego depletion in the relationship between entrapment and suicidal ideation through mediation analyses.	• Entrapment fully mediated the relationship between cognitive reactivity and suicidal ideation. However, contrary to our hypothesis, the strength of this mediated relationship did not vary across levels of mindfulness. • Ego depletion, measured by self-regulatory fatigue, partially mediated the relationship between entrapment and suicidal ideation
5/Qualitative semi-structured interview	Investigation of the dynamic nature of suicidal ideation through first-person accounts of daily lived experience.	• Suicidal ideation is characterised by fluctuation and unpredictability, with considerable overlap in the perceived influences on its frequency, duration, and intensity. • Suicidal ideation may be perceived as an integrated part of one's existence, despite fluctuations in its intensity. • The paradox of temporary relief through distraction: a short-term coping strategy with long-term negative consequences. • Exhaustion and a perceived loss of control tend to exacerbate suicidal ideation.

6.1.1 To what extent is suicidal ideation a dynamic process?

This thesis demonstrates that suicidal ideation is not a static state, but a fluctuating process shaped by dynamic interactions between internal and external factors in daily life. This finding was supported by both quantitative and qualitative evidence, as shown in a systematic review of dynamic indicators of suicidal ideation in published empirical studies (Chapter 2) and an interview study exploring how individuals make sense of suicidal ideation within the context of their daily experiences (Chapter 5). The systematic review investigated the temporal dynamics of suicidal ideation through a narrative synthesis of key dynamic indicators such as persistence, variability, and instability. In this context, 'temporal dynamics' refers to inherent short-term fluctuations, ranging from minutes to a week, in the frequency, duration, and intensity of suicidal ideation, reflecting its responsiveness to environmental, biological, and psychological changes. Findings indicated that suicidal ideation generally exhibits varying levels of temporal dependency (i.e., persistence), meaning that its level at one time point tends to be positively associated with its level at the next. However, this carryover effect weakens as the interval between assessments increases. Furthermore, there is a trend suggesting that the strength of the carryover effect increases as the sampling frequency decreases, implying that suicidal ideation fluctuates more rapidly over minutes to hours than over longer intervals such as daily or every few days. This finding remains preliminary, however, as only 10 studies with longer assessment intervals contributed to the synthesis.

A similar pattern emerged in the investigation of variability. Results indicated that a substantial proportion of the variance in suicidal ideation is attributable to within-person variability (1-ICC) compared to between-person variability (ICC). Furthermore, studies using shorter time intervals between assessments revealed a broader range of within-person variability in suicidal ideation (1-ICC range = 0.16 to 0.95; 16% to 95%) compared to studies with daily (1-ICC range = 0.29 to 0.80; 29% to 80%) and weekly (1-ICC range = 0.27 to 0.58; 27% to 58%) assessments. This highlights the complexity of capturing the temporal dynamics of suicidal ideation within very short timeframes (e.g., minutes to hours). On the one hand, this may reflect individual differences in the rapid fluctuations in suicidal ideation; on the other hand, it suggests that suicidal ideation may be particularly sensitive to research methodology and contextual factors. While a relatively more consistent pattern of within-person variability has been observed in studies with longer assessment intervals, this finding

requires further replication due to the disproportionate number of studies conducted at longer time intervals. Nevertheless, the rapid shifts in suicidal ideation occurring within minutes and hours are underscored by instability metrics, which showed that suicidal ideation can change from one moment to the next by 8.04% to 26.8% relative to its total scale range.

From observation, these results did not differ significantly based on sample characteristics or sampling strategies, with the exception of assessment frequency mentioned above. Nevertheless, there is some evidence suggesting potential differences in the temporal dynamics of different constructs of suicidal ideation, especially with regard to instability. Specifically, passive suicidal ideation appears to be more susceptible to fluctuations from one moment to the next than active suicidal ideation. Despite the overall evidence supporting significant fluctuations in suicidal ideation at the group level (i.e., nomothetic approach), individual-level investigations (i.e., idiographic approach) revealed substantial heterogeneity in the dynamic nature of suicidal ideation, underscoring the importance of considering individual differences in the experience and trajectory of suicidal ideation. Indeed, the fluctuating experience of suicidal ideation received strong experiential support through qualitative semi-structured interviews (Chapter 5). All participants described their suicidal ideation as waxing and waning, with no clear or consistent patterns. These fluctuations reflected both at the short-term, momentary level and at a broader, episodic level, with varying experiential features both within and between individuals. These findings align with the systematic review, particularly the visualisations of suicidal ideation trajectories, which generally did not follow a smooth or linear course. This was well-illustrated by one participant: “If it is a graph, the line goes up and you sit up there and you are feeling really, really crappy and use distractions to dip down, but they will fluctuate back up” (William).

Importantly, the qualitative exploration using IPA not only mirrors the quantitative findings from short-term longitudinal studies but also complements them by providing contexts and real-life meaning. Without first-person accounts, it would be difficult to truly grasp what fluctuation means and how it is subjectively experienced. As illustrated by William’s quote, he felt “really, really crappy” during periods of heightened suicidal ideation, often represented as peaks or cusps in individual time series plots. These peaks often reflect overwhelming emotional distress that is debilitating and leads to a profound sense of hopelessness (See sub-theme, *Lost in mind: drowning in overwhelming emotions*, Results section, Chapter 5). Conversely, suicidal ideation can also manifest as fleeting or short-lived thoughts, which may align with the rapid fluctuations indicated in the systematic review, those occurring over minutes to hours. Although such fleeting suicidal thoughts typically

would not disrupt daily functioning as more intense ideation does, this does not mean they are 'free of worry'. There are considerable individual differences in how people interpret and respond to these short-lived suicidal thoughts. Some individuals may find them ignorable or even comforting at times, while others experience them as intrusive, confusing, and intensely urgent, further exacerbating their mental distress (See sub-theme, *Subjective experience of fleeting thoughts*, Results section, Chapter 5).

Moreover, the qualitative interviews provide unique insight into the 'dips' in suicidal ideation trajectories by revealing that perceptions of fluctuation are shaped by individuals' viewpoints across different timescales (e.g., momentary suicide risk vs. the entire suicidal episode) and their understanding of what alleviation truly means (e.g., viewing distractions as only temporarily effective) (See group theme, *Whole vs. part: the role of timescale and perspective*, Results section, Chapter 5). Despite the measurable fluctuations evidenced through indicators of persistence, variability, and instability in Chapter 2, from a lived, experiential perspective, there is no straightforward answer to the question: To what extent is suicidal ideation a dynamic process? While all participants described their suicidal ideation as feeling "up and down" rather than constant, for some, the experience was so deeply embedded in their sense of self that it felt like a persistent aspect of their identity. This sense of resignation, regardless of the actual fluctuations in the intensity of suicidal ideation, profoundly influenced how individuals constructed meaning in their personal life narratives.

6.1.2 What factors are associated with different patterns of suicidal ideation?

This thesis does not adopt a fixed, universal definition of 'patterns' across studies. Instead, it conceptualised patterns of suicidal ideation as a multidimensional construct, encompassing various aspects of how suicidal ideation unfolds and interacts with internal and external factors over time. Broadly, these patterns include its concurrent, prospective, and time-invariant dynamic associations with a range of factors (Chapter 2); its frequency, duration, and intensity (Chapter 3); and its occurrence and elevations in daily life (Chapter 5). Chapter 2 (i.e., the systematic review) investigated different types of dynamic associations between suicidal ideation and a range of cognitive, affective, social-interpersonal, and clinical/sociodemographic factors across three levels: momentary, daily, and weekly. Overall, findings indicated that several factors were significantly associated with current and

subsequent suicidal ideation, as well as with average variability or instability of suicidal ideation over the study period. For example, hopelessness was consistently associated with concurrent suicidal ideation in all investigations across sampling frequencies. In comparison, sleep problems, regardless of their specific aspects, showed good predictive consistency in prospective associations among studies with daily assessments. Clinical and sociodemographic factors were most frequently examined in studies of time-invariant associations (i.e., aggregated dynamic measures and suicidal ideation subtypes), with characteristics of suicidal ideation yielding consistent findings across these studies. Other factors, such as interpersonal perceptions, rumination, and proximal risk for suicide attempts, were explored in fewer studies and demonstrated overall good predictive consistency in both concurrent and prospective associations with suicidal ideation across assessment frequencies.

Notably, across all three levels of assessment frequency, the investigated factors appeared to be more consistently associated with concurrent suicidal ideation than with prospective and time-invariant associations. These factors include hopelessness, negative and positive affect, perceived burdensomeness, and thwarted belongingness, and others. Another pattern that emerged is the greater inconsistency in findings among studies examining momentary-level associations compared to those using daily and weekly assessments. Collectively, these findings highlight the challenges in reliably capturing the dynamic associations between investigated factors and suicidal ideation at the momentary level, over minutes and hours, and the limited ability to accurately predict suicidal ideation at the next time point. This aligns with the findings discussed in Section 6.1.1, which underscore the highly variable nature of suicidal ideation and the complexity of capturing it in real time.

Importantly, our investigation into factors associated with different patterns of suicidal ideation did not differentiate results based on specific constructs of suicidal ideation. As a result, this thesis is unable to determine whether there are distinct dynamic associations between passive and active suicidal ideation with investigated factors. However, such differentiation seems plausible, as emerging evidence suggests that suicidal ideation may operate on different timescales depending on its constructs (Coppersmith et al., 2023a). Our qualitative findings (Chapter 5) support this idea by illustrating that suicidal ideation can vary in its impact on daily life depending on its duration (fleeting vs. dominating), intensity (ignorable vs. unbearable), and function (coping with distress vs. seeking escape from emotional pain). For example, participants stated that overwhelmingly intense suicidal ideation was emotionally and physically draining, often leading to a profound sense of hopelessness and the belief that no other strategies are viable. In contrast, fleeting and

passive suicidal ideation generally carried less emotional intensity and urgency for most participants. Taken together, the experiential evidence suggests that the factors associated with intense suicidal ideation may not necessarily be the same as those linked to brief, short-lived suicidal ideations.

While Chapter 2 and 5 provided a broad overview of emerging factors associated with dynamic patterns of suicidal ideation, Chapter 3 narrowed the focus to a specific set of psychological factors and their associations with frequency, duration, and intensity of suicidal ideation, using a cross-sectional online survey. This study investigated cognitive reactivity, ego depletion, and other psychological constructs contextualised within the IMV model, including entrapment, impulsivity, stress, and depression. Results showed that although nearly all factors were individually associated with the three parameters of suicidal ideation, the majority of these associations were accounted for by depression, particularly in relation to the frequency and duration of suicidal ideation. Notably, one subcomponent of cognitive reactivity, Hopelessness/Suicidality (HOP), demonstrated a particularly strong influence on elevated suicide risk. HOP was the only variable that significantly predicted the frequency, duration, and intensity of suicidal ideation after controlling for depression. The tendency to activate suicide-related cognition in response to mild emotional distress may reflect the perceived "adaptive" function of suicidal ideation in managing distress and regaining a sense of control. This interpretation is supported by individuals' lived experiences in Chapter 5, where suicidal ideation was, at times, perceived as a coping mechanism during times of distress, or as a conditioned cognitive response to environmental triggers reminiscent of previous suicide attempts. One participant described this experience in a way that closely reflects HOP:

> *"If I think to myself, [any negative situations] is really frightening, 'I cannot do this', Or it feels overwhelmingly catastrophic, even though it is really small, I can just think to myself, 'it's okay because I always have this option (suicide)'. And then, everything starts to feel less overwhelming…" (Scarlett)*

In addition to HOP, only entrapment and negative urgency (a subcomponent of impulsivity) were significantly associated with frequency of suicidal ideation, while only perceived stress and the cognitive reactivity total score were independently associated with its duration, independent of depression. In contrast, a broader set of factors were independently associated with suicidal ideation intensity, including the cognitive reactivity total score, both measures of ego depletion (depletion sensitivity and self-regulatory fatigue), entrapment,

and perceived stress. The pattern of results, highlighting the limited predictive utility for frequency and duration beyond depression, implies that capturing the dynamic aspects of suicidal ideation may be difficult through a cross-sectional survey. These findings are, to some extent, consistent with those presented in Chapter 2, which underscore the fluctuating nature of suicidal ideation and the challenges in identifying consistent dynamic associations across studies.

The fluctuations in suicidal ideation, driven by a dynamic and complex interplay of internal and external factors, complicate the prediction of its frequency and duration. This is supported by individuals' lived experiences (Chapter 5), where fluctuations in suicidal ideation are often described as random and unpredictable. Furthermore, the qualitative investigation revealed that individuals tend to perceive suicidal ideation as an integrated experience, without clearly or intentionally distinguishing the factors influencing its frequency, duration, and intensity (See the group theme, *Fluctuating suicidal ideation*, Results section, Chapter 5). It can be argued that the intensity of suicidal ideation is meaningfully illustrated in conjunction with the other two aspects in the experiential world. Unlike frequency and duration, which are more fluid and susceptible to memory bias, intensity is often more salient to individuals, as it is closely linked with emotional states. For further discussion, see Section 6.2.2.

6.1.3 With a particular focus on cognitive reactivity and ego depletion, what psychological factors are associated with suicidal ideation and suicide attempts?

This thesis focuses on examining two underexplored factors, cognitive reactivity and ego depletion, in relation to suicide risk. Chapter 3 included cognitive reactivity alongside other psychological factors to examine the extent to which cognitive reactivity and ego depletion differentiate between individuals with different suicidal histories (NH, SI, and SA). In Chapter 4, these two factors were contextualised within the motivational phase of the IMV model, as potential psychological pathways underlying the relationship between entrapment and suicidal ideation. Our findings indicated that most psychological factors significantly distinguished between suicidal history groups, except for certain sub-components of cognitive reactivity (i.e., Acceptance Coping and Control/Perfectionism) and impulsivity (i.e., Lack of perseverance). The majority of these factors distinguished between the NH vs.

SI and NH vs. SA groups, with fewer distinguishing between the SI and SA groups. Factors that differentiated between the SI and SA groups included both measures of ego depletion (depletion sensitivity and self-regulatory fatigue), cognitive reactivity (total score, aggression subscale, and hopelessness/suicidality subscale), impulsivity (total score, negative urgency, positive urgency, and lack of premeditation), depression, and two protective factors (mindfulness and resilience).

However, results from a multivariate model using total scale scores showed that only impulsivity (SI vs. SA) and depression (NH vs. SA, SI vs. SA) independently predicted suicidal history groups. These results are largely consistent with our predictions and the theoretical context of the IMV model. Specifically, entrapment is most strongly associated with a history of suicidal ideation, whereas impulsivity is more pronounced in those with a history of suicide attempts. While preliminary, our findings suggest that cognitive reactivity and ego depletion can significantly differentiate between all three suicidal history groups, though their effects may not be as strong as impulsivity and depression. The psychological pathway through which cognitive reactivity and ego depletion affect elevated suicide risk (particularly suicidal ideation) can be explained by their association with entrapment. As indicated in Chapter 4, entrapment fully mediated the relationship between cognitive reactivity and suicidal ideation, and ego depletion, as measured by self-regulatory fatigue, partially mediated the relationship between entrapment and suicidal ideation.

The finding that entrapment increased the risk of suicidal ideation through self-regulatory fatigue, but not through depletion sensitivity, highlights the nuanced influence of different components of ego depletion in the pathway from entrapment to suicidal ideation. Specifically, it is the state of being depleted due to sustained exertion of self-regulatory resources, rather than a trait-like susceptibility to ego depletion, that underlies the relationship between entrapment and suicidal ideation. This distinction is further supported by the findings in Chapter 5, where *Exhaustion* emerged as a sub-theme functioning as a tipping point for heightened emotional distress, often preceding the onset or intensification of suicidal ideation. While not all instances of exhaustion stemmed from entrapment, several participants described experiences where feelings of mental exhaustion and entrapment were deeply intertwined, forming a psychologically draining state wherein suicidal ideation emerged as a perceived resolution to end the pain. This is illustrated by the quote below:

> *"My suicidal thoughts and feelings usually come about if I feel that I am in a situation where I am trapped and there is no way out. And, particularly, if what it is that I am*

worried about is on my mind constantly. It is very exhausting to be worrying all the time about the future and about the worst-case scenario, […] So, I think that the suicidal thoughts and feelings come about just as a result of complete mental exhaustion." (Charlotte)

6.2 Findings in relation to previous research

This thesis contributes to the existing literature that emphasises the importance of understanding suicidal ideation as a dynamic construct that fluctuates over short periods. Moreover, the findings extend prior research in several ways, which are discussed below in the context of existing literature.

6.2.1 Understanding the temporal dynamics of suicidal ideation

In recent years, one of the major advances in suicide research has been the growing recognition of the short-term dynamic change of suicidal ideation. This has been facilitated by the rise of short-term longitudinal studies employing intensive sampling methods to track suicidal ideation over brief periods spanning as short as minutes to hours (e.g., Coppersmith et al., 2023a; Kaurin et al., 2023; Oquendo et al., 2021; Rath et al., 2019). In response to this emerging body of work, several published review studies have synthesised findings from intensive longitudinal studies using EMA and daily diaries (Gee et al., 2020; Kleiman & Nock, 2018). Some reviews have focused on methodological capabilities for short-term changes in suicidal ideation (Ammerman & Law, 2022; Kivelä et al., 2022; Rabasco & Sheehan, 2022; Sedano-Capdevila et al., 2021), while others have had a specific examination focus such as theoretical frameworks (Winstone et al., 2024) or age groups (Casini et al., 2023). However, while researchers have known that suicidal ideation varies considerably over a short time period, less is known about the extent to which it fluctuates and what we actually mean by 'fluctuations'. In contrast, research on affective dynamics in broader psychological science has attracted significant research interest since the early 2000s (Ebner-Priemer et al., 2009; Eid & Diener, 1999; Koval et al., 2013; Mroczek et al., 2003; Trull et al., 2015; Wichers, 2015), culminating in a comprehensive meta-analysis that advanced understanding of the dynamic patterns of emotion and their relevance to psychological well-being (Houben et al., 2015).

Building upon the existing suicide literature and methodological approaches used in the study of affective dynamics, this thesis contributes to the investigation of short-term fluctuations in suicidal ideation by narratively synthesising its dynamic pattens and unpacking the complex dynamic associations between suicidal ideation and its influencing factors (Chapter 2). By systematically examining fluctuations in suicidal ideation across dynamic patterns, our findings expand on previous research and indicate that, on average, suicidal ideation demonstrates (a) substantial within-person variability, (b) a small to moderate instability from one time point to the next, and (c) temporal dependency, with a small to moderate degree in prior levels of suicidal ideation being carried over to subsequent time point. Additionally, the findings also unpacked the dynamic associations (e.g., concurrent, prospective, time-invariant) between suicidal ideation and its influencing factors, across various assessment intervals ranging from minutes to days. These findings reinforce the notion that suicide risk develops through complex interactions between psychological and contextual factors (O'Connor & Nock, 2014; Turecki et al., 2019). Particularly, several individual studies suggest that investigated factors are more strongly associated with suicidal ideation concurrently than prospectively (e.g., Hallensleben et al., 2019; Kinkel-Ram et al., 2021; Kleiman et al., 2017; Rath et al., 2019), a pattern also reported in a recent systematic review examining constructs of the IMV model (Winstone et al., 2024). Our review lends further support to previous studies on a greater scale, by synthesising findings across 106 studies from 65 unique samples.

These findings are supported and extended by the lived experience narratives presented in Chapter 5, which described suicidal ideation as waxing and waning, varying in duration and intensity without a clear pattern (Chapter 5). Some findings from the qualitative investigation echo those of a previous study that conducted thematic analysis based on text interactions with young people experiencing suicidal crisis (Van Wyk & Gibson, 2022). In this study, participants described their suicidality as dynamic, characterised by gradual elevation and rapid shifts over time. Notably, Van Wyk and Gibson (2022) also identified a theme in which the persistent experience of suicidal ideation led individuals to perceive it as a part of life, with recurring suicidality often associated with a history of multiple suicide attempts. These findings are consistent with those of Chapter 5; however, we extended previous research by suggesting that suicidal ideation is a fluctuating process that is largely shaped by individuals' reflections on the role of distraction and their personal construction of meaning through subjective relativism, which draws on different temporal reference points (e.g., the current moment vs. an entire episode).

The association between a history of suicide attempts and fluctuations in suicidal ideation has been found inconsistently in the literature, as revealed in Chapter 2. Some studies suggested that individuals with a history of suicide attempts experience greater fluctuations in suicidal ideation (Byran & Rudd, 2018; Byran et al., 2019; Ernst et al., 2024; Husky et al., 2017; Witte et al., 2006), while others did not observe this effect (Kleiman et al., 2018a, Sample 2; Oquendo et al., 2020; Peters et al., 2019; Spangenberg et al., 2022, Sample 1). The rationale for this hypothesised association is grounded in early research suggesting that the link between specific external triggers and suicidal crises weakens with the recurrence of suicidal episodes (Beck, 1996; Post et al., 1996). Furthermore, individuals with a history of multiple suicide attempts appear to be more vulnerable to suicidal states in response to a broader range of factors, which may seem less relevant to traditional indicators such as depression and hopelessness, compared to those with no history or only a single suicide attempt (Joiner, 2002; Joiner & Rudd, 2000).

This process of cognitive sensitisation is similar to cognitive reactivity, in that existing dysfunctional cognitive patterns are more likely to be activated in response to merely mild negative mood for those with high levels of cognitive reactivity (Lau et al., 2004; Williams et al., 2008). While it remains unclear whether cognitive reactivity is associated with a history of multiple suicide attempts or greater real-time fluctuations in suicidal ideation, preliminary evidence from this thesis offers some insight. In Chapter 5, two participants (Scarlett and Amelia) with a history of multiple suicide attempts and early life trauma described suicidal ideation, especially passive ideation, as a constant part of their lives, no longer triggered by any specific major events or circumstances. Additionally, Chapter 3 demonstrated that, in a cross-sectional online survey, cognitive reactivity was associated with more frequent suicidal ideation (especially the hopelessness/suicidality component) and higher suicidality, distinguishing individuals in the SA group from those in the NH and SI groups in the univariate analysis.

6.2.2 Characterising suicidal ideation by its frequency, duration, and intensity

Although the majority of research in the suicide literature has treated suicidal ideation as a single construct, some researchers have argued that suicidal ideation is, in fact, a multifaced construct and emphasised the importance of examining it with more specificity to improve understanding and refine treatment targets (Jobes et al., 2024; Miranda et al., 2023; Reeves

et al., 2022). With a focus on the frequency, duration, and intensity of suicidal ideation, this thesis investigated the psychological factors associated with these three parameters through a cross-sectional online survey (Chapter 3) and the semi-structured interviews (Chapter 5). The findings indicated that, while most investigated factors were individually associated with all three parameters, only a few significant risk factors persisted in predicting the frequency and duration of suicidal ideation beyond the effect of depression. In comparison, most of the investigated factors independently associated with the intensity of suicidal ideation, except for impulsivity and certain cognitive reactivity subcomponents. As detailed in Chapter 3, this pattern is somewhat surprising but sensible upon reflection, given that most established risk factors identified in studies using composite scales of suicidal ideation tend to focus on intensity or severity rather than frequency or duration(e.g., Beck Scale for Suicidal Ideation; Beck et al., 1979). Furthermore, predicting how often suicidal ideation occurs and how long it lasts may be particular challenging, as these aspects reflect more dynamic features of suicidal ideation, which has been shown to fluctuate significantly over short periods (Coppersmith et al., 2023; Nock, Prinstein, & Sterba, 2009; Oquendo et al., 2021), including findings from this thesis.

Existing evidence generally supports the finding that impulsivity is a more reliable predictor of suicide attempts, whereas its association with suicidal ideation remains unclear (Anestis et al., 2014; Brezo, Paris, & Turecki, 2006). Our findings regarding the effect of impulsivity on the parameters of suicidal ideation may help to clarify some of these inconsistent findings. In Chapter 3, which explores factors distinguishing between suicidal history groups, in line with previous research, impulsivity total score (as measured by the short-version UPPS-P; Cyders et al., 2007; Whiteside & Lynam, 2001) significantly distinguished between the SI and SA groups in the multivariate analysis, with higher impulsivity associated with individuals in the SA group. In addition, our results further indicated that impulsivity total score and its subcomponents (negative urgency, positive urgency, and lack of premeditation) were no longer associated with the duration and intensity of suicidal ideation, after controlling for depression, whereas negative urgency independently predicted more frequent suicidal ideation beyond the effect of depression. This finding highlights the utility and importance of examining the fine-grained patterns of suicidal ideation in combination with the specificity of multi-components of impulsivity. By doing so, the results suggested that impulsivity, particularly the tendency to act impulsively when experiencing negative emotion, is more strongly associated with how often suicide ideation occurs than with its intensity. This is consistent with previous studies employing prospective designs (Hadzic et

al., 2020; Lucht et al., 2022b), which found that trait impulsivity was associated with greater fluctuations (as measured by MSSD) in passive suicidal ideation, but not with its overall intensity.

Moreover, the influence of the hopelessness/suicidality subscale of cognitive reactivity was particularly noteworthy, as it remained a significant predictor across all three parameters of suicidal ideation. A plausible explanation is that a low threshold for the activation of suicide-related cognitions (i.e., in response to mild emotional distress) may be linked to the 'adaptive' functions of suicidal ideation indicated in prior research, such as attempts to regain control over life (Crocker, Clare, & Evans, 2006; Siegel & Meyer, 1999), provide emotional relief (Crane et al., 2014), or regulate emotion through negative reinforcement (Coppersmith et al., 2023; Kleiman et al., 2018). These themes were also echoed by participants in the semi-structured interviews presented in Chapter 5. However, while the ease of reactivation of suicide-related cognitions in response to sad mood may serve as a short-term coping mechanism, repeated activation can reinforce the association between low mood and the biopsychological arousal tied to the experience suicidal ideation. This may, in turn, exacerbate feelings of entrapment and increase the likelihood of suicidal behaviour (Lau et al., 2004, Williams et al., 2005b). Our findings support this mechanism, as the Hopelessness/Suicidality subscale was associated not only with more frequent suicidal ideation, but also with ideation that was longer-lasting and more intense.

Taken together, it is evident that separately examining the frequency, duration, and intensity of suicidal ideation has important research implications for developing more precise risk profiles and uncovering distinct underlying psychological processes. However, the ecological value of these dimensions in everyday, experiential world appears less straightforward. As indicated in Chapter 5, there is substantial overlap in the participants' experiential accounts on reflecting what influences how often, how long, and how intense suicidal ideation is experienced. Admittedly, this overlap may represent the reality that these parameters share similar underlying risk profiles, given their moderate intercorrelations, as reported in Chapter 3 (prior to adjusting for depression). Nevertheless, the interpretative perspective this thesis aims to convey is that integrating these experiential dimensions is essential for fostering meaning-making in constructing the experience of suicidal ideation. This is analogous to a core principle of Personal Construct Theory, which asserts that subjective experience holds greater psychologically significance than the objective events themselves ("Experience is such an important event in charting what comes next. […] Experience already embraces the events." p.18). Individuals construct their experiential

world not merely by the registration of events, but by interpretating and organising their experiences of those events (Kelly, 2003). A related discussion on how intensity and frequency shape affective experience is detailed in Diener, Larsen, Levine, and Emmons (1985), which may provide some insight into the present context.

6.2.3 Understanding suicide risk: a self-regulation perspective

As one of the primary foci of this thesis, the role of ego depletion in suicidal ideation and suicide attempts was examined within the framework of the self-regulatory model of suicide (Vohs & Baumeister, 2002). This was investigated through a cross-sectional online survey detailed in Chapter 3 and 4, and there were echoes of it in semi-structured interviews presented in Chapter 5. This section discusses suicide risk, particularly suicidal ideation, from a self-regulation perspective, addressing the question posed in Chapter 1: Are suicidal thoughts and actions attempts to manage overwhelming emotions and life stressors through negative reinforcement, or are they simply consequences of self-regulation failure? To this end, relevant findings from the thesis are integrated with Baumeister and Heatherton's (1996) theoretical framework on self-regulation failure.

6.2.3.1 Are suicidal ideation and actions attempts to manage overwhelming emotions and life stressors through negative reinforcement?

As discussed earlier, certain forms of suicidal ideation may function as coping mechanisms for managing negative emotions. This was supported by findings from Chapter 5 and previous research highlighting the potential 'adaptive' role of suicidal ideation (Coppersmith et al., 2023; Crane et al., 2014; Crocker, Clare, & Evans, 2006). In such instances, suicidal ideation appears to act as a form of self-regulation, where the wish to die or thoughts of suicide 'overrides' the distress triggered by adverse events or circumstances (Baumeister et al., 1994), offering temporary psychological relief. However, not all forms of suicidal ideation exhibit this adaptive quality. Our findings suggest that passive suicidal ideation is more common in such situations (e.g., "If I want, I could kill my self", "It's okay because I always have this option"). In contrast, another form of suicidal ideation often arises in contexts marked by a perceived loss of autonomy or a sense of hopelessness, evoking intense emotional distress. These experiences are more indicative of self-regulation failure, as discussed below in Section 6.3.2.2. This aligns with previous research suggesting that lower perceived controllability of suicidal ideation confers a higher risk for lifetime suicide attempts (Nock et al., 2018; Van Spijker et al., 2014).

Importantly, even when suicidal ideation provides temporary relief, it does not necessarily make individuals less vulnerable to suicide risk. On the contrary, such relief may increase the likelihood of persistent suicidal ideation through potential negative reinforcement (Kleiman et al., 2018). This counterproductive effect fits into "misregulation", a form of self-regulation failure in which self-control is exerted in a way that fails to achieve the intended outcome (Baumeister & Heatherton, 1996; Carver & Scheier, 1981). Although it remains unclear from the thesis findings whether suicide attempts function as a coping mechanism, it is argued that suicide attempts may be too threatening, with disproportionately high personal costs, to serve as a way of coping. Moreover, suicide attempts are often 'one-off' behaviours which, if successful, preclude further internal conflict around self-control. This aligns with Baumeister and Heatherton's (1996) concept of "abandoning self-control", in contrast to maintaining self-control that involves ongoing internal conflict between desire and standards. In light of this, it is proposed that suicide attempts may not function as a form of self-regulation.

6.3.2.2 Are suicidal ideation and actions simply consequences of self-regulation failure?

The central premise of the self-regulatory model of suicide (Vohs & Baumeister, 2002) is that the progression from self-discrepancy to emotional dysregulation and cognitive deconstruction reflects a gradual depletion of self-regulatory resources, with suicide perceived as the ultimate escape from self-awareness. From this perspective, suicide arises from an individual's inability to effectively manage aversive self-awareness and negative affect, following a sequence of failures in regulating thoughts, emotions, and attention. Within this framework, suicide as an escape from negative self-awareness can be interpreted as "under-regulation", a type of self-regulation failure characterised by the inability or unwillingness to exert self-control (Baumeister & Heatherton, 1996). Chapter 3 showed that ego depletion was associated with higher suicidality, distinguishing between all three suicidal history groups (NH vs. SI, NH vs. SA, SI vs. SA) in univariate analysis. However, its predictive strength may not be as strong as impulsivity and depression. This may be partly explained by its correlation with entrapment ($r = 0.635$, $p < .01$), which was also a non-significant predictor in the multivariate model. Chapter 4 found that ego depletion, measured by self-regulatory fatigue, partially mediated the relationship between entrapment and suicidal ideation. These findings suggest that the effects of ego depletion and entrapment may have been attenuated in multivariate analysis due to their shared variance. Nevertheless, the mediation analysis supports the self-regulatory model of suicide, indicating that being in

a trapped psychological state depletes self-regulatory resources, thereby increasing suicidal ideation as a perceived means of escape.

In light of Baumeister and Heatherton's (1996) theory, certain constructs within the process of self-regulation can be transferable to the understanding of suicide. This section introduces two such constructs, failure of transcendence and psychological inertia, with brief explanations of how each maps onto suicide risk. These constructs were selected based on their relevance and distinctiveness to the studies conducted in this thesis, as well as the limitations of space for additional examples. *Transcendence* refers to focusing or diverting attention beyond the immediate stimuli. A failure of transcendence, wherein an individual shifts away from their long-term goals and higher standards to focus on the immediate situation, is considered a proximal cause of self-regulation failure. In the context of suicide research, this resembles the "tunnel vision" often observed in suicidal individuals, which is evoked by states such as defeat, entrapment (Gilbert, 1998; O'Connor & Kirtley, 2018), and hopelessness (Beck et al., 1975).

Psychological inertia refers to the difficulty of interrupting or overriding ongoing psychological processes, especially when they have persisted for a longer time. This lingering effect of mental states aligns with rumination, a known risk factor for suicidality, characterised by repetitive, enduring, and immerse contemplation of the cause and consequence of emotional distress without active resolution (Morrison & O'Connor, 2008). As such, effective self-regulation requires to be involved early in the process to prevent these further deteriorations. Although not a dominant theme in Chapter 5, a few of the participants who took part in the interviews did describe experiences reflective of psychological inertia. The following quote offers a direct illustration drawn from one of the relevant transcripts:

> *"If I do not feel great by lunchtime, I know I am going to feel much worse later in the day. I find it hard to cut it off once it is started in a day. […] If it is a shorter period of blackness, feeling like that, then it gets worse or if I have not kind of stopped and like gone into that mode, or trying to look after myself fast enough? " (Amelia)*

In sum, this thesis highlights the potential of conceptualising suicide risk within the framework of self-regulation. The latter part of this section suggests that both suicidal ideation and suicide attempts can be understood as consequences of self-regulation failure. However, these phenomena are not as straightforward as supposed, underscoring the complexity of the psychology of suicide. As discussed in Section 6.3.2.1, certain forms of

suicidal ideation may serve as attempts to regulate negative emotion, yet this strategy often results in misregulation and ultimately leads to counterproductive outcomes over time.

6.3 Research implications

The findings of this thesis have important implications for future research. Evidence of short-term fluctuations of suicidal ideation highlights the limitations of static, single-timepoint assessments. Suicidal ideation is a highly variable construct, with its persistence, variability, and instability changing over minutes to days in respond to complex interactions among multiple factors. Within this, a self-regulation framework may provide a valuable lens for understanding acute cycles in the suicidal process. These observations underscore the need for more nuanced approaches that can capture short-term changes and distinct experiential dimensions of suicidal ideation such as frequency, duration, intensity, and controllability. The findings also point to individual differences in how people interpret and respond to fluctuations in suicidal ideation, suggesting that personalised research models may be more effective than "one-size-fits-all" approaches for improving prediction accuracy and sensitivity. Overall, this thesis demonstrates the value of a mixed-method cross-sectional approach in providing deep, complimentary insights into a construct that is dynamic and challenging to capture through a single methodological lens. The implications of these findings for theory and clinical practice were outlined separately below.

6.3.1 Theoretical implications

Echoing the theoretical models of suicide presented in Chapter 1, which form the theoretical foundation for this thesis, this section presents our findings in relation to the self-regulatory model of suicide, the integrated motivational-volitional model, and the fluid vulnerability theory. Overall, while the thesis findings support these theories, they highlight the importance of incorporating temporal dynamic and individual differences into suicide models to improve understanding of suicide risk.

6.3.1.1 The Self-Regulatory Model of Suicide

As discussed in the preceding Section 6.2.3, the findings of the thesis support the self-regulatory model of suicide (Vohs & Baumeister, 2002), which opens up discussion on the potential of understanding suicide risk through the lens of self-regulation framework

(Baumeister & Heatherton, 1996). However, this model does not clearly differentiate the impact of gradual depletion of self-regulation resources on suicidal ideation versus suicide attempts; for example, the extent to which depleted self-regulation capacity increases the risk of transitioning from ideation to action. Given that the self-regulatory model of suicide is primarily built upon the escape theory of suicide (Baumeister, 1990) and incorporates elements of the strength model of self-regulation (Baumeister, 2002; Baumeister, Vohs, & Tice, 2007), it may benefit from further elaboration. Specifically, more discussion is needed on how key concepts from the self-regulation framework can be applied to suicidal behaviour, in order to more effectively ground suicide risk within the process of self-regulation.

We have preliminarily discussed some of these ideas in Section 6.2.3, but there are many more potential concepts that align well with existing knowledge of suicide. For example, Baumeister and Heatherton (1996) proposed that fluctuations in the ability to resist temptation are shaped by the salience of conflicting desires and the individual's self-regulation capacity. An irresistible impulse alone is not sufficient to cause self-regulation failure; it has to be accompanied by a temporary depletion of self-regulatory resources. This process can be applied to explain fluctuations in suicide risk, with preliminary evidence from lived experience suggesting that short-term dynamic changes in suicidal ideation are linked to cycles of depletion and replenishment of mental resources (Chapter 5). Furthermore, it may indicate that the depletion of self-regulatory resources signifies a proximal risk for suicide attempts, as the energy-depleted state reduces inhibition against acting on the irresistible impulse, in this case, suicidal ideation.

6.3.1.2 The Integrated Motivational-Volitional Model

In line with the key premise of the integrated motivational-volitional (IMV) model (O'Connor & Kirtley, 2018), the findings of this thesis indicated that entrapment and impulsivity each distinguish individuals with suicidal ideation from those without, and those with suicidal ideation from individuals who act on it, respectively. By incorporating cognitive reactivity and ego depletion into the investigation, this thesis provides an innovative exploration of the motivational phase of the IMV model, offering preliminary empirical evidence for their significant roles. Furthermore, the findings enhance our understanding of the entrapment-to-suicidal ideation pathway in two ways: (1) cognitive reactivity was associated with suicidal ideation through the indirect effect of entrapment, and (2) entrapment increased risk of suicidal ideation through the indirect effect of self-regulatory fatigue. The former also supports the notion of "holistic entrapment schema",

induced by repeated activations of dysfunctional cognitions, through which cognitive reactivity increases suicidal ideation (Lau et al., 2004; Williams et al., 2005b).

Although the IMV model is one of the most comprehensive suicide frameworks for explaining how interactions between biopsychosocial factors contribute to the development of suicidal ideation and suicide attempts, it does not explicitly address the temporal dynamics of suicide risk or account for individual variability. While the model acknowledges the cyclical relationship between ideation and attempts, suggesting that fewer triggers are required to activate a suicidal state potentially due to cognitive reactivity, it does not specify other dynamic aspects, such as, the timescales over which risk factors operate, or whether they contribute to momentary versus long-term risk. Similarly, although the pre-motivational phase outlines background factors that explain who is at risk of developing suicidal ideation, the model would benefit from further elaboration on how its key premises accommodate individual variability in experience and progression of suicide risk.

6.3.1.3 The Fluid Vulnerability Theory

As the first dynamic framework for understanding the suicidal process, the fluid vulnerability theory (FVT; Rudd, 2006) has gained increasing attention in recent years, driven by a growing body of research focused on short-term fluctuations in suicidal ideation. This thesis certainly presents one such effort to apply FVT. Our investigation supports the central premise of the FVT, that suicidal episodes are time-limited, through three studies employing distinct methodologies (a systematic review, cross-sectional surveys, and semi-structured interviews). The wide range of factors identified in Chapter 2 across cognitive, affective, social-interpersonal, and clinical/sociodemographic domains aligns with the four components of the suicide mode (i.e., suicidal belief system, affective system, physiological system, and behavioural system). The theory's explanation of individual differences in the frequency of suicidal crises, attributed to personal baseline risk (i.e., the threshold at which the suicide mode is activated), was supported by the finding showing a significant association between cognitive reactivity and increased suicidality.

Furthermore, the model posits that the interaction between low baseline risk and a broader range of triggers contributes to repeated suicide attempts. This may help explain the observed association between highly fluctuating suicidal ideation and a history of multiple suicide attempts, as reported in prior studies (Byran & Rudd, 2018; Byran et al., 2019; Ernst et al., 2024; Husky et al., 2017; Witte et al., 2006). Given the growing interest in short-term

fluctuations of suicidal ideation, the FVT provides a valuable foundation for ongoing theoretical and empirical research. While its core premises are clear and compelling, the theory could be strengthened by further refinement, specifically, by offering a more structured framework that delineates phases of the suicidal process and incorporates empirically tested hypotheses involving specific risk or protective factors.

6.3.2 Clinical implications

The implications for clinical intervention and suicide prevention primarily centre on recognising suicide risk as a dynamic process and acknowledging the multifaceted nature of suicidal ideation. Fleeting or passive suicidal thoughts should not be overlooked, as they may intensify at other points in time when saliant life stressors arise. Effective clinical practice therefore requires frequent and sensitive assessments that address both short-term, "in-the-moment" risk and longer-term safety and recovery, with an emphasis on early intervention. The considerable fluctuations in suicidal ideation over short periods highlight the need for a flexible, personalised approach, responsive to rapid changes in risk. These perspectives are reinforced by recent practice guidance from National Health Service (NHS) England (2025), which stresses moving beyond risk prediction towards holistic, individualised care that helps patients manage the maintenance and intensification of suicidal thoughts.

Fluctuations in suicidal ideation may, in part, reflect the activation of negative core beliefs about the self and an individual's mental and physical capacity to manage the associated emotional pain. Effective treatment should therefore integrate Cognitive Behavioural Therapy (CBT) techniques to identify and modify automatic negative thoughts linked to dysfunctional core beliefs. In addition, interventions such as Dialectical Behaviour Therapy (DBT), which strengthen self-regulatory capacities including emotion regulation and self-acceptance, may also be beneficial. Given the potential role of psychological inertia in sustaining distress, the early application of adaptive coping techniques may help mitigate cognitive vulnerabilities (e.g., rumination) that might otherwise escalate into a full-blown suicidal episode. From a self-regulation perspective, suicidal ideation can be seen as a warning sign of a severely depleted internal energy system, signaling unmet needs and an overloaded mind. In this way, suicidal crises may be understood as acute but temporary states that may ride out as self-regulatory resources are replenished. Clinical interventions could therefore focus on identifying tailored strategies to restore mental and physical resources,

while ensuring individuals remain safe and supported until the crisis subsides. Taken together, the dynamic and heterogeneous nature of suicidal ideation necessitates a holistic, person-centred approach to treatment planning, characterised by collaboration with patients to address individual risk and protective factors. Evidence-based frameworks, such as Just-in-Time Adaptive Interventions for Suicide Prevention (JITAIs; Coppersmith et al., 2022; Nahum-Shani et al., 2018) and the Collaborative Assessment and Management of Suicidality approach (CAMS; Jobes, 2006, 2009) embrace these principles and are encouraged to be more widely integrated into clinical practice.

From a longer-term perspective, raising the threshold for activation of the suicide mode (i.e., baseline risk, as outlined in the FVT) is essential for reducing the risk of suicide relapse. In this regard, interventions may benefit from adopting a comprehensive approach that targets cognitive (e.g., maladaptive thoughts patterns), emotional (e.g., emotional regulation), and behavioural (e.g., aggression and impulse control) domains. As demonstrated in this thesis and in previous research (Jobes et al., 2024; Reeves et al., 2022), the phenomenological features of suicidal ideation vary across forms (e.g., passive vs. active), parameters (e.g., frequent vs occasional; fleeting vs persistent), and controllability (i.e., ability to manage the thoughts). Recognising this multidimensionality enables more specific and achievable treatment goals, which are likely to be more effective than attempting to eliminate suicidal ideation altogether (Jobes et al., 2024). For example, treatments may aim to reduce the frequency and duration of suicidal ideation while increasing individuals' perceived controllability over these thoughts. To support this, screening tools should be sufficiently sensitive and comprehensive to capture the full spectrum and fluctuations of suicidal ideation, rather than overly relying on single items such as "thoughts of killing myself".

6.4 Reflexivity

Starting from the sequence of investigation, the systematic review (Chapter 2) and the cross-sectional online survey (Chapter 3 and 4) began first and were conducted in parallel, followed by the semi-structured interviews (Chapter 5). Almost everything in my PhD journey was about learning and personal growth. Among the many experiences, two stand out as particularly rewarding across the research phase. The first was conducting the systematic review, which equipped me with a comprehensive set of research skills that proved essential for subsequent investigations. More broadly, it enhanced my ability to comprehend complex research publication, evaluate research quality, and engage in critical

reading and thinking. These skills, in turn, elevated my own standards for conducting research and improved my academic writing. Moreover, the specific focus of the review (i.e., short-term fluctuations of suicidal ideation) remarkably expanded my research perspective. It allowed me to explore a highly important but methodologically and theoretically complex topic that I might have otherwise avoided. While the learning outcome was deeply rewarding and strengthened my capacity for independent learning, the process challenging, particularly in navigating a rapidly evolving research area that often employs 'state-of-the-art' methodologies in suicide research.

Another significant experience was conducting the semi-structured interviews. Guided by Interpretative Phenomenological Analysis (IPA), I gained an in-depth understanding of suicidal ideation from the lived experiences of participants. This was particularly helpful for integrating and consolidating knowledge, bridging theoretical insights with real-life contexts. Specifically, while ego depletion (exhaustion) had not been explored in the studies included in the systematic review as factors associated with dynamic patterns of suicidal ideation, it does emerge as a significant sub-theme in the interview study, described by nearly all participants. Importantly, given the relatively limited research on self-regulation in relation to suicide, we could not have expected its significant presence, highlighting it as an underestimated factor in shaping our understanding of suicidal ideation. Upon reflection, I should have anticipated and acknowledged the challenges posed by the systematic review, recognising that it might span a large part of the thesis journey. As I channelled most of my focus and attention into it, in the early phases of my PhD, progress on other parts of the thesis were slower than anticipated. If I have managed my time/focus better, I might have had more time to further explore two components of ego depletion (exhaustion and disinhibition) in relation to suicide risk, as well as whether childhood trauma is associated with increased suicidal ideation through the indirect effect of ego depletion. Although ego depletion has been extensively studied using experimental design, and it is admittedly appealing to do so, these explorations would be more feasible to conduct through an online survey at the initial stage due to time constraints.

Finally, although the thesis did not formally incorporate the lived experience of individuals with suicidal ideation and behaviours or other stakeholders beyond their role as participants, steps were undertaken to ensure the feasibility and relevance of the research. The survey questions and interview schedule were pre-tested with suicide researchers and members of the general population to assess clarity and sensitivity before implementation. Additionally, the studies aimed to address key questions that have been highlighted in suicide research,

thereby aligning with key concerns in the field. Nevertheless, it is recognised that more structured involvement of a Patient and Public Involvement (PPI) advisory group could have further informed the study design and procedures.

6.5 COVID-19

This thesis investigation began in November 2020, during the peak of the COVID-19 pandemic in the UK. Although the pandemic-related restrictions did not directly impede the practical conduct of the research, they introduced concerns that may have had indirect effects on the investigation. The most significant impact was on the research timeline. The semi-structured interviews (Chapter 5), originally intended to be conducted entirely in person, were postponed until 2023 due to lockdowns and social-distancing policies that made in-person data collection unfeasible until pandemic conditions improved. This intentional but unavoidable delay was the primary factor contributing to the extended research timeline. Next, although the online survey (Chapter 3 and 4) was conducted during the pandemic and may theoretically have influenced participants' responses, the results did not show any unusual or unexpected patterns that could be clearly attributed to pandemic-related factors. Moreover, the psychological constructs under investigation were not particularly sensitive to the context of COVID. Therefore, it was concluded that the pandemic did not have a substantial impact on the survey findings. Finally, the global circumstances during the pandemic had a significant personal impact. International travel restrictions and quarantine requirements prevented me from returning to my home country until after the completion of the semi-structured interviews in August 2023. This prolonged separation from family contributed to feelings of isolation and reduced motivation, which further slowed the pace of research progress.

6.6 Strengths and limitations

This thesis improves our understanding of suicide risk primarily in three ways. First, a comprehensive systematic review synthesised findings on short-term fluctuations in suicidal ideation, focusing on temporal dynamic indicators and patterns of association with relevant factors under investigation. The results demonstrated that suicidal ideation fluctuates substantially across time frames ranging from minutes to days, as reflected in measurable changes its persistence, variability, and instability. These fluctuations are possibly due to the

ongoing, dynamic interactions with a range of internal and external influences, exhibiting varying associations based on time patterns (concurrent, prospective, and time-invariant). These findings were further enriched by a qualitative investigation that explored individuals' lived experience and meaning-making process related to fluctuations in suicidal ideation. The perception of fluctuations was largely shaped by the use of distractions as a way of coping, and by a personal construct system that favours experientially meaningful way of construing lived experiences. Finally, this thesis highlights the role of self-regulation in the development of suicidal ideation and, potentially, suicide attempts. It supports the notion that self-regulatory resources become progressively depleted in the process leading to suicidal ideation (e.g., the defeat/humiliation – entrapment – suicidal ideation pathway described in the IMV model; O'Connor & Kirtley, 2018), aligning with the central premise of the self-regulatory model of suicide (Vohs & Baumeister, 2002). Preliminary evidence from this thesis suggests that entrapment contributes to increased suicidal ideation through self-regulatory fatigue.

Taken together, the strength of this thesis lies in its mixed-methods, cross-sectional approach. In retrospect, the relationship between suicidal ideation and associated factors showed the most consistent patterns when examined concurrently (see Chapter 2), underscoring the value of detailed examination that is cross-sectional in nature. By integrating a systematic review, quantitative surveys, and a qualitative interview, this thesis was able to provide a richer understanding of the dynamic nature of suicidal ideation from multiple angles. Furthermore, these studies confirmed that, at a single point in time, fluctuations in suicidal ideation are associated with a wide range of variables. This is particularly valuable when examining dynamic constructs that may change over time; in this case, focused cross-sectional investigations could provide meaningful snapshots of concurrent associations. Additionally, a cross-sectional design is well-suited to studies with an explorative focus, as it allows for larger sample sizes compared to longitudinal or EMA designs, which are typically employed once initial evidence has been established.

Despite the thesis's contribution to our current knowledge of suicide, its findings should be interpreted with caution due to several methodological limitations. While a large number of studies were included in the systematic review, those with daily and weekly assessments were underrepresented compared to studies with momentary assessments, with fewer than half of the studies (45/112, 40%) using independent samples. These limitations reduced the reliability of cross-group comparisons across different timescales and restrict the generalisability of the overall findings. Furthermore, the narrative interpretations of

persistence, variability, and instability primarily relied on commonly reported metrics, such as the autoregressive effect, intraclass correlation coefficients (ICC), and proportional changes in root mean squared successive differences (RMSSD) relative to the total scale score. This approach may have overlooked less-studied indicators, such as the probability of acute change. Although ICC offers insight into the proportion of variances in suicidal ideation attributable to fluctuations within individual (1-ICC) versus between-individual differences, it serves as a proxy measure of variability rather than a direct measure. The interpretations of the systematic review's findings were also limited by the narrative synthesis approach, which focused primarily on the presence, direction, and regression coefficients of significant effects, rather than effect sizes. Additionally, the synthesis of dynamic associations focused on identifying relevant factors but did not explore how these factors influenced one another, thereby failing to uncover more nuanced patterns (e.g., cross-lagged associations, network dynamics, etc).

The qualitative investigation relied on participants' subjective reports of their experiences with fluctuations in suicidal ideation and focused on the role of distractions rather than effective coping strategies in shaping perceptions of these fluctuations. Findings concerning psychological factors associated with suicidal ideation parameters, as well as the mediation analyses, were based on a cross-sectional online survey conducted with a small sample. This led to a limited number of participants in the NH group compared to the SI and SA groups, thereby reducing the statistical power of the mediation analysis, which was conducted only among participants in the suicidal groups. Although initial positive findings from cross-sectional studies provided a rationale for conducting more sophisticated examinations, this design precluded the establishment of temporal relationships and, consequently, restricted the ability to draw causal inferences – an issue that is particularly relevant when interpreting mediation models. Interpretations relating to ego depletion in the online survey were based on distinct self-report questionnaires that assessed different but related aspects of ego depletion (referred to as trait and state aspects in Chapter 3 and 4), given the absence of a widely used self-report measure for ego depletion within the research field. Taken together, these limitations reduce the generalisability of the online survey findings and highlight the needs for replication in a larger sample, ideally using a longitudinal design.

6.7 Future research

The findings of this thesis highlight three important areas for future research to advance the field of suicide studies: (1) short-term fluctuations in suicidal ideation, (2) the multi-dimensional patterns of suicidal ideation, and (3) the relationship between ego depletion and suicide risk. As noted earlier, research into affective dynamics has gained prominence in the early 2000s, following foundational work that began in the 20th century (e.g., Diener et al.,1985; Wessman & Ricks, 1966). In contrast, the more recent emergence of interest in short-term dynamics in suicide research likely reflects the different developmental and evolutionary origins of these research areas. While emotion holds clear evolutionary significance as a basic human function, perspectives on suicide have undergone a long and complex evolution, from being heavily stigmatised in ancient cultures (Lykouras, Poulakou-Rebelakou, Tsiamis, & Ploumpidis, 2013) to more recently being approached with greater empathy and awareness in modern society (Jobes & Joiner, 2019; Tadros & Jolley, 2001). In light of this, in the study of short-term dynamics, suicide researchers may benefit from drawing methodological insights from the study of affective dynamics. To support progress in this area, future research would benefit from meta-analytic methods to quantify the magnitude of dynamic metrics of suicidal ideation, and to examine how these associations with risk and protective factors vary as functions of sampling characteristics and individual differences (see Houben et al., 2015, for an example in emotion literature). To enhance comparability across studies, researchers are also encouraged to use consistent and precise terminology when describing dynamic patterns (Ebner-Priemer et al., 2009; Jahng et al., 2008).

Equally important, future research would benefit from a dedicated effort to examine suicidal ideation not merely as a by-product of suicide attempts or death, but as a profound experience of human suffering (Jobes et al., 2024). To this end, research efforts can be directed toward investigating the multi-dimensional aspects of suicidal ideation. The thesis has underscored the value of examining the parameters of suicidal ideation. For example, entrapment, a known significant proximal risk factor for suicidal ideation, was found to be associated with the frequency and intensity of suicidal ideation, but not with its duration. In fact, most factors under investigation were predictors of the intensity of suicidal ideation only, after controlling for depression. This highlights the need for further research into the frequency and duration of suicidal ideation, ideally using real-time assessment to enhance ecological validity and reduce recall bias, as these dimensions play a key role in shaping its dynamic nature. Another

compelling reason to adopt a multi-dimensional approach is its potential to better inform clinical treatment and intervention strategies, as different phenomenological profiles may reflect distinct underlying pathologies (Bernanke et al., 2017). Finally, as this thesis emphasises the role of ego depletion in suicide risk, and the potential value of framing suicidal ideation and suicide attempts within a self-regulation framework, future work may focus on further clarifying the nature of the ego depletion effect. This may include examining ego depletion in relation to conceptually similar constructs, such as mental fatigue, burnout, and exhaustion; exploring whether components such as exhaustion and disinhibition represent subcomponents of ego depletion; and developing innovative paradigms or study designs that accurately capture ego depletion in contexts of suicide or mental well-being research more broadly.

6.8 Conclusions

This thesis contributes to the existing literature on the dynamic nature of suicidal ideation through a systematic narrative synthesis of its patterns and associations within current suicide research, a qualitative investigation of lived experiences, and a cross-sectional online survey examining key parameters of suicidal ideation (i.e., frequency, duration, and intensity). Overall, suicidal ideation was found to fluctuate significantly over minutes to days, exhibiting small to moderate positive temporal dependency, substantial average within-person variability, and small to moderate instability. The dynamic associations with investigated factors were complex and characterised by considerable individual variability. Across momentary, daily, and weekly sampling frequencies, concurrent associations yielded more consistent findings than both prospective time-lagged and time-invariant associations (i.e., aggregated dynamic measures over the study period). Notably, hopelessness was consistently associated with concurrent suicidal ideation across all investigations and sampling frequencies, while sleep problems in general demonstrated good predictive consistency in prospective associations in studies using daily assessments.

Individuals' experiential accounts provided valuable insight into the fluctuating nature of suicidal ideation, particularly highlighting the role of distraction as a coping strategy that shapes the perception of fluctuations. Notably, the thesis underscores an important aspect of personal construct involved in living with suicidal ideation: the tendency to integrate experiences in order to foster meaning-making. This perspective advances understanding of how individuals' perceptions of discrete episodes of suicidal ideation (i.e., fluctuations)

contribute to their self-identity and broader reflections on life. Additionally, a separate investigation of the frequency, duration, and intensity of suicidal ideation revealed that most factors under investigation were more strongly associated with intensity, highlighting the challenges in predicting more dynamic aspects such as frequency and duration. Finally, this thesis pays particular attention to exploring suicide risk through the lens of self-regulation. By investigating ego depletion alongside cognitive reactivity through mediation analyses, this thesis extends understanding of the well-established relationship between entrapment and suicidal ideation: while cognitive reactivity increases vulnerability to entrapment, which subsequently leads to suicidal ideation, ego depletion was found to partially mediate the pathway from entrapment to suicidal ideation.

In light of the thesis findings, it is essential for clinicians to adopt a dynamic and individualised approach to suicide risk. Clinical treatment and intervention should therefore be flexible, personalised, and sensitive to fluctuations in suicide risk, while incorporating effective coping strategies to manage the persistence and intensification of suicidal thoughts. Rather than focusing solely on resolving acute suicidal crisis, effective treatment should aim to reduce baseline vulnerability by setting long-term goals across multiple domains (i.e., cognitive, affective, physiological, and behavioural). Incorporating therapeutic approaches such as Cognitive Behaviour Therapy (CBT) and Dialectical Behaviour Therapy (DBT) can be particularly effective for addressing dysfunctional thought patterns and enhancing self-regulatory capacities. Treatment goals can also be tailored to target specific aspects of suicidal ideation, such as reducing its duration or enhance controllability. However, the findings presented in this thesis require further replication to strengthen their generalisability. Our understanding of the dynamic nature of suicidal ideation could be advanced by systematically quantifying and summarising its dynamic patterns, as well as by conducting fine-grained analyses of its associations with both psychological and contextual factors. Future research would benefit from more in-depth investigations into the various dimensions of suicidal ideation.

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Appendices

Appendix 1: Assessment tools for methodological completeness and quality

Table A1.1 *Methodological completeness and transparency assessment tool for EMA studies (Adapted from Trull & Ebner-Priemer, 2020)*

	Reporting Criteria	Absent 0	Partial 1	Complete 2
1	Justify sample size (e.g., results from a multilevel power analysis)			
2	Explain rationale for the sampling design (e.g., random, event-based, etc.)			
3	Explain rationale for sampling density (e.g., assessments per day) and scheduling (i.e., when the assessments are scheduled)			
4	Provide technical details of sampling (e.g., prompting and recording practices; procedures for event-based entries; ability to suspend/delay responses; branching details, triggering assessments, follow-ups or dense sampling of events/experiences)			
5	Report full text of items, rating time frames, response options/scaling			
6	Report psychometric properties of items in the current EMA-study (between and within person); origin of the items			
7	Describe hardware and software used			
8	Define valid and missing data (for participants broadly, and specific to individual EMA reports); descriptive analyses regarding valid data (e.g., mean per person, range, % participants above and below 80% threshold)			
9	Describe procedures used to enhance compliance and participation (e.g., remuneration schedule, participant training)			

10	Describe the final data set: number of reports (total; person average; group average), days in study and retention rates, and rates of delayed or suspended responding (if applicable)
11	Describe preparation for data analyses (e.g., centering of predictor variables and at what level); report covariates included in the models
12	Data analysis: Describe levels of analysis (momentary, day, person); explain how time is taken into account in analyses; specify and justify choices of random versus fixed effects in models; describe analytic modeling used as well as statistical software used

Note. Score range: 0-24. Inadequate report: 0-8; Moderate report: 9-17; Adequate report: 18-24.

Table A1.2 *Quality assessment tool for studies assessing SI daily (once per day) and weekly (adapted from McClelland et al., 2020, and Tooth et al., 2005)*

Criteria	0	1	2	Score
1. Sample selection	Opportunity sampling	Representative sample (e.g., either the author commented, or some effort was made to show that the sample is representative of their target population)	N/A	
2. Sample size	No justification for sample size or no mention of whether this study had sufficient statistical power	Justification for sample size was included (e.g., power calculation) but the sample size was not achieved.	Justification for sample size was included, and the study had the sufficient statistical power to detect anticipated effects	
3. Validity of SI measure	Single-item assessment with no valid or reliable backing; Assessment of a combination of thinking of suicide and self-harm.	Selected items taken from a standardised measure (but not the full scale)	Full standardised measure or subscale targeted to assess SI	
4. Attrition or missing data	No report of any	Attrition or missing data were reported but no attempt to adjust accordingly	Loss to follow-up or missing data were accounted for in the analysis	
5. Confounders	No attempt to control confounding variables during recruitment or analysis	Some attempt to control for confounding variables (e.g., demographics)	Accounts for additional confounding variables (e.g., suicide history, depression, other psychological variables)	
6. Generalisability	Unclear whether the findings are generalisable to the target population.	Results can be generalised to a target population	N/A	

Note. Score range: 0-10. Low quality: 0-3; Moderate quality: 4-7; High quality: 8-10.

Appendix 2: Independent and overlapping sample groups

Table A2.1 *Independent and overlapping sample groups in studies included in the review*

No.	Study	Sample Group
1	Hadzic et al., (2020)	G1
2	Hallensleben et al., (2019)	G1
3	Hallensleben et al., (2024)	G1
4	Kraiss et al., (2024)	G1
5	Lucht et al., (2022a)	G1
6	Lucht et al., (2022b)	G1
7	Rath et al., (2019)	G1
8	Spangenberg et al., (2022, Sample 1)	G1
9	Brudern et al., (2022)	G1
10	Al-Dajani & Czyz (2022)	G2
11	Czyz et al., (2022, Sample 2)	G2
12	Czyz et al., (2023)	G2
13	May et al., (2023)	G2
14	Al-Dajani et al., (2024)	G2
15	Kleiman et al., (2017, Sample 1)	G3
16	Kleiman et al., (2018a, Sample 1)	G3
17	Kleiman et al., (2018b)	G3
18	Coppersmith et al., (2019)	G3
19	Franz et al., (2021)	G3
20	Kaurin et al., (2022a)	G4
21	Kaurin et al., (2022c)	G4
22	Kaurin et al., (2023)	G4
23	Kaurin et al., (2022b)	G4
24	Tsypes et al., (2022)	G4
25	Kleiman et al., (2017, Sample 2)	G5
26	Kleiman et al., (2018a, Sample 2)	G5
27	Mou et al., (2018)	G5
28	Wang et al., (2021)	G5
29	Rogers & Bozzay (2024)	G6
30	Rogers et al., (2022b)	G6
31	Rogers et al., (2022a)	G6
32	Rogers et al., (2024b)	G6

33	Czyz et al., (2019)	G7
34	Kuehn et al., (2022)	G7
35	Schatten et al., (2021)	G7
36	Aadahl et al., (2021)	G8
37	Hallard et al., (2021)	G8
38	Ammerman & Jacobucci (2023)	G9
39	Jacobucci et al., (2022)	G9
40	Armey et al., (2020)	G10
41	Rogers et al., (2024a)	G10
42	Baryshnikov et al., (2024a)	G11
43	Baryshnikov et al., (2024b)	G11
44	Bodell et al., (2021)	G12
45	Kinkel-Ram et al., (2021)	G12
46	Bonilla-Escribano et al., (2023)	G13
47	Porras-Segovia et al., (2021)	G13
48	Byran & Rudd (2018)	G14
49	Byran et al., (2019)	G14
50	Coppersmith et al., (2023a)	G15
51	Coppersmith et al., (2023b)	G15
52	Glenn et al., (2022)	G16
53	Glenn et al., (2021)	G16
54	Kyron et al., (2018)	G17
55	Kyron et al., (2022)	G17
56	van Ballegooijen et al., (2022)	G18
57	Littlewood et al., (2019)	G18
58	Peters et al., (2019)	G19
59	Selby et al., (2013)	G19
60	Rizk et al., (2019)	G20
61	Stanley et al., (2021)	G20
62	Rogers & Joiner (2019)	G21
63	Rogers et al., (2021)	G21
64	Witte et al., (2005)	G22
65	Witte et al., (2006)	G22
66	Gerner et al., (2023)	G23
67	Oakey-Frost et al., (2023)	G23
68	Andrewes et al., (2024)	G24
69	Auerbach et al., (2023)	G25
70	Bagge et al., (2014)	G26
71	Ballard et al., (2017)	G27
72	Ballard et al., (2022)	G28
73	Bayliss et al., (2024)	G29

74	Bell & Shah (1999)	G30
75	Ben-Zeev et al., (2012)	G31
76	Brim et al., (1984)	G32
77	Coppersmith et al., (2024)	G33
78	Cox et al., (2023)	G34
79	Crowe et al., (2019)	G35
80	Czyz et al., (2022, Sample 1)	G36
81	De Beurs et al., (2024)	G37
82	Depp et al., (2017)	G38
83	Ernst et al., (2024)	G39
84	Al-Dajani et al., (2021)	G40
85	Hamilton et al., (2023)	G41
86	Hamilton et al., (2024)	G42
87	Herzog et al., (2023)	G43
88	Humber et al., (2013)	G44
89	Husky et al., (2017)	G45
90	Jeong et al., (2021)	G46
91	Kaliush et al., (2024)	G47
92	Kaurin et al., (2024)	G48
93	Kuehn et al., (2024)	G49
94	Lewis et al., (2023)	G50
95	Li et al., (2024)	G51
96	Madsen et al., (2019)	G52
97	Mandel et al., (2024)	G53
98	Nock et al., (2009)	G54
99	Oquendo et al., (2020)	G55
100	Ortiz & Smith (2020)	G56
101	Peters et al., (2022)	G57
102	Ratzon et al., (2024)	G58
103	Restifo et al., (2015)	G59
104	Sels et al., (2024)	G60
105	Smith et al., (2024)	G61
106	van den Brink et al., (2024)	G62
107	Victor et al., (2019)	G63
108	Wallace et al., (2024)	G64
109	Wolford-Clevenger et al., (2020)	G65
110	Yin et al., (2023)	G66
111	Zhu et al., (2022)	G67
112	Zuromski et al., (2017)	G68

Note. G: Group. Studies with the same sample group number indicate overlapping samples.

Appendix 3: Study findings on dynamic indicators of suicidal ideation (N = 94)

Table A3.1 *Summary of dynamic indicators of suicidal ideation (N = 94)*

Study	SI Assessment Frequency	Sample Group	Persistence	Variability	Instability	Other Indicators
Al-Dajani & Czyz (2022)	Once/day	2†	Insufficient details	ICC active = 0.52	N/A	N/A
Ammerman & Jacobucci (2023)	Multiple/day	9†	Covariates: social contact, social connection. Discrete-time models: The effect of social contact on SI: active SI AR effects = 0.872, 95% CI 0.58 to 1.209; for passive SI AR effects = 0.747, 95% CI 0.462 to 1.06 The effect of social connection on SI: active SI AR effects = 0.938, 95% CI 0.60 to 1.336; for passive SI AR effects =0.738, 95% CI 0.501 to 1.004 Continuous-time models: Both passive and active SI showed strong autoregressive effects (i.e., 0.863 and 0.843, respectively); however, statistical significance was not reported.	N/A	N/A	N/A
Andrewes et al., (2024)	Multiple/day	24	N/A	ICC active = 0.56 Other indicators: intra-individual SD = 0.61	RMSSD = 0.58 (range = 0.00 to 2.19) across the week; calculated proportional RMSSD: 14.5%	Time-series plots (individual)

				On average, participants experienced at least one-unit change in SI every two days, with 63% of those changes occurring within the same day.	RMSSD = 0.42 (range = 0.00 to 1.35) within each day; calculated proportional RMSSD: 10.5%	
Armey et al., (2020)	Multiple/day	10†	N/A	N/A	High-risk group (N = 26), RMSSD = 1.06, SD = 0.41 Medium-risk group (N = 47), RMSSD = 0.66, SD = 0.21 Low-risk group (N = 30), RMSSD = 0.01, SD = 0.06 Calculated proportional RMSSDs: 26.5% (high-risk group), 16.5% (medium-risk group), and 0.3% (low-risk group).	N/A
Bagge et al., (2014)	Multiple/day	26	Insufficient details	ICC active = 0.45	N/A	N/A
Ballard et al., (2017)	Once/day	27	N/A	ICC composite = 0.24	N/A	Other descriptive statistics: 39% of participants with active SI on Day 1 reported clinically significant SI by Day 4. Approximately 5% showed increased SI on Day 2 and 4.
Ballard et al., (2022)	Varying (Daily & Weekly)	28	Covariates: hopelessness and psychological pain Short-term analysis: SI AR β (SE) = 0.246 (0.112), 95% CI [0.026, 0.466], p = 0.028. Long-term analysis: SI AR β (SE) = 0.24 (0.136), 95% CI [-0.027, 0.507], p = 0.078.	ICC composite = 0.71 for short-term analysis (daily) ICC composite = 0.62 for long-term analysis (weekly)	N/A	N/A

Baryshnikov et al., (2024a)	Multiple/day	11†	<u>Unconditional models</u> For suicidality, in the simple lagged regression, AR coefficient in logit units = 0.73 (95% CI 0.68, 0.79); this decreased to 0.35 (95% CI 0.28, 0.43) after adjusting for within-person mean random effect, and to 0.43 (95% CI 0.35, 0.51) after further adjusting for lag-2 suicidality. <u>Conditional models</u> Covariates: BPD symptoms, hopelessness, depression, anxiety, psychological pain The regression coefficient in logit units for suicidality was 0.42 (95% CI 0.32, 0.53) after controlling for BPD symptoms, and 0.39 (95% CI 0.27, 0.51) after controlling for all covariates.	N/A	N/A	N/A
Baryshnikov et al., (2024b)	Multiple/day	11†	N/A	N/A	N/A	Time-series plots (individual)
Bayliss et al., (2024)	Multiple/day	29	Covariates: suicide capability SI AR effect B = 1.47, SE = 0.38, p <.001, OR (95% CI) = 4.36 (2.05, 9.26)	N/A	N/A	N/A
Bell & Shah (1999)	Multiple/day	30	N/A	N/A	N/A	Time-series plots (individual)
Ben-Zeev et al., (2012)	Multiple/day	31	Insufficient details	N/A	N/A	N/A
Bodell et al., (2021)	Weekly	12†	N/A	ICC active = 0.73	N/A	N/A

Bonilla-Escribano et al., (2023)	Varying (Multiple & Daily)	13†	N/A	Other indicators: variability in rate of change (median absolute deviation of absolute slopes) Low-variability group: 65% of sample High-variability group: 35% of sample Mean variabilities for the low vs high variability group for wish to live: 3.516, 6.455	N/A	N/A
Brim et al., (1984)	Once/day	32	N/A	Other indicators: coefficient of variation Secondary depression group showed significantly lower SI variability and longer presence of SI, compared to the primary depression group (% rating days SI was present: 29% for primary depression and 53% for secondary depression, $p < .05$).	No significant group difference in day-to day suicidal ideation variability (MSSD) between primary and secondary depression groups; MSSD values not reported.	N/A
Byran & Rudd (2018)	Weekly	14†	Nonlinear models: Multiple attempters exhibited nonlinear change processes of SI, indicating an instable pattern of SI compared to single attempers and ideators.	N/A	N/A	Trajectory plots (group)
Byran et al., (2019)	Weekly	14†	Covariates: Session number, SA during follow-up Dynamic system model: At both between-person (B = -0.71, SE = 0.07, p <.001) and within-person levels (B = -0.84, SE = 0.07, $p < .001$), SI showed stability over time, with higher severity in the current session predicting lower severity in the next, and vice versa.	N/A	N/A	Trajectory plots (group)

			Participants who made a SA during follow-up showed greater resistance to change and higher variability in SI.			
Coppersmith et al., (2019)	Once/day	3†	Covariates: sadness, PB, TB (referred to as loneliness) Social support: AR SI B=0.95; 95% CI 0.93, 0.98; p <.001 Social support, sadness, PB, TB: AR SI B=0.95; 95% CI 0.93, 0.98, p < .001	N/A	N/A	N/A
Coppersmith et al., (2023a)	Multiple/day	15†	Covariates: suicidal desire or suicidal intent Negative effects suggested self-regulating effects or dampening effects: AR suicide intent = -1.832; 95% CI -2.716, -1.185; AR suicide desire = -0.144; 95% CI -0.214, -0.09 Current suicidal intent predicted future intent for 2 to 3 h, while current suicidal desire predicted future suicidal desire for 20 h.	Other indicators: 19% more participants reported high-risk moments in burst surveys than in EMA surveys. P_{mode} statistics showed 50% of responses to suicidal desire differed from the individual mode (median P_{mode} = 0.50, IQR = 0.30 to 0.83), while suicide intent showed less variability (median P_{mode} = 0.91, IQR = 0.49 to 0.99), with 15 individuals showing no variability.	N/A	Time-series plots (individual)
Coppersmith et al., (2023b)	Multiple/day	15†	SI AR β = 0.571; 95% CI 0.531,0.612, p <.001, 85.71% percent of participants with a significant path.	N/A	N/A	N/A
Coppersmith et al., (2024)	Multiple/day	33	Covariates: PB, isolated, hopelessness. GIMME: group-level: non-significant AR; individual-level: significant AR across adults and adolescents, but inconsistent across individuals. Multilevel VAR models: SI AR effects were significant for both adults and	N/A	N/A	Time-series plots (individual)

			adolescents, with small magnitudes (coefficients not specified).			
Cox et al., (2023)	Once/day*	34	Covariates: sleep variables (sleep onset latency, wake after sleep onset, sleep duration, sleep timing, sleep quality, nightmares) SI AR effects were significant and positive in all models Passive SI: AR effects ranged from 0.37 to 0.44 (Std. estimates) Active SI: AR effects ranged from 0.30 to 0.39 (Std. estimates)	N/A	N/A	N/A
Crowe et al., (2019)	Multiple/day	35	N/A	ICC composite for total sample = 0.75 ICC composite 1 for MDD = 0.69 ICC composite 2 for Control = 0.50	MDD group showed greater suicidality instability between moments (RMSSD) than controls (B = 0.272, SE = 0.058, p <.001), but the effect became non-significant after adjusting for intra-individual mean suicidality; RMSSD values not reported.	N/A
Czyz et al., (2019)	Once/day	7[†]	Covariates: Connectedness, PB, hopelessness, intervention group AR for SI frequency , $\beta = 0.24$, $p < .001$ AR for SI duration $\beta = 0.29$, $p < .001$ AR for SI urge $\beta = 0.22$, $p < .001$	ICC active 1 (frequency) = 0.57 ICC active 2 (duration) = 0.54 ICC active 3 (urge severity) = 0.53 Other indicators: % of ratings changes 54.7% of frequency, 44% of duration, and 43.3% of urge severity ratings changed by at least one WPSD from one day to the next.	N/A	Time-series plots (individual)
Czyz et al., (2022, Sample 1)	Multiple/day	36	N/A	N/A	Persistent high group (29.5%): frequency (RMSSD=0.82) and severity (RMSSD=1.62)	Trajectory plots (group); Time-series plots (individual)

					Declining group (4.9%): frequency (RMSSD=1.03) and severity (RMSSD=1.76). Low ideation group (65.6%): frequency (RMSSD=0.39) and severity (RMSSD=0.71). Calculated proportional RMSSDs ranged from 9.8 to 25.5% for frequency and 10.1 to 25.1% for severity.	
Czyz et al., (2022, Sample 2)	Once/day	2[†]	N/A	N/A	Persistent high group (30.8%): frequency (RMSSD=0.84) and severity (RMSSD=1.46). Declining group (15.4%): frequency (RMSSD = 0.88) and severity (RMSSD = 1.65). Low ideation group (53.8%): frequency (RMSSD=0.77) and severity (RMSSD=0.38). Calculated proportional RMSSDs ranged from 19.3 to 22% for frequency and 5.4 to 23.6% for severity.	Trajectory plots (group); Time-series plots (individual)
De Beurs et al., (2024)	Multiple/day	37	N/A	N/A	N/A	Time-series plots (individual); Heat maps (Individual)
Ernst et al., (2024)	Multiple/day	39	Covariates: WTL, WTD Suicidal desire autocorrelation φ = 0.19 (p not reported)	ICC passive 1 (WTD) = 0.70 ICC passive 2 (WTL) = 0.76 ICC active (desire) = 0.71	MSSD (SD) for WTD = 1.45 (1.64), WTL = 1.14 (1.24), and suicidal desire = 0.88 (1.39) Converted RMSSD: RMSSD WTD = 1.20, WTL = 1.04, suicidal desire = 0.94	Heat maps (individual)

					Calculated proportional RMSSDs: 20% for WTD, 17.3% for WTL, and 15.7% for suicidal desire.	
Gerner et al., (2023)	Multiple/day	23	Covariates: interpersonal hopelessness, general hopelessness SI AR effects were significant and positive in all models, with β ranging from 0.14 to 0.18.	ICC active = 0.44	RMSSD = 0.19, range = 0.01 to 0.44 Calculated proportional RMSSD: 19%	Time-series plots (individual)
Glenn et al., (2022)	Multiple/day	16	N/A	ICC active 1 (desire) = 0.46 ICC active 2 (intent) = 0.45 ICC passive (desire for life) = 0.70	N/A	N/A
Hadzic et al., (2020)	Multiple/day	1†	N/A	N/A	MSSD (SD) SI Total = 4.80 (5.57) MSSD (SD) Passive SI = 1.95 (2.02) MSSD (SD) Active SI = 1.39 (2.10) Converted RMSSD: RMSSD SI = 2.19, passive SI = 1.40, active SI = 1.18 Calculated proportional RMSSDs: 13.7% for SI total, 17.5% for passive SI , and 14.8% for active SI	N/A
Hallensleben et al., (2019)	Multiple/day	1†	<u>Unconditional models</u> Unstandardised fixed regression coefficient were 0.40 (95% CI 0.34, 0.46; SE = 0.03; t(df) = 13.54 (73); p <.001) for passive SI and 0.39 (95% CI 0.31, 0.47; SE = 0.04; t(df) = 10.19 (73); p <.001) for active SI. <u>Conditional models</u> Covariates: depressiveness, hopelessness, PB, TB	ICC passive = 0.75 ICC active = 0.64	Passive SI: Mean MSSD (SD) = 1.95 (2.02), Range = 0.00 to 9.05 Active SI: Mean MSSD (SD) = 1.39 (2.10), Range = 0.00 to 12.83 Repeated report; see Hadzic et al., (2020) for synthesised results.	Heat maps (Individual)

			Passive SI in model 1: AR B = 0.15; 95% CI 0.11, 0.19; SE = 0.02; p <.001. Passive SI in model 2: AR B = 0.26; 95% CI 0.20, 0.32; SE = 0.03; p <.001. Active SI in model 3a: AR B = 0.24; 95% CI 0.18, 0.30; SE = 0.03; p <.001. Active SI in model 3b: AR B = 0.23; 95% CI 0.15, 0.31; SE = 0.04;p <.001. Active SI in model 4a: AR B = 0.32; 95% CI 0.24, 0.40; SE = 0.04; p <.001. Active SI in model 4b: AR B = 0.32; 95% CI 0.24, 0.40; SE = 0.04; p <.001.			
Hallensleben et al., (2024)	Multiple/day	1†	Insufficient details	N/A	N/A	N/A
Hamilton et al., (2023)	Once/day*	41	N/A	ICC active 1 (occurrence) = 0.25 ICC active 2 (intensity) = 0.20	N/A	N/A
Hamilton et al., (2024)	Once/day*	42	N/A	ICC active = 0.22 ICC passive = 0.22	N/A	N/A
Herzog et al., (2023)	Multiple/day	43	N/A	N/A	SI variability for the total sample: RMSSD (SD) = 3.01 (2.22); low variability group: 1.45 (0.54); high variability group: 4.75 (2.09) Calculated proportional RMSSD: 8.4% for the total sample	N/A
Husky et al., (2017)	Multiple/day	45	Insufficient details	N/A	N/A	N/A
Jacobucci et al., (2022)	Multiple/day	9†	<u>Unconditional models</u> SI AR effect estimate = 1.159 (significance not specified) <u>Conditional models</u> Covariates: PB, TB, NA	N/A	PAC for active SI: most participants had < 0.1 probability of active SI shifting by ≥ 1 or 2 between timepoints	N/A

			SI AR effect estimate = 0.919; 95% CI 0.597, 1.284			
Jeong et al., (2021)	Once/day	46	N/A	ICC composite = 0.29	N/A	N/A
Kaliush et al., (2024)	Multiple/day	47	<u>Unconditional models</u> Dynamical system models: Desire to live showed attractive dynamics across all waves, with set points and stability estimates of 0.02, -0.69 (wave 1); -0.01, -0.84 (wave 2); and -0.02, -0.85 (wave 3). Desire to live showed increasing stability around a lower set point from pregnancy to 6 weeks postpartum (B = −0.16, SE = 0.03, $p < .001$), with no significant change from 6 weeks to 4 months postpartum (B = -0.01, SE = 0.03, $p > .05$).	N/A	N/A	N/A
Kaurin et al., (2022a)	Multiple/day	4†	N/A	ICC composite = 0.38	N/A	N/A
Kaurin et al., (2022b)	Once/day*	4†	N/A	ICC composite = 0.601	N/A	N/A
Kaurin et al., (2022c)	Multiple/day	4†	Covariates: hostility, PA, NA, impulsivity GIMME: SI autocorrelation for five participants ranged from = -0.05 to 0.2 (Pearson r). AR effects for SI were significant at both group and individual level analysis; however, individual-level results revealed notable variability	N/A	N/A	Time-series plots (individual); Kernel density plots (individual)

			in the strength and direction of AR effects.			
Kaurin et al., (2024)	Weekly	48	N/A	ICC composite = 0.42	N/A	N/A
Kleiman et al., (2017, Sample 1)	Multiple/day	3†	Covariates: hopelessness, loneliness (TB), PB AR SI B = 0.40; 95% CI 0.34, 0.46; SE = 0.03; p <.001.	ICC active total = 0.53 ICC active 1 (desire) = 0.46 ICC active 2 (intention) = 0.49 Other indicators: % of ratings changes 29.1% SI ratings differed by at least one WPSD from the next time point; 94.1% of participants experienced at least one such change.	SI overall: RMSSD = 2.28 (range: 0.00-4.54); Desire to kill self: RMSSD = 0.77 (range: 0.00-1.84); Intention to kill self: RMSSD = 1.07 (range: 0.00-1.85); Resist urge: RMSSD = 0.84 (range = 0.00-1.77). Calculated proportional RMSSDs: 19% (overall SI), 19.2%(desire), 26.8% (intent), and 21% (resist urge)	Time-series plots (individual)
Kleiman et al., (2017, Sample 2)	Multiple/day	5†	Covariates: hopelessness, loneliness (TB) AR SI B = 0.59; 95% CI 0.50, 0.68; SE = 0.05; p <.001	ICC active total = 0.67 ICC active 1 (desire) = 0.65 ICC active 2 (intention) = 0.69 Other indicators: % of ratings changes 28% of SI ratings differed by at least one WPSD from the next time point; 100% of participants experienced at least one such change.	Overall SI RMSSD = 3.08 (range: 0.00-7.37) Desire RMSSD = 1.32 (range: 0.00-3.46) Intention RMSSD = 1.07 (range: 0.00-2.99 Resist urge RMSSD = 1.66 (range: 0.00-5.32). Calculated proportional RMSSDs: 11.4% (overall SI), 14.7%(desire), 11.9% (intent), and 18.4% (resist urge)	Time-series plots (individual)
Kleiman et al., (2018a, Sample 1)	Multiple/day	3†	N/A	Other indicators: WPSD 5 profiles of SI were classified by participants' SI differences in mean and variation around that mean Low mean & low variability (N=9). RMSSD SI = 0.84, mean =	Five SI profiles: Low mean & low variability (N=9). RMSSD SI = 0.84 Low mean & moderate variability (N=15). RMSSD SI = 2.01 Moderate mean & high variability (N=14). RMSSD SI = 3.08	Time-series plots (individual)

				0.42,within-person SD = 0.68, Max = 2.70, % > 0 = 28.95 Low mean & moderate variability (N=15). RMSSD SI = 2.01, mean = 1.27, ,within-person SD = 1.66, Max = 6.27, % > 0 = 47.03 Moderate mean & high variability (N=14). RMSSD SI = 3.08, mean = 2.34, within-person SD = 2.78, Max = 9.93, % > 0 = 58.56 High mean & low variability (N=4). RMSSD = 1.64, mean = 6.00, ,within-person SD = 1.50, Max = 9.50, % > 0 = 99.94 High mean, high variability (N=9). RMSSD=3.38, mean = 5.51, ,within-person SD = 2.83, Max = 11.22, % > 0 = 94.96.	High mean & low variability (N=4). RMSSD = 1.64 High mean, high variability (N=9). RMSSD=3.38 Repeated report, see Kleiman et al., (2017a, Sample 1) for synthesised results	
Kleiman et al., (2018a, Sample 2)	Multiple/day	5†	N/A	WPSD: 5 profiles were identified Low mean & low variability (N = 4). RMSSD = 0.69, mean = 0.54, within-person SD = 0.83 , Max = 2.50, % > 0 = 21.99. Moderate mean & low variability (N = 9). RMSSD = 1.49, mean = 3.73, within-person SD = 1.22, Max = 6.33 , % > 0 = 99.5. Moderate mean & moderate variability (N = 6). RMSSD = 4.09, mean = 3.07, within-person SD = 3.40, Max = 9.83, % > 0 = 62.73. High mean & moderate variability (N = 9). RMSSD = 3.63, mean = 8.47, within-person SD = 3.29, Max = 15, % > 0 = 99.11.	Five SI profiles: Low mean & low variability (N = 4). RMSSD = 0.69, Moderate mean & low variability (N = 9). RMSSD = 1.49 Moderate mean & moderate variability (N = 6). RMSSD = 4.09 High mean & moderate variability (N = 9). RMSSD = 3.63 High mean & high variability (N = 4). RMSSD = 6.81 Repeated report, see Kleiman et al., (2017a, Sample 2) for synthesised results	Time-series plots (individual)

				High mean & high variability (N = 4). RMSSD = 6.81, mean = 12.00, within-person SD = 5.12, Max = 23, % > 0 = 99.57.		
Kraiss et al., (2024)	Multiple/day	1†	Covariates: PB, TB, hopelessness. Model 1: PB at t-1; SI AR std. estimate = 0.406; 95% CI 0.350, 0.463. Model 2: TB at t-1; SI AR std. estimate = 0.436; 95% CI 0.379, 0.495 Model 3: Hopelessness t-1; SI AR std. estimate = 0.411; 95% CI 0.349, 0.472	N/A	N/A	N/A
Kuehn et al., (2022)	Once/day	7†	Covariates: coping strategies SI urge AR was significant and positive in all three participants: Person1, β ranges between 0.43 and 0.65, p <.001 Person2, β ranges between 0.35 and 0.38, p <.001 Person3, β ranges between 0.38 and 0.45,p <.001	N/A	N/A	Time-series plots (individual)
Kuehn et al., (2024)	Multiple/day	49	Covariates: negative emotions (sadness, shame, fear, guilt, anger) GIMME: Group-level analysis showed no consistent AR effect of SI, with direction and magnitude varying across individuals. Person-specific models revealed substantial heterogeneity in magnitude and direction of effects, with 51.72% showing positive and 48.28% showing negative AR effects, and ORs ranging from 0.67 to 1.42.	ICC active = 0.20	N/A	N/A

Kyron et al., (2018)	Once/day	17†	Covariates: PB, TB PB: SI autocorrelations for day 1 to day 2 = 0.67, day 2 to day 3 = 0.66, and day 1 to day 3 = 0.17; p <.01). TB: SI autocorrelations for day 1 to day 2 = 0.74, day 2 to day 3 = 0.70, and day 1 to day 3 = 0.16; p < .01)	N/A	N/A	Trajectory plots (group)
Kyron et al., (2022)	Once/day	17†	Covariates: PB, TB Full sample: φ = 0.24; SD = 0.011; 95% CI = 0.22, 0.26 No prior SA: φ = 0.18; SD = 0.017; 95% CI = 0.14, 0.21 Prior SA: φ = 0.28; SD = 0.016; 95% CI = 0.25, 0.31	Random residual variances	N/A	N/A
Li et al., (2024)	Once/day	51	Covariates: mindfulness SI at T-1 significantly predicted SI at T (φ = 0.282; 95% CI: 0.222, 0.348), indicating a positive carryover effect.	ICC composite = 0.53 Mean (WPSD) = 0.740 (0.668)	N/A	N/A
Littlewood et al., (2019)	Once/day*	18	N/A	ICC composite = 0.52	N/A	N/A
Lucht et al., (2022a)	Multiple/day	1†	Insufficient details	ICC composite = 0.73	N/A	N/A
Lucht et al., (2022b)	Multiple/day	1†	N/A	N/A	MSSD Passive SI range: 0 to 21.1(m = 2.0, sd=2.0) MSSD Active SI range: 0 to 26.2 (m = 1.4, sd=2.1) Repeated report; see Hadzic et al., (2020) for synthesised results.	N/A

Madsen et al., (2019)	Weekly	52	N/A	N/A	N/A	Trajectory plots (group and individual)
Mandel et al., (2024)	Multiple/day	53	Covariates: cognitive dysfunction (hopelessness, unbearability, rumination, and attentional fixation). WTD AR effects: B = 1.39; SE = 0.25; p<.001; OR = 4.03; 95% CI 2.45, 6.61. WTL AR effects: B = 0.20; SE = 0.02; p<.001; 95% CI 0.15, 0.24.	ICC passive 1 (WTL) = 0.63 ICC passive 2 (WTD) = 0.60	N/A	N/A
May et al., (2023)	Once/day	2†	N/A	N/A	N/A	Trajectory plots (group)
Nock et al., (2009)	Multiple/day	54	N/A	N/A	N/A	Other descriptive statistics: When SI occurred, its intensity was primarily mild (30.8%) to moderate (53.8%), with durations ranging from < 5s (0.0%) to > 5h (11.5%), and the longest durations between 1-30min (46.2%) and 30-60min (15.4%)
Oakey-Frost et al., (2023)	Multiple/day	23†	Covariates: WTL, WTD, Suicidal ambivalence, SI (suicidal desire) SI AR effect B = 0.20; 95% CI 0.15, 0.25; p<.001; controlling for WTD and WTL	ICC passive 1 (WTL) = 0.47 ICC passive 2 (WTD) = 0.46 ICC active (desire) = 0.49	RMSSDs for WTL RMSSD = 0.23 (range = 0.05-0.57), WTD = 0.21 (range = 0.01-0.41), Suicidal desire = 0.17 (range = 0.00-0.44) Calculated proportional RMSSDs: 23% (WTL), 21% (WTD), and 17% (desire)	Time-series plots (individual)

			SI AR effect B = 0.20; 95% CI 0.15, 0.26; p<.001; controlling for ambivalence WTD AR effect B = 0.11; 95% CI 0.05, 0.17; p <.001; controlling for SI and WTL WTL AR effect B = 0.16; 95% CI 0.11, 0.22; p <.001; controlling for SI and WTD			
Oquendo et al., (2020)	Multiple/day	55	Insufficient details	N/A	For repeated RMSSD in each EMA period, 39% of the variance was due to within-person timepoint to timepoint differences, and 61% was due to between-person variability. No significant change in RMSSD over 2-year study period (F=1.48, df = 5137, p= .200), regardless of baseline SI variability level. RMSSD values were not reported.	N/A
Ortiz & Smith (2020)	Weekly	56	Covariates: eating disorder symptoms Autocorrelations for SI from week 1 to 5 were all positive and significant, ranging from 0.65 to 0.75, p < .01.	N/A	N/A	N/A
Peters et al., (2019)	Weekly	19†	N/A	N/A	SI MSSD M(SD) = 0.26 (0.26) Converted RMSSD: RMSSD SI = 0.51, calculated proportional RMSSD: 10.2%	N/A
Peters et al., (2022)	Multiple/day	57	N/A	N/A	MSSD values not provided.	N/A
Porras-Segovia et al., (2021)	Varying (Daily & Weekly)	13†	N/A	N/A	N/A	Heat maps (individual)

Rath et al., (2019)	Multiple/day	1†	Covariates: PB, TB, PA, depressiveness, hopelessness, anxiety. SI at time T was predicted by itself at T-1 (standardised coefficient = 0.26, p <.001)	N/A	N/A	N/A
Restifo et al., (2015)	Once/day	59	N/A	N/A	N/A	Trajectory plots (group)
Rizk et al., (2019)	Multiple/day	20†	N/A	N/A	RMSSD SI (SD) = 5.1 (2.9); 25% of participants had variability lower than 3.14 and 25% had higher variability than 6.86. Calculated proportional RMSSD: 14.20%	N/A
Rogers & Bozzay (2024)	Multiple/day	6†	N/A	ICC active 1(desire) = 0.73 ICC active 2 (intent) = 0.84	RMSSD suicidal desire = 12.50; calculated proportional RMSSD: 12.5% RMSSD suicidal intent = 8.04; calculated proportional RMSSD: 8.04%	Time-series plots (individual)
Rogers & Joiner (2019)	Weekly	21†	Covariates: PB, TB Dynamical system models: The SI set point was 4.98, with SI significantly negatively predicting itself, indicating temporal stability over the study period (B = -0.60, SE = 0.04, p < .001).	ICC active = 0.66	N/A	N/A
Rogers et al., (2021)	Weekly	21†	Covariates: suicide-specific rumination, PB, TB, agitation, insomnia, nightmares, SI, age, gender, suicide plan recency	ICC active 1 (intent) = 0.68 ICC active 2 (DSI-SS) = 0.66	N/A	N/A

			AR Suicidal intent, B= 0.65, SE = 0.06, p < .01.			
Rogers et al., (2022b)	Multiple/day	6†	Insufficient details	ICC composite = 0.51	RMSSD SI = 0.53, M (SD) of SI = 0.46 (0.69), range = 0-3.92. Calculated proportional RMSSD: 13.30%	N/A
Rogers et al., (2022a)	Multiple/day	6†	Covariates: Physical distance, psychological distance, fearlessness about death. Suicidal intent AR, B= 0.24; SE = 0.02; p <.001; 95% CI 0.20, 0.27; Cohen's f^2 = 0.04.	ICC intent = 0.83	RMSSD intent: M (SD) = 8.04 (6.41), range = 0 to 31.40 Repeated report; see Rogers & Bozzay (2024) for synthesised results	N/A
Rogers et al., (2024a)	Multiple/day	10†	N/A	ICC intent = 0.83 EMA SI variability: Mean (WPSD) = 0.45 (0.57), range = 0 to 2.12	N/A	N/A
Rogers et al., (2024b)	Multiple/day	6†	Covariates: stress, hopelessness, suicide-specific rumination Dynamical system models: Suicidal intent was a significant negative predictor of itself, demonstrating temporal stability (B = -0.64; SE = 0.01; 95% CI -0.66, -0.62; p <.001).	N/A	N/A	N/A
Schatten et al., (2021)	Once/day	7†	N/A	ICC active = 0.42	N/A	Time-series plots (individual)
Selby et al., (2013)	Weekly	19†	Covariates: depression, affective sensitivity, NA, behavioural dysregulation, peer invalidation, family invalidation.	ICC composite = 0.59	N/A	N/A

			Lag-weekly-SI, β = 0.35, SE = 0.01, p < .01.			
Sels et al., (2024)	Multiple/day	60	N/A	ICC composite = 0.78 Other indicators: Mean (WPSD) for composite SI = 26.58 (11.14)	N/A	N/A
Smith et al., (2024)	Multiple/day	61	Insufficient details	N/A	N/A	N/A
Spangenberg et al., (2022, Sample 1)	Multiple/day	1†	N/A	N/A	Four SI subtypes Low-stable (RMSSD=0.24) High-unstable (RMSSD=1.70) Low-moderate stable (RMSSD=1.13) Moderate-unstable (RMSSD=1.41) Repeated report, see Hadzic et al., (2020) for synthesised results.	Time-series plots (individual)
Tsypes et al., (2022)	Once/day*	4†	Insufficient details	N/A	N/A	N/A
van Ballegooijen et al., (2022)	Multiple/day	18†	Covariates: defeat, entrapment The lag 1 (3h) network showed significant autocorrelations for SI (r = 0.23). The lag 2 (6h) and 3 (9h) networks showed significant autocorrelations for SI (r = 0.15 and 0.11, respectively) The lag 4 (12h) network showed no significant autocorrelations on any variables.	N/A	N/A	N/A
van den Brink et al., (2024)	Multiple/day	62	N/A	N/A	N/A	Heat maps (individual)
Victor et al., (2019)	Multiple/day	63	N/A	ICC active = 0.05	N/A	N/A

Wallace et al., (2024)	Once/day*	64	Covariates: affective-cognitive construct (PA, NA, rumination, distress intolerance, emotion dysregulation). All autoregressions and variability parameters were significant and varied randomly. Fixed effect: SI AR effects B ranged from 0.14 to 0.15 Random effect: SI AR effects B = 0.12 across all models	ICC composite = 0.35	N/A	N/A
Wang et al., (2021)	Multiple/day	5†	N/A	N/A	MSSD and PAC of SI were included as dynamic features in SI modelling; specific values were not reported.	Time-series plots (individual)
Witte et al., (2005)	Once/day	22†	N/A	N/A	Repeated report, see Witte et al., (2006) for synthesised results.	N/A
Witte et al., (2006)	Once/day	22†	N/A	N/A	MSSD (SD) for SI: total group = 66.29 (105.93); zero SA = 37.41 (49.18); single SA = 84.81 (130.38); multiple SA = 114.26 (147.95). RMSSD for SI: total group = 8.14; zero SA = 6.12; single SA = 9.12; multiple SA = 10.96. Calculated proportional RMSSDs: 7.5% for entire group, 5.7% for zero SA, 8.4% for single SA, 10.1% for multiple SA.	Trajectory plots (group)
Wolford-Clevenger et al., (2020)	Once/day	65	N/A	ICC passive = 0.60 ICC active = 0.49	N/A	N/A
Yin et al., (2023)	Once/day	66	Covariates: shame, fear, joy, anger, sadness, misery GIMME:	ICC composite = 0.40	N/A	N/A

			AR coefficients were not specified SI autoregressive path was significant at the group level across all time points. Individual-level patterns showed heterogeneity in the direction and strength of SI AR effects; the stability of individual-level patterns varied significantly across timepoints and participants.			
Zhu et al., (2022)	Once/day*	67	Covariates: depression, anxiety, PTSD symptoms Idiographic approach: SI AR effects were not significant in any individual models. Standardized coefficients ranged from -0.38 to 0.37, with significance defined at $p < 0.005$ to adjust for family-wise errors.	N/A	N/A	N/A
Zuromski et al., (2017)	Weekly	68	Modelling latent changes <u>Unconditional models</u> Higher previous levels of SI (but not recent changes) predicted a negative change in SI at the next time point (Estimate = -0.728, SE = 0.089, $p < .001$). <u>Conditional models</u> Covariates: insomnia and depression Higher SI levels predicted downward changes at subsequent time points (β = -0.719, SE = 1.04, $p < .001$).	N/A	N/A	Time-series plots (individual)

Note. AR = Autoregressive effect; BPD = Borderline personality disorder; CI = Confidence intervals; df = Degrees of freedom; DSI-SS = Depressive symptom inventory-suicidality subscale; ED = Eating disorder; EMA = Ecological Momentary Assessment; GIMME = Group Iterative Multiple Model Estimation; ICC = Intraclass correlation coefficient; IQR = Interquartile Range; MDD = Major depressive disorder; MSSD = Mean Squared Successive Differences; N/A = Not applicable; OR = Odds ratio; PAC = Probability of acute change; PB = Perceived burdensomeness; PTSD = Post-traumatic stress disorder; RMSSD = Root Mean Square of Successive Differences; SA = Suicide attempt; SD = Standard deviation; SE =

Standard error; SI = Suicidal ideation; TB = Thwarted belongingness; VAR = Vector Autoregressive Model; WPSD = Within-Person Standard Deviation; WTD = Wish to die; WTL = Wish to live; β = Standardised regression coefficient; φ = Autoregressive coefficient. ***** Assessment frequency was collapsed or aggregated from the original sampling schedule for analysis. † Indicates studies with overlapping samples; see Table x for details.

Appendix 4: Study findings on dynamic associations between factors and suicidal ideation (N = 106)

Table A4.1 *Summary of dynamic associations between factors and suicidal ideation (N = 106)*

Study	Sample Group	SI Assessment Frequency	Dynamic Associations	Study Quality
Aadahl et al., (2021)	8†	Multiple/day	Concurrent relationships NA, hopelessness, defeat, and entrapment each predicted state-level SI; all but entrapment remained significant in multivariate analysis. Cognitive confidence ($\beta = 0.309$, $p < 0.001$), suicide-specific positive($\beta = 0.567$, $p < 0.001$) and negative ($\beta = 0.621$, $p < 0.001$) metacognitive beliefs were all individually predicted SI at a state level; Only positive ($\beta = 0.468$, $p < 0.001$) and negative ($\beta = 0.504$, $p < 0.001$) metacognitive beliefs about SI remained significant predictors of SI in the multivariate model.	Adequate report
Al-Dajani & Czyz (2022)	2†	Once/day	Concurrent relationships Daily PB and belongingness (family/peer) were associated with same-day SI urge intensity Within-person interaction effect: high PB and low family/peer belongingness linked to higher same-day SI intensity, with greater belongingness buffering PB effects. Prospective relationships Baseline and daily PB were significantly predicted next-day SI, whereas belongingness did not. No significant PB and belongingness interaction effects on next-day SI intensity.	Moderate quality

Al-Dajani et al., (2021)	40	Multiple/day	<u>Concurrent relationships</u> Higher NA following SI were found on all emotions (anger, anxiety, hopelessness, sadness, stress, and worry), and NA composite score (semi-partial R^2 range = 0.147-0.367).which differed on SI function. SI as a solution to a problem was linked to higher hopelessness (b = 0.33, SE = 0.09, p < .000, semi-partial R^2 = 0.026), sadness (b = 0.29, SE = 0.09, p = .001, semi-partial R^2 = 0.021), stress (b = 0.23, SE = 0.10, p = .020, semi partial R^2 = 0.011), and NA composite (b = 0.18, SE = 0.07, p = .005, semi-partial R^2 = 0.015), after experiencing SI, whereas SI as an escape was associated with higher anger (b = 0.28, SE = 0.11, p = .007, semi-partial R^2 = 0.014). Longitudinal results within 10-h window showed sig reduced in NA intensity only for anxiety and stress	Adequate report
Al-Dajani et al., (2024)	2†	Weekly*	<u>Concurrent relationships</u> Mean levels of anger (B = 0.17), nervousness (B = 0.21), hopelessness (B = 0.56), and sadness (B = 0.44) were positively associated with more frequent SI, whereas happiness (B = -0.64) was negatively associated with SI frequency. The interaction between mean and variability was significant only for anger: mean anger was related to SI frequency at moderate to high anger variability.	Moderate quality
Ammerman & Jacobucci (2023)	9†	Multiple/day	<u>Prospective relationships</u> Absence of social contact was linked to higher passive and active SI at T+1, controlling for SI AR effects. Social connection variables (conflict, quality, duration) were not associated with passive or active SI.	Adequate report
Armey et al., (2020)	10†	Multiple/day	<u>Concurrent relationships</u> Individuals with higher NA relative to others (OR≈2.5) and their own average (OR≈4.9) were at increased risk for SI, while higher PA relative to others (OR≈0.3) and their own average (OR≈0.3) had decreased odds of SI. A higher NA to PA ratio (OR≈2.0 to 2.5) relative to others and their own average (OR≈3.0) increased SI risk. Individuals with higher anger/irritability were at increased risk for SI relative to their own average, with fluctuations over time, peaking around day 15 (OR max≈2.7).	Adequate report
Auerbach et al., (2023)	25	Weekly	<u>Subtypes</u> High-risk group (n=26), Medium-risk group (n=47), and Low-risk group (n=30) Group differences: Clinical severity, suicide events during follow-up, baseline psychological pain (F (2,98) = 16.15, p < .001) and PB (F(2,98) = 8.94, p < .001) differed across groups. The high-risk group showed consistently low weekly mood, while the medium-risk group exhibited greater mood variability. <u>Prospective relationships</u>	Moderate quality

			Mood reductions, but not variability, over the prior 7 days predicted clinically significant SI in high and medium-risk adolescents (b = 0.85, SE = 0.30, p < .01, OR = 2.34, 95% CI = 0.26, 1.44).	
Bagge et al., (2014)	26	Multiple/day	<u>Prospective relationships</u> Alcohol use (adjusted univariate: b = 0.20, p < .01; adjusted multivariate: b = 0.20, p < .01) and negative life events (adjusted univariate: b = 0.57, p < .01; adjusted multivariate: b = 0.58, p < .01) consistently predicted increased next-hour SI across univariate and multivariate models, even after adjusting for prior SI; drug use predicted SI only before adjustment.	Moderate quality
Ballard et al., (2022)	28	Varying (Daily & Weekly)	<u>Prospective relationships</u> Hopelessness/psychological pain at T did not predict SI at T+1 in either short-term (β = 0.151; SE = 0.119; 95% CI -0.082, 0.384) or long-term (β = 0.054; SE = 0.122; 95% -0.185, 0.293) analyses.	Moderate quality
Baryshnikov et al., (2024a)	11†	Multiple/day	<u>Prospective relationships</u> After controlling for SI at T-1, depression severity (β = 0.19; 95% CI 0.06, 0.32) at T-1 predicted next-timepoint SI, while psychological pain, anxiety, and hopelessness did not. BPD comorbidity as a moderator: psychological pain predicted SI in patients with depression and BPD (β = 0.28; 95% CI 0.11, 0.46), but not in those without BPD.	Moderate report
Baryshnikov et al., (2024b)	11†	Multiple/day	<u>Concurrent relationships</u> Within-person variations in psychological pain significantly predicted SI (β = 0.17; 95% CI 0.12, 0.22), after controlling for hopelessness (β = 0.10, 95% CI 0.05, 0.15), depression (β = 0.12, 95% CI 0.08, 0.17), anxiety (β = 0.03; 95% CI -0.02, 0.07), and BPD status (β = 0.15; 95% CI -0.15, 0.44).	Moderate report
Bayliss et al., (2024)	29	Multiple/day	<u>Concurrent relationships</u> Suicidal mental imagery was significantly associated with concurrent SI (B = 1.64; OR = 5.15; 95% CI 4.04, 6.57; p < .001) <u>Prospective relationships</u> Suicidal mental imagery significantly predicted SI at T+1(B = 0.32; OR = 1.38; 95% CI 1.08, 1.77, p = .01), after controlling for SI AR effects.	Adequate report
Ben-Zeev et al., (2012)	31	Multiple/day	<u>Prospective relationships</u> Sadness (coefficient = 0.063, p = .032), tension (coefficient = 0.050, p =.015), and boredom (coefficient = 0.061, p =.001) predicted greater subsequent SI within the same day, controlling for prior SI; helplessness, worthlessness, anhedonia, difficulty concentrating, hopelessness, and guilt were not significant predictors. In the multivariate model, only boredom remained a significant predictor, after controlling for prior SI.	Moderate report

Bodell et al., (2021)	12†	Weekly	Concurrent relationships Burdensomeness predicted same-week SI at both between-person (B = 0.13; SE = 0.03; p<.001; 95% CI 0.08, 0.19) and within-person levels (B = 0.06; SE = 0.01; p<.001; 95% CI 0.04, 0.08), even after controlling for baseline clinical variables. Belongingness and its interaction with burdensomeness were significant predictor. Prospective relationships Burdensomeness, but not belongingness, predicted next-week SI at both between-person (B = 0.13; SE = 0.03; p <.001; 95% CI 0.08, 0.18) and within-person (B = 0.03; SE = 0.01; p < .01; 95% CI 0.01, 0.05) levels, even after controlling for baseline clinical variables.	Moderate quality
Bonilla-Escribano et al., (2023)	13†	Varying (Multiple & Daily)	Subtypes Two clusters were identified: Low-variability group: 65% of sample; High-variability group: 35% of sample Time-invariant relationships The high-variability group showed greater overall instability, particularly in social withdrawal, sleep measures, wish to live, and social support. Two clusters were distinguished by ten clinical features, including depression severity, impulsivity, marital status, SI patterns, nicotine dependence, SI control, binge eating disorder, and clinical events during follow-up.	Adequate report
Brim et al., (1984)	32	Once/day	Time-invariant relationships Compared to the primary depression group, the secondary depression group showed lower overall SI variability (p < .01), but no significant difference in day-to-day SI variability.	Moderate quality
Brudern et al., (2022)	1†	Once/day*	Prospective relationships Sleep disturbances predicted next-day active SI (b = 0.18, p = .042), but not passive SI (b = 0.10, p = .343).	Adequate report
Byran & Rudd (2018)	14†	Weekly	Time-invariant relationships Only multiple attempters showed a nonlinear pattern of (SI), showing two stable SI states (low at 0.21 and high at 2.25) separated by an unstable state (1.65); ideators and first-time attempters showed only one stable low-SI state.	Moderate quality
Byran et al., (2019)	14†	Weekly	Time-invariant relationships Individuals who made SA during follow-up showed greater and consistent fluctuations in SI over time, although their average SI severity and decline rates did not differ from those who did not attempt suicide.	Moderate quality
Coppersmith et al., (2019)	3†	Once/day	Concurrent relationships Social support was negatively associated with same-day (B = -0.41; 95% CI -0.52, -0.30; P<.001) and next-day suicidal ideation (B = -0.35; 95% CI: -0.46, -0.24; P<.001), even after controlling for sadness, burdensomeness, and thwarted belongingness.	Moderate quality

			Prospective relationships After adjusting for same-day SI, social support and other variables were no longer associated with next-day SI.	
Coppersmith et al., (2023b)	15†	Multiple/day	Concurrent relationships On days with nonzero SI, 77.7% of the time individuals reported using SI to cope with difficult emotions. SI was followed by decreases in NA within 4 (β = −6.29, p = .001) and 8 (β = −6.45, p = .001) hours, respectively. When SI was present, larger decreases in NA were observed compared to when SI was absent (β = −2.88, p = .001). Prospective relationships Self-reported use of SI to cope with negative emotions predicted next-day SI severity (OR = 1.08, p < .001), but this relationship disappeared after controlling for prior-day SI. Increased NA predicted higher SI 4 hours later (β = 0.177, p < .001), with 48.6% of participants showing a significant effect.	Adequate report
Coppersmith et al., (2024)	33	Multiple/day	Concurrent and prospective associations Multilevel models and vector autoregressive models supported all concurrent associations and some prospective associations proposed by IPTS (hopelessness, isolation, PB), while the GIMME models found no support, showing no group-level contemporaneous or lagged paths.	Moderate report
Cox et al., (2023)	34	Once/day*	Prospective relationships Univariate models: Sleep quality negatively predicted passive (β = -0.16; 95% CI -0.23,0.09) and active (β =-0.08; 95% CI -0.16, -0.001) SI Nightmare positively predicted passive SI (β = 0.15; 95% CI 0.08, 0.21) Wake after sleep onset positively predicted passive (β = 0.06; 95% CI 0.004, 0.12) and active (β = 0.07; 95% CI 0.003, 0.15) SI Sleep onset latency, sleep duration and sleep timing showed no significant impact on passive and active SI. Multivariate models: Nightmares (β = 0.13; 95% CI 0.06, 0.19) and sleep quality (β = -0.13; 95% CI -0.21, -0.05) on passive SI remained significant predictors.	Moderate report
Crowe et al., (2019)	35	Multiple/day	Time-invariant relationships The MDD group showed greater suicidality instability than controls (B = 0.272, SE = 0.058, p <.001), but this difference was explained by higher overall suicidality levels.	Adequate report

Czyz et al., (2019)	7†	Once/day	Concurrent relationships PB, connectedness, and hopelessness were each significantly associated with same-day, but not next-day, SI frequency, duration, and urge severity. All three two-way interactions between three predictors and SI were associated with same-day SI frequency, duration, urge severity Prospective relationships After controlling for previous-day SI, only the PB and connectedness interaction predicted all next-day SI outcomes; the connectedness and hopelessness interaction predicted next-day SI frequency and duration.	Moderate quality
Czyz et al., (2022, Sample 1)	36	Multiple/day	Subgroups Three SI trajectories were identified: low (65.6%), persistently high (29.5%), and declining (4.9%). Time-invariant relationships The persistent SI group showed greater hopelessness, lower coping self-efficacy, and more severe clinical symptoms than the declining and low SI groups. The three groups did not differ in SA history.	Moderate report
Czyz et al., (2022, Sample 2)	2†	Once/day	Subgroups Three SI trajectories were identified: low (53.8%), persistently high (30.8%), and declining (15.4%). Time-invariant relationships The persistent SI group showed greater hopelessness, lower coping self-efficacy, and more severe clinical symptoms than the declining and low SI groups. The three groups did not differ in SA history.	Moderate quality
Czyz et al., (2023)	2†	Once/day	Prospective relationships The best performing model predicting next-day SI combined cumulative averages and deviations from the mean for SI duration, hopelessness, burdensomeness, and self-efficacy.	Moderate quality
De Beurs et al., (2024)	37	Multiple/day	Dynamic clustering At the individual levels, there was significant variability in factor clustering and dynamics, while at the group-level, hopelessness, worrying, feeling sad, entrapment, and rumination were grouped together with SI, indicating these factors showed similar trajectories over time. Concurrent relationships At the individual levels, unique factor networks emerged, with five negative mood symptoms often clustering together. At the group level, these symptoms were central, with SI being the least central. Burdensomeness and restlessness were isolated. Overall, individual networks varied despite common patterns. Prospective relationships	Moderate report

			At the individual levels, the five negative mood symptoms influenced each other over time, with varying directions across individuals. At the group level, feeling sad and SI were isolated, with no connections to other symptoms.	
Depp et al., (2017)	38	Weekly	Prospective relationships Energy levels began changing 3 weeks before increased suicide risk, while mood changes predicted risk starting 2 weeks prior. Decreased energy in week 3 followed by decreased mood in week 2 were associated with the most severe SI rating, while high level of energy in week 3 followed by decreased mood in week 2 were associated with the second severe SI rating	Moderate quality
Ernst et al., (2024)	39	Multiple/day	Concurrent relationships Both WTD and WTL were significantly associated with suicidal desire. A significant interaction between WTD and WTL: suicidal desire was higher when WTD was strong and WTL was weak Prospective relationships Lower WTL predicted greater suicidal desire at the next timepoint, whereas WTD did not. A significant interaction between WTD and WTL: the effect of WTD on suicidal desire was stronger when WTL was low Time-invariant relationships Inpatients with a history of SA showed greater fluctuations in all SI constructs.	Adequate report
Franz et al., (2021)	3†	Once/day	Concurrent relationships Daily stress predicted higher same-day SI; this link was stronger for individuals with low or average cognitive reappraisal or expressive suppression.	Moderate quality
Gerner et al., (2023)	23†	Multiple/day	Concurrent relationships IH-TB, IH-PB, and their interaction significantly predicted SI, even after controlling for general hopelessness. Prospective relationships IH-TB predicted SI at T+1; IH-PB did not after adjusting for hopelessness. Their interaction did not predict SI at T+1.	Adequate report

Glenn et al., (2021)	16†	Once/day*	Concurrent relationships Higher daily average sadness was related to greater SI during the day (B=1.006, SE = 0.031, p < .001) Prospective relationships Subjective measures showed that longer time to fall asleep (B = 0.001, SE = 0.001, p = .021), higher sleep quality (B = 0.121, SE = 0.031, p < .001), nightmares (B = 0.595, SE = 0.070, p < .001), and more rumination before sleep (B = 0.028, SE = 0.009, p = .002) predicted greater next-day SI, after controlling for daily sadness, while wake after sleep onset, total sleep time, and sleep efficiency were not significant predictors. Objective measures showed that only less time awake during the night predicted greater next-day SI	Adequate report
Glenn et al., (2022)	16†	Multiple/day	Prospective relationships Prior-day interpersonal NLEs and TB with family/friends significantly predicted next-day SI in the multivariate models. TB with family significantly mediated the link between interpersonal NLEs and next-day suicidal ideation.	Adequate report
Hadzic et al., (2020)	1†	Multiple/day	Time-invariant relationships Impulsivity total score (r= 0.26, p < .05) and the motor aspect (r= 0.32, p < .01) were significantly associated with passive SI fluctuations.	Moderate report
Hallard et al., (2021)	8†	Multiple/day	Concurrent relationships Maladaptive coping strategies (worry,β =0.34, p < 0.001; punishment, β =0.48, p <0.001; rumination, β =0.33, p <0.001) all predicted SI at the state level. Adaptive coping strategies (distraction, β = −0.39, p < 0.001; social control, β =− 0.25, p <0.001; reappraisal, β =−0.31, p <0.001) predicted SI at a state level. All predictors remained significant in a multivariate model.	Adequate report
Hallensleben et al., (2019)	1†	Multiple/day	Concurrent and prospective relationships Depressiveness, hopelessness, PB, and TB were concurrently associated with passive SI, but only hopelessness, PB, and prior SI predicted next-time point SI. All predictors showed concurrent associations with active SI, but only hopelessness, PB, and the PB and TB interaction predicted next-timepoint SI.	Adequate report
Hallensleben et al., (2024)	1†	Multiple/day	Prospective relationships Group-level: Prior affect (depressive, anxious, or positive) did not predict SI at T. Individual-level: There was considerable variation across individuals in strength and directions of associations.	Adequate report

Hamilton et al., (2023)	41	Once/day*	Concurrent relationships Greater reactivity to negative, and lower reactivity to positive, interpersonal events predicted SI occurrence; only affective reactivity to negative events predicted SI intensity (B = 0.36, SE = 0.05, p < .001). Prospective relationships Earlier sleep timing (B = 0.09, SE = 0.05, p = .04) predicted higher next-day SI occurrence, while sleep duration and quality did not directly predict SI. However, shorter sleep and poorer quality indirectly increased SI through heightened negative and reduced positive affective reactivity, respectively.	Moderate quality
Hamilton et al., (2024)	42	Once/day*	Concurrent relationships Negative experience on social media (especially social comparison; B = 0.21, SE = 0.10, p < .05) was significantly associated with passive (B = 0.44, SE = 0.14, p < .01) and active (B = 0.29, SE = 0.15, p = .048) SI Positive experience on social media (especially feeling supported or connected; B = -0.31, SE = 0.11, p < .01) was significantly associated with passive (B = -0.46, SE = 0.13, p < .001) and active (B = -0.38, SE = 0.14, p < .01) SI Social media use was not associated with passive and active SI	Adequate report
Herzog et al., (2023)	43	Multiple/day	Subgroups SI variability (RMSSD) was 3.01 (SD = 2.22) overall; 1.45 (0.54) in the low-variability group and 4.75 (2.09) in the high-variability group. Time-invariant relationships After Bonferroni correction, the high-variability group showed greater severity and variability only in EMA-assessed SI and depressive affect. Groups did not differ in demographic factors and SA history Attentional interference by Stroop task predicted SI variability (b = 0.165; p = .048; 95% CI 0.003, 0.495), after controlling for affect and SI severity.	Moderate report
Humber et al., (2013)	44	Multiple/day	Concurrent relationships After correcting for multiple tests, anger affect, and expression were not linked to passive SI. Prospective relationships Internalised anger predicted passive SI (β = 0.056–0.07, p < .001), even when controlling for externalised anger. Anger affect did not predict passive SI.	Adequate report
Husky et al., (2017)	45	Multiple/day	Prospective relationships After controlling for prior SI, environmental contexts, daily behaviours, social company, mood, and negative family events were significant predictors of subsequent SI, with specific activities and emotions either increasing or decreasing the likelihood of SI.	Moderate report

			Time-invariant relationships Clinical variables were not linked to average SI frequency. Among baseline psychological factors, only inward directed anger (coefficient = -0.095, p = 0.047) was significantly associated with SI, while impulsivity, outward-directed anger, and childhood trauma were not significant predictors of average SI frequency during EMA. Women and those with a prior severe SA showed greater SI variability.	
Jacobucci et al., (2022)	9†	Multiple/day	Prospective relationships After controlling for prior SI, PB (β = 0.163; 95% CI 0.008, 0.316), TB (β = 0.182; 95% CI 0.019, 0.342)), NA (β = 0.099; 95% CI -0.064, 0.260) at T-1 individually predicted SI at T.	Moderate report
Jeong et al., (2021)	46	Once/day	Concurrent relationships Daily SI correlated with daily pain (r = 0.51, p<.001), daily impulsivity (r = 0.34, p<.001), NA ((r = 0.34, p<.001), and positive affect (r = -0.23, p<.001). NA instability (but not PA instability) moderated the link between daily pain and SI (coefficient = 0.41, t = 2.56, p<.05), after controlling for baseline pain intensity.	Low quality
Kaliush et al., (2024)	47	Multiple/day	Time-invariant relationships Women with fluctuating desires to live had lower, more stable sleep efficiency during pregnancy and showed a sleep–emotion dysregulation link postpartum.	Moderate quality
Kaurin et al., (2022a)	4†	Multiple/day	Concurrent relationships Within-person effects of social perceptions on SI were mediated by affect (higher NA, lower PA), but not by impulsivity, which showed no link to SI during social interactions.	Adequate report
Kaurin et al., (2022b)	4†	Once/day*	Concurrent relationships Daily average NA was associated with same-day average SI. Prospective relationships Sleep (quality, latency, and duration) did not predict next-day SI within individuals NA did not mediate sleep–SI links, and BPD severity had no moderating effect.	Moderate report
Kaurin et al., (2022c)	4†	Multiple/day	Concurrent and prospective relationships Across all individual-level models, no variable had a consistently higher number of links to other variables, including NA, hostility, PA, and impulsivity.	Adequate report
Kaurin et al., (2023)	4†	Multiple/day	Concurrent relationships Higher NA and impulsivity were linked to SI at the momentary level, while hostility and lower PA were associated with SI at both momentary and daily levels.	Moderate report

			Individuals with a history of SA showed a stronger link between NA and SI at the momentary level, and between hostility and SI at the daily level, compared to those without SA history.	
Kaurin et al., (2024)	48	Weekly	<u>Concurrent relationships</u> Irritability and STBs were positively associated at the within-person level, even after controlling for depression. The change in irritability and STBs showed significant covariation at the early stage (baseline to week 4), but these effects were small and influenced by weekly depression severity.	Moderate quality
Kinkel-Ram et al., (2021)	12†	Weekly	<u>Concurrent relationships</u> Agitation was associated with same-week SI at the within-person levels (B = 0.13; SE = 0.01; p < .001; 95% CI 0.11, 0.16), whereas sleep quality was not (B = -0.03; SE = 0.03; p = 0.26; 95% CI -0.09, 0.03). A significant interaction showed that higher agitation and poorer sleep quality in the same week predicted more severe SI (B = -0.02; SE = 0.01; p < .05; 95% CI -0.04, -0.001). <u>Prospective relationships</u> Neither agitation, sleep quality, nor their interaction predicted SI in the following week.	Moderate quality
Kleiman et al., (2017, Sample 1)	3†	Multiple/day	<u>Concurrent relationships</u> Hopelessness (B = 0.70, p < .001), loneliness (B = 0.26, p < .001), and burdensomeness (B = 0.33, p <.001) were significantly associated with SI concurrently. <u>Prospective relationships</u> Hopelessness and burdensomeness predicted future SI, while prior SI was the only predictor after controlling for previous SI.	Adequate report
Kleiman et al., (2017, Sample 2)	5†	Multiple/day	<u>Concurrent relationships</u> Hopelessness (B = 0.92, p < .001) and loneliness (B = 0.16, p = .041) were significantly associated with SI concurrently. <u>Prospective relationships</u> Only hopelessness predicted SI at the next time point, while prior SI was the only predictor after controlling for previous SI.	Adequate report
Kleiman et al., (2018a, Sample 1)	3†	Multiple/day	<u>Subtypes</u> Five SI profiles were classified based on SI mean and variability: Low mean & low variability (N=9), Low mean & moderate variability (N=15), Moderate mean & high variability (N=14), High mean & low variability (N=4), High mean & high variability (N=9)	Adequate report

			Time-invariant relationships No differences in age of first attempt or lifetime SA across profiles. High mean & low variability had the highest proportion (75%) of recent SA attempts.	
Kleiman et al., (2018a, Sample 2)	5†	Multiple/day	Subtypes Five profiles were identified based on SI mean and variability: Low mean & low variability (N = 4), Moderate mean & low variability (N = 9), Moderate mean & moderate variability (N = 6), High mean & moderate variability (N = 9), High mean & high variability (N = 4). Time-invariant relationships No significant associations were found between SI profiles and suicide attempt history.	Adequate report
Kleiman et al., (2018b)	3†	Multiple/day	Concurrent relationships SI occurrence was followed by decreased negative affect (change from 0.14 to 0.38 at T to -0.37 to -0.18 at T+1) and increased positive affect (change from -0.22 to -0.07 at T to 0.17 to -0.26 at T+1). From before to after participant-initiated SI, the occurrence of SI was associated with decreased sad mood and increased overall positive affect.	Adequate report
Kraiss et al., (2024)	1†	Multiple/day	Prospective relationships Within-person group models controlling for prior SI: PB (β = 0.077; 95% CI 0.043, 0.112) and hopelessness (β = 0.053; 95% CI 0.014, 0.097) at T-1 each predicted SI at T, while TB did not (β = 0.025; 95% CI − 0.010, 0.061). There was substantial variability in idiographic associations, particularly between PB and SI (SD = 0.11, range = -0.195 to 0.555).	Adequate report
Kuehn et al., (2022)	7†	Once/day	Prospective relationships The relationship between suicidal urges, coping, and self-efficacy to resist suicide varied across three individuals, illustrating differences in both the presence and strength of effects.	Moderate quality
Kuehn et al., (2024)	49	Multiple/day	Concurrent and prospective relationships Group-level paths: Only sadness was significantly associated with SI at the same time point, and this link was present in fewer than 50% of individuals. Person-specific model: The contemporaneous association between sadness and SI was the most common path, present in 31% of models, followed by shame and SI in 28%. While the most common pattern was a single NA linked to SI contemporaneously, 34% of models showed multiple emotions associated with SI, with nearly one-third third of models reflecting complex, mixed (positive/negative, contemporaneous/lagged) dynamics between emotions and SI.	Adequate report

Kyron et al., (2018)	17†	Once/day	Concurrent relationships PB, TB, and their interaction concurrently were concurrently associated with SI. Prospective relationships PB was associated with next-day SI, whereas TB's effect on next-day SI was limited to day 1 to day 2. The interaction between PB and TB was weakly significant in predicting next-day SI. SI increased two days before an NSSI incident and remained higher than two days prior, with no change on the day after.	Low quality
Kyron et al., (2022)	17†	Once/day	Concurrent relationships Both PB (β = 0.30; 95% CI 0.28, 0.33) and TB (β = 0.04; 95%CI 0.02, 0.06) were significantly associated with same-day SI, with weaker relationships at higher distress tolerance. Distress tolerance was inversely associated with SI persistence (β = -0.16; 95% CI -0.25, -0.06) and predicted lower volatility in SI (β = -0.14;95% CI -0.24, -0.05). However, it did not predict average SI across time (β = -0.09; 95% CI -0.25, 0.06). Lifetime suicide attempts were significantly associated with higher rates of change in SI in response to PB (β = 0.71; 95% CI 0.65, 0.76) and TB (β = 0.52; 95% CI 0.41, 0.60), greater persistence of SI over time (β = 0.52; 95% CI 0.43, 0.61), and increased variability in SI (β = 0.85; 95% CI 0.83, 0.87).	Moderate quality
Lewis et al., (2023)	50	Weekly	Concurrent relationships Reduced in-person contact, but not remote contact, predicted higher SI at the within-person level, especially among individuals with high attachment avoidance. Loneliness showed limited evidence as a predictor of SI during EMA follow-up.	Low quality
Li et al., (2024)	51	Once/day	Prospective relationships State mindfulness at T-1 did not predict SI at T, after controlling for covariates. Trait mindfulness strengthened the link between non-judgmental acceptance and SI.	Moderate quality
Littlewood et al., (2019)	18†	Once/day*	Prospective relationships Shorter sleep duration and poor sleep quality predicted higher next-day SI; sleep efficiency or latency showed no effects. Sleep quality moderated the link between pre-sleep entrapment and next-day SI.	Adequate report
Lucht et al., (2022a)	1†	Multiple/day	Prospective relationships After controlling for prior SI, negative valence of mood and lower PA at t-1 predicted changes in SI at T, but NA did not.	Adequate report

Lucht et al., (2022b)	1†	Multiple/day	Time-invariant relationships State impulsivity predicted daily variability, but not intensity, of passive SI (β = 0.12; 95% CI 0.03, 0.22; p = .009).	Moderate report
Madsen et al., (2019)	52	Weekly	Subtypes Five SI trajectories were identified: persistent-high (9.8%), fast-response (26.5%), fluctuating (5.2%), persistent-low (53.7%), and slow-response-relapse (4.8%). Compared with the persistent-low class, previous SAs increased the odds of being in all SI classes except the persistent-low class. Living with a partner reduced the odds of being in the persistent-high class. Higher mood severity increased the odds of being in the fast-response, persistent-high, and fluctuating classes. Compared to the persistent-high class, higher mood symptom severity was linked to lower odds of being in the fast-response, slow-response-relapse, and fluctuating classes.	Moderate quality
Mandel et al., (2024)	53	Multiple/day	Concurrent relationships Hopelessness, rumination, attention fixation, and unbearability were each positively linked to WTD and negatively to WTL. Social context moderated the relationships between unbearability and WTD, hopelessness and WTL, and rumination and WTL, with effects being stronger when being around with others than being alone. In multivariate models, unbearability, attentional fixation, and rumination significantly predicted concurrent WTD, while hopelessness, attention fixation, and rumination significantly predicted concurrent WTL. Prospective relationships Unbearability negatively predicted prospective WTL, controlling for SI autocorrelations.	Adequate report
Mou et al., (2018)	5†	Multiple/day	Concurrent relationships After applying a Bonferroni correction, all types of NA (except for guilt) were significantly associated with higher SI. The relationship between NA (excluding anxiety and humiliation) and SI was stronger in individuals with BPD than in those without.	Moderate report
Nock et al., (2009)	54	Multiple/day	Concurrent relationships SI often co-occurred with a range of other self-destructive thoughts (e.g., NSSI, 42.3%), contextual factors (e.g., being alone, 42.3%; socialising, 34.6%), events and feelings (e.g., sad/worthless, 57.7%; pressure, 42.3%), and engaging alternative behaviours (e.g., talking to someone, 34.6%).	Adequate report
Oakey-Frost et al., (2023)	23†	Multiple/day	Concurrent relationships WTL (Estimate = -0.05; 95% CI -0.08, -0.01; p = .005), WTD (Estimate = 0.48; 95% CI 0.44, 0.51; p < .001), and ambivalence (Estimate = 0.25; 95% CI 0.23, 0.27; p < .001)) were associated with SI concurrently	Adequate report

			Prospective relationships After controlling for prior SI, WTD (Estimate = 0.05; 95% CI 0.002, 0.10; p = .043) and ambivalence (Estimate = 0.04; 95% CI 0.01, 0.06; p = .002) at T-1 remained significant predictor of SI at T, while WTL did not.	
Oquendo et al., (2020)	55	Multiple/day	Prospective relationships Within-person SI variability remained stable over two years (F=1.48, df = 5137, p=.200) and did not differ by baseline variability level or SA history. Individuals with higher baseline SI variability showed greater increases in SI following stressful events over time, even after accounting for prior SI severity and baseline variability (b = 0.25, SE = 0.06, p < 0.001). Time-invariant relationships SI high variability group had higher mean SI at baseline than the low variability group (t (49) =-4.41, p<.0001). Physical abuse (B=0.07, SE=0.03, p=.042), impulsivity (B=0.03, SE=0.01, p=.014), and lifetime aggression (B=0.09, SE=0.03, p=.008) at baseline predicted variability of SI over a 2-year follow-up. Physical abuse was no longer a significant predictor of SI variability, after individually controlling for lifetime aggression (B = 0.07, SE = 0.04, p = 0.059), impulsivity (B = 0.02, SE = 0.01, p = .055), and affective lability (B = 0.01, SE = 0.01, p = .238)	Moderate report
Ortiz & Smith (2020)	56	Weekly	Prospective relationships The relationship between SI and ED overall symptoms were mostly non-significant; subscale analyses showed some prospective associations between shape/eating concerns and SI at specific weeks.	Moderate quality
Peters et al., (2019)	19[†]	Weekly	Time-invariant relationships SI lability was unrelated to most variables, including SI intensity, but was correlated to NA intensity and reactivity; only shifts toward SI improvement, not worsening, were significantly associated with both NA intensity and reactivity. SI lability did not moderate the relationship between SI intensity and subsequent SA (OR = 1.17, p = .814, 95% CI 0.16, 8.42) or NSSI (OR = 2.91, p = .278, 95% CI 0.44, 19.38) at 6 months.	Moderate quality
Peters et al., (2022)	57	Multiple/day	Time-invariant relationships SI instability was not correlated with any baseline variables, including depression, affective instability, and past-week SI. In multiple regression, depression instability and connectedness instability remained significantly associated with SI instability even after controlling for SI intensity, whereas anger/irritability instability was not. Individuals with multiple past SA had greater SI variability than those with only one SA (z = 2.09, p < .05).	Moderate report

Porras-Segovia et al., (2021)	13†	Varying (Daily & Weekly)	Concurrent relationships In a time window of 96 hours: WTD often co-occurred with sleep problems; low appetite was associated with high WTD and low WTL; and negative feelings were common in profiles where WTD was present.	Moderate quality
Rath et al., (2019)	1†	Multiple/day	Concurrent relationships In the contemporaneous network, SI was linked to all variables, most strongly with hopelessness. Prospective relationships In the temporal network, only PB (fixed effects coefficient: 0.06, p <.05) predicted SI at the next-time point.	Adequate report
Ratzon et al., (2024)	58	Once/day	Prospective relationships After adjusting for covariates, both objectively (OR = 1.06, p = .04) and subjectively (OR = 1.03, p = .01) measured sleep onset latency predicted greater odds of next-day death wish.	Moderate quality
Restifo et al., (2015)	59	Once/day	Subtypes Five SI trajectory classes were identified: persistent-high (10.2%), high-rapid improvement (14.2%), moderate-early improvement (9.6%), low-slight worsening (8.5%), and low-some improvement (57.5%). Patients with persistent SI had a higher likelihood and frequency of subsequent self-injury than those with transient SI. SI status 24 hours after initial endorsement more accurately distinguished consistent from transient SI (pattern 1 vs 2) than baseline predictors.	Moderate quality
Rizk et al., (2019)	20†	Multiple/day	Time-invariant relationships Affective lability predicted SI variability, and this association remained significant even after controlling for depression severity (b = 0.046, t = 2.088, df = 2, 35, p = 0.044).	Moderate report
Rogers & Bozzay (2024)	6†	Multiple/day	Prospective relationships Sleep duration was significantly associated with greater suicidal intent (B = -0.51, p < .001) and desire (B = -0.47, p <.001) at the within-person level, even after accounting for baseline hopelessness and brooding rumination.	Adequate report
Rogers & Joiner (2019)	21†	Weekly	Prospective relationships PB (B = 0.14, SE = 0.02, p <.001), not TB (B = 0.02, SE = 0.02, p ≥ .05), had a significant impact on SI stability, with higher PB predicting higher subsequent SI. Capability for suicide moderated the SI stability and the effects of PB and TB on SI changes, with stronger effects at higher levels of capability. Chronicity of SI moderated the effect of PB on SI (B = -0.01, SE = .00, p = .035), with stronger effects at higher SI chronicity.	High quality

Rogers et al., (2021)	21†	Weekly	Concurrent relationships Suicide-specific rumination predicted suicidal intent beyond various covariates (PB, TB, agitation, insomnia, nightmares, SI, age, gender, and SA history), with significant effects for TB, nightmares, SI, age, and insomnia. Prospective relationships Suicide-specific rumination predicted suicidal intent at the subsequent time point, beyond concurrent intent and all level 1 and level 2 covariates.	High quality
Rogers et al., (2022b)	6†	Multiple/day	Concurrent relationships Higher distress, arousal, lower happiness, and higher rumination were each significantly associated with concurrent SI frequency. The interactions between distress and rumination, arousal and rumination, and happiness and rumination, were also significantly associated with concurrent SI frequency at the within-person level. Prospective relationships After controlling for SI frequency at T-1, all affective states and rumination remained significant, but with reduced effects on the association between affective states and SI frequency. None of the interaction effects predicted SI at next time point.	Adequate report
Rogers et al., (2022a)	6†	Multiple/day	Concurrent relationships Physical distance to suicide methods, psychological distance to suicide methods, and fearlessness about death were each uniquely and positively associated with suicidal intent, at the within-person level. Prospective relationships After controlling for suicidal intent at T-1, psychological distance was uniquely predictive of suicidal intent at within-person levels. A significant interaction between within-person physical distance and SA history showed that the link between lower physical distance and higher suicidal intent at T+1 was weaker in individuals with a SA history.	Adequate report
Rogers et al., (2024a)	10†	Multiple/day	Time-invariant relationships Only low perceived controllability significantly predicted SI variability (B = 0.09; SE = 0.04; p = .049; 95% CI 0.00, 0.17) over and above frequency, duration, and intensity of SI assessed at baseline.	Moderate report
Rogers et al., (2024b)	6†	Multiple/day	Prospective relationships Suicidal intent was destabilised by hopelessness (B = 0.04, p <.001) and suicide-related rumination (B = 0.04, p <.001), but not stress: higher hopelessness and rumination tended to increase suicidal intent at the next timepoint.	Adequate report
Schatten et al., (2021)	7†	Once/day	Concurrent relationships Higher within-person anger was associated with higher concurrent odds of SI, after day 20 (OR = 1.5-2.0).	Moderate quality

			Higher within-person misery was concurrently associated with SI over the whole follow-up period, with the trend fluctuating around day 23 Higher within-person happiness was associated with reduced SI only during day 4-12. <u>Prospective relationships</u> Previous-day anger and misery were not associated with the next-day SI, while higher happiness on the previous-day was linked to increased odds of next-day SI.	
Selby et al., (2013)	19[†]	Weekly	<u>Concurrent relationships</u> During weeks with elevated SI, adolescents also reported higher depression (r = 0.09, p <.01), NA intensity (r = 0.51, p <.01), affective sensitivity (r = 0.29, p <.01), behavioural dysregulation (r = 0.28, p <.01), and peer (r = 0.19, p <.01) and family invalidation (r = 0.27, p <.01). <u>Prospective relationships</u> All prior-week variables significantly predicted SI the following week, including SI (β = 0.35, RR = 1.42), behavioural dysregulation (β = 0.14, RR = 1.15), family invalidation (β = 0.04, RR = 1.04), affective sensitivity (β = 0.16, RR = 1.17), negative affective intensity (β = 0.21, RR = 1.23), peer invalidation (β = 0.14, RR = 1.15), and depression (β = 0.17, RR = 1.19), all p < .001. Male adolescents with higher prior-week affective sensitivity, family invalidation (both prior-week and baseline), and behavioural dysregulation showed increased SI in the following week.	Moderate quality
Sels et al., (2024)	60	Multiple/day	<u>Concurrent relationships</u> Perceived responsiveness was negatively associated with same-day SI (b=−0.08; SE=0.03; p=0.01; 95% CI −0.14, −0.02). Perceived responsiveness was not a significant within-person predictor of SI, as its effect was accounted for by PB, TB, and hopelessness. The interaction between perceived responsiveness and PB, TB, and hopelessness was significant: at low levels of these factors, perceived responsiveness acted protectively against SI, but had no effect at high levels.	Adequate report
Smith et al., (2024)	61	Multiple/day	<u>Concurrent relationships</u> In the contemporaneous network, hopelessness, feeling ashamed and disgusted, and agitation were associated with both active and passive SI. Momentary sleep concerns and feeling ineffective were associated with passive SI, while not feeling close to other was linked to active SI. <u>Prospective relationships</u> In the temporal network, passive SI at the next-time point was predicted by active SI, hopelessness, feeling ashamed and disgusted with self and others, and feeling ineffective, while only hopelessness predicted active SI.	Moderate report

Spangenberg et al., (2022, Sample 1)	1†	Multiple/day	Subtypes Four SI subtypes were identified: Low-stable, high-unstable, low-moderate stable, and moderate-unstable. Time-invariant relationships Only baseline SI and depression significantly differed between subtypes, while age, trait impulsivity, childhood trauma, and SA history did not. The high-unstable subtype showed the highest EMA-assessed SI, baseline SI, and depression, significantly differing from the low-stable and low-moderate stable subtypes.	Adequate report
Stanley et al., (2021)	20†	Multiple/day	Concurrent relationships In univariate models, both distraction/positive activity-based coping (b = - 0.08) and mindfulness-oriented coping (b = - 0.03) predicted decreased SI, but only distraction/positive activity-based coping (b = - 0.12) remained significant in the multiple predictor model. Using more coping strategies per interval was linked to greater SI reduction, with each additional strategy associated with a 0.14-point decrease in SI (t = -2.13, p = 0.003).	Moderate report
Tsypes et al., (2022)	4†	Once/day*	Concurrent relationships Daily reasons for living was associated with SI at the within-person level (β = - 0.13, 95% CI -0.18, -0.08); SA history did not affect this association; those with higher average SI showed more strongly negative association. Prospective relationships Previous-day reasons for living predicted next-day SI at the within-person level (β = −0.05, 95% CI: 0.09, 0.01), even after controlling for NA and prior-day SI. The protective effect of reasons for living against SI was stronger for people with lower extraversion.	Moderate report
van Ballegooijen et al., (2022)	18†	Multiple/day	Prospective relationships Entrapment predicted SI across 3 to 12 h intervals, while defeat showed no significant temporal link with SI any time interval.	Adequate report
van den Brink et al., (2024)	62	Multiple/day	Concurrent relationships At the group-level, more reasons to live than die and think about terminating my life myself were not associated with any variables in the undirected network. Prospective relationships At the group-level, inner peace predicted more reasons to live than die.	Moderate report
Victor et al., (2019)	63	Multiple/day	Prospective relationships Internalising (β=0.23; SD = 0.06; 95% CI0.11, 0.34) and externalising (β= 0.19; SD = 0.07; 95% CI 0.06, 0.32) NA at	Adequate report

			T-1 were each associated with suicide urges at T; Substance use covariates were all significant. In multivariate analysis, only internalising NA at T-1 was associated with suicide urge at T (β= 0.19; SD =0.07; 95% CI: 0.05, 0.33), while Substance use covariates were all significant. There was a significant indirect effect of rejection (β = 0.10; SD=0.04; 95% CI0.03, 0.19) and criticism (β= 0.05; SD=0.02; 95% CI: 0.01, 0.10) at T-1 on subsequent suicide urges through increases in internalising NA.	
Wallace et al., (2024)	64	Once/day*	<u>Concurrent relationships</u> Only NA and rumination each showed a significant concurrent association with SI, with higher same-day NA and rumination both associating with higher same-day SI. <u>Prospective relationships</u> PA was associated with decreased next-day SI, while NA, distress intolerance, rumination, and emotion dysregulation were associated with higher next-day SI.	Adequate report
Witte et al., (2005)	22†	Once/day	<u>Time-invariant relationships</u> SI variability was significantly correlated with SI intensity (r = 0.30, p < .05), SI duration (r = 0.24, p <.05), and SA status (r = 0.28, p <.01). No significant gender differences were found for SI variability (F (1, 108) = 2.68, p = .11).	Moderate quality
Witte et al., (2006)	22†	Once/day	<u>Time-invariant relationships</u> Individuals with a history of multiple SA showed greater SI variability than those without, but not those with single history (F(2, 107) = 4.81, p < .01). SA status significantly predicted SI variability, controlling for depression, hopelessness, suicide risk.	Moderate quality
Wolford-Clevenger et al., (2020)	65	Once/day	<u>Concurrent relationships</u> PB and TB were both positively associated with passive SI within the same day. PB, hopelessness, and their interaction were significantly associated with same-day active SI, while TB alone was not (p = .05). The three-way interaction (PB, TB, hopelessness, p = .078) approached significance.	Moderate quality
Yin et al., (2023)	66	Once/day	<u>Concurrent and prospective relationships</u> Group-level patterns showed that SI was associated with sadness on the same day, while subgroup-level patterns indicated that SI was linked to misery across various timepoints. Individual-level patterns demonstrated great heterogeneity in the strength, stability, direction, positive or negative associations, and temporal patterns of associations.	Moderate quality
Zhu et al., (2022)	67	Once/day*	<u>Concurrent relationships</u> Within-person contemporaneous correlations showed substantial variability: suicide urges was associated with	Moderate report

			depression (M = 0.30, SD = 0.29), anxiety (M = 0.37, SD = 0.24), and PTSD symptoms (M = 0.30, SD = 0.32) Prospective relationships Idiographic models showed that prior-day anxiety, PTSD symptoms, and SI did not predict of next-day SI for all participants, while higher depression mood predicted lower SI in the next day in one participant (β = -0.49, p = .005).	
Zuromski et al., (2017)	68	Weekly	Prospective relationships Higher prior insomnia levels, but not changes in insomnia, predicted greater increases in SI over time, even after controlling for depression (estimate = 0.020, SE = 0.008, p = .012).	High quality

Note. AR = Autoregressive effect; BPD = Borderline personality disorder; CI = Confidence intervals; df = Degrees of freedom; ED = Eating disorder; EMA = Ecological Momentary Assessment; IH = Interpersonal hopelessness; IPTS = The Interpersonal Theory of Suicide; M = Mean; MDD = Major depressive disorder; MSSD = Mean Squared Successive Differences; N/A = Not applicable; NA = Negative affect; NLE = Negative life events; NSSI = Non-suicidal Self-Injury; OR = Odds ratio; PA = Positive affect; PB = Perceived burdensomeness; PTSD = Post-traumatic stress disorder; RMSSD = Root Mean Square of Successive Differences; SA = Suicide attempt; SD = Standard deviation; SE = Standard error; SI = Suicidal ideation; STB = Suicidal thoughts and behaviours; TB = Thwarted belongingness; WTD = Wish to die; WTL = Wish to live; β = Standardised regression coefficient. * Assessment frequency was collapsed or aggregated from the original sampling schedule for analysis. †Indicates studies with overlapping samples.

Appendix 5: Pearson's correlations of the study measures in the total sample (N = 312)

Table A5.1 *Pearson's correlations of the study measures in the total sample (N = 312)*

		Suicidality	Depletion Sensitivity	Self-Regulatory Fatigue	Cognitive reactivity					Impulsivity						Depression	Stress	Entrapment			Mindfulness	Resilience
					Total score	Acceptance/ Coping	Avoidant Coping	Perfectionism/ Control	Aggression	Hopelessness/ Suicidality	Total score	Negative Urgency	Positive Urgency	Lack of Perseverance	Lack of Premeditation	Sensation Seeking			Total score	Internal Entrapment	External Entrapment		
Suicidality	*r*		.332**	.384**	.354**	-0.036	.269**	0.054	.265**	.507**	.191**	.300**	.176**	0.105	.139*	-0.086	.414**	.294**	.356**	.351**	.306**	-.249**	-.339**
	N		312	312	312	312	312	312	312	312	311	311	311	311	311	311	312	312	312	312	312	312	312
Depletion Sensitivity	*r*			.691**	.568**	0.014	.570**	.233**	.454**	.501**	.353**	.532**	.253**	.270**	.240**	-0.11	.541**	.460**	.497**	.489**	.427**	-.395**	-.545**
	N			312	312	312	312	312	312	312	311	311	311	311	311	311	312	312	312	312	312	312	312
Self-Regulatory Fatigue	*r*				.584**	-0.001	.450**	.139*	.568**	.633**	.399**	.539**	.293**	.302**	.309**	-0.103	.664**	.630**	.690**	.670**	.603**	-.581**	-.628**
	N				312	312	312	312	312	312	311	311	311	311	311	311	312	312	312	312	312	312	312
Cognitive Reactivity																							
Total score	*r*					.375**	.758**	.642**	.725**	.790**	.364**	.541**	.314**	0.097	.150**	0.049	.536**	.469**	.551**	.549**	.466**	-.377**	-.404**
	N					312	312	312	312	312	311	311	311	311	311	311	312	312	312	312	312	312	312
Acceptance/Coping	*r*						-0.015	.299**	.201**	0.036	0.094	0.027	.222**	-.125*	-0.063	.164**	0.02	0.008	0.066	0.068	0.053	0.027	0.092
	N						312	312	312	312	311	311	311	311	311	311	312	312	312	312	312	312	312
Avoidant Coping	*r*							.453**	.351**	.600**	.160**	.348**	.111*	0.101	0.073	-0.099	.458**	.434**	.483**	.462**	.431**	-.365**	-.452**
	N							312	312	312	311	311	311	311	311	311	312	312	312	312	312	312	312
Perfectionism/Control	*r*								.244**	.298**	0.078	.192**	0.11	-.117*	-0.073	0.083	.202**	.171**	.161**	.175**	.120*	-0.056	-.144*
	N								312	312	311	311	311	311	311	311	312	312	312	312	312	312	312
Aggression	*r*									.517**	.512**	.626**	.386**	.159**	.289**	.166**	.372**	.264**	.341**	.360**	.263**	-.269**	-.239**
	N									312	311	311	311	311	311	311	312	312	312	312	312	312	312
Hopelessness/Suicidality	*r*										.301**	.494**	.215**	.199**	.184**	-0.09	.611**	.570**	.659**	.643**	.573**	-.469**	-.473**
	N										311	311	311	311	311	311	312	312	312	312	312	312	312
Impulsivity																							
Total score	*r*											.648**	.770**	.553**	.685**	.545**	.320**	.238**	.265**	.252**	.237**	-.263**	-.196**

	N		311	311	311	311	311	311	311	311	311	311	311	311	311	311
Negative Urgency	*r*			.467**	.225**	.324**	0.064	.363**	.329**	.409**	.417**	.334**	-.405**	-.403**		
	N			311	311	311	311	311	311	311	311	311	311	311		
Positive Urgency	*r*				.230**	.364**	.316**	.229**	.141*	.206**	.193**	.189**	-.193**	-.220**		
	N				311	311	311	311	311	311	311	311	311	311		
Lack of Perseverance	*r*					.454**	0.044	.279**	.349**	.256**	.231**	.244**	-.246**	-.227**		
	N					311	311	311	311	311	311	311	311	311		
Lack of Premeditation	*r*						.174**	.241**	.172**	.188**	.168**	.181**	-.256**	-.131*		
	N						311	311	311	311	311	311	311	311		
Sensation Seeking	*r*							-0.038	-.148**	-.153**	-.149**	-.133*	.185**	.290**		
	N							311	311	311	311	311	311	311		
Depression	*r*								.705**	.700**	.673**	.621**	-.524**	-.451**		
	N								312	312	312	312	312	312		
Stress	*r*									.742**	.702**	.670**	-.548**	-.507**		
	N									312	312	312	312	312		
Entrapment																
Total score	*r*										.940**	.912**	-.556**	-.548**		
	N										312	312	312	312		
Internal Entrapment	*r*											.717**	-.545**	-.546**		
	N											312	312	312		
External Entrapment	*r*												-.480**	-.462**		
	N												312	312		
Mindfulness	*r*													.503**		
	N													312		

Note. *D*epression was measured with the 8-item PHQ-9. **p<.05, **p<.01*

Appendix: 6 Univariate multinomial logistic regression pairwise analysis

Table A6.1 *Univariate multinomial logistic regression pairwise analysis of variables associated with suicide history groups (N = 312)*

	NH vs SI[a]					NH vs SA[a]					SI vs SA[b]				
			95% CI					95% CI					95% CI		
	B	**OR**	Low	High	***p***	**B**	**OR**	Low	High	***p***	**B**	**OR**	Low	High	***p***
Depletion sensitivity	**0.076**	**1.079**	**1.044**	**1.114**	**< .001**	**0.105**	**1.111**	**1.072**	**1.152**	**< .001**	**0.030**	**1.030**	**1.005**	**1.056**	**.016**
Self-regulatory fatigue	**0.091**	**1.096**	**1.057**	**1.135**	**< .001**	**1.131**	**1.140**	**1.096**	**1.186**	**< .001**	**0.040**	**1.041**	**1.014**	**1.068**	**.002**
Cognitive reactivity															
Total score	**0.061**	**1.063**	**1.039**	**1.087**	**< .001**	**0.078**	**1.082**	**1.055**	**1.108**	**< .001**	**0.018**	**1.018**	**1.002**	**1.034**	**.027**
Acceptance/Coping	-0.016	0.984	0.908	1.067	.704	-0.027	0.973	0.894	1.059	.530	-0.012	0.989	0.930	1.051	.711
Avoidant Coping	**0.147**	**1.158**	**1.088**	**1.232**	**< .001**	**0.171**	**1.187**	**1.111**	**1.268**	**< .001**	0.025	1.025	0.980	1.072	.278
Control/Perfectionism	0.071	1.074	0.989	1.166	.089	0.060	1.062	0.975	1.157	.166	-0.011	0.989	0.933	1.047	.700
Aggression	**0.124**	**1.132**	**1.057**	**1.213**	**< .001**	**0.172**	**1.188**	**1.105**	**1.277**	**.001**	**0.048**	**1.050**	**1.004**	**1.097**	**.031**
Hopelessness/Suicidality	**0.304**	**1.356**	**1.232**	**1.492**	**< .001**	**0.403**	**1.496**	**1.348**	**1.659**	**< .001**	**0.098**	**1.103**	**1.050**	**1.160**	**< .001**
Impulsivity															
Total score	0.005	1.005	0.966	1.046	.803	**0.056**	**1.057**	**1.014**	**1.102**	**.009**	**0.051**	**1.052**	**1.022**	**1.083**	**< .001**
Negative urgency	**0.237**	**1.267**	**1.116**	**1.439**	**< .001**	**0.369**	**1.446**	**1.258**	**1.663**	**< .001**	**0.132**	**1.141**	**1.037**	**1.256**	**.007**
Positive urgency	-0.028	0.973	0.867	1.091	.635	**0.126**	**1.134**	**1.008**	**1.276**	**.036**	**0.154**	**1.166**	**1.075**	**1.265**	**< .001**
Lack of perseverance	0.062	1.064	0.913	1.240	.428	0.136	1.145	0.977	1.342	.094	0.074	1.076	0.969	1.196	.170
Lack of premeditation	0.022	1.022	0.884	1.182	.765	0.146	1.157	0.996	1.344	.057	**0.123**	**1.131**	**1.023**	**1.252**	**.016**
Sensation seeking	**-0.176**	**0.838**	**0.746**	**0.942**	**.003**	**-0.141**	**0.868**	**0.771**	**0.978**	**.020**	0.035	1.036	0.958	1.120	.377

Entrapment															
Total score	**0.242**	**1.274**	**1.170**	**1.388**	**< .001**	**0.294**	**1.341**	**1.225**	**1.469**	**< .001**	0.051	1.053	0.966	1.112	.067
Internal entrapment	**0.422**	**1.525**	**1.310**	**1.776**	**< .001**	**0.505**	**1.658**	**1.412**	**1.945**	**< .001**	0.083	1.087	0.992	1.191	.075
External entrapment	**0.384**	**1.468**	**1.258**	**1.712**	**< .001**	**0.471**	**1.602**	**1.359**	**1.889**	**< .001**	0.088	1.092	0.977	1.219	.120
Depression	**0.189**	**1.209**	**1.125**	**1.298**	**< .001**	**0.269**	**1.309**	**1.211**	**1.415**	**< .001**	**0.080**	**1.083**	**1.036**	**1.132**	**< .001**
Stress	**0.281**	**1.325**	**1.182**	**1.485**	**< .001**	**0.336**	**1.400**	**1.241**	**1.579**	**< .001**	0.055	1.057	0.981	1.138	.148
Mindfulness	**-0.060**	**0.942**	**0.904**	**0.982**	**.004**	**-0.099**	**0.906**	**0.866**	**0.948**	**< .001**	**-0.039**	**0.962**	**0.933**	**0.993**	**.015**
Resilience	**-0.182**	**0.834**	**0.775**	**0.897**	**< .001**	**-0.239**	**0.788**	**0.728**	**0.852**	**< .001**	**-0.057**	**0.945**	**0.898**	**0.994**	**.028**

Note. Depression was measured with the 8-item PHQ9. B = Unstandardised beta; OR = Odds ratio; CI = Confidence interval; *p* = p-value; [a]NH group is reference; [b]SI group is reference. Values highlighted in bold are statistically significant (p < 0.05). NH = No history of suicidal ideation or attempts; SI = History of suicidal ideation only; SA = History of suicidal attempt.

Appendix 7: Sensitivity analysis on ego depletion measures

To examine what are the most important risk factors for distinguishing between individuals by suicidal history group, two multivariate models were conducted in which depletion sensitivity and self-regulatory fatigue were separately entered into each model along with other risk factors.

Table A7.1 *Multivariate multinomial logistic regression between NH, SI, and SA groups (n= 311, df = 2)*

	Variables	χ^2	*p*
Model 1	Depletion sensitivity	3.148	.207
	Cognitive reactivity total score	4.972	.083
	Impulsivity total score	**8.372**	**.015**
	Entrapment total score	3.406	.182
	Depression	**10.792**	**.005**
	Stress	1.234	.540
Model 2	Self-regulatory fatigue	2.832	.243
	Cognitive reactivity total score	**6.416**	**.040**
	Impulsivity total score	**7.730**	**.021**
	Entrapment total score	2.555	.279
	Depression	**9.481**	**.009**
	Stress	1.541	.463

Note. Depression was measured with the 8-item PHQ9. Values highlighted in bold are statistically significant ($p < 0.05$). NH = no history group, SI = history of suicidal ideation only group, SA = history of suicidal attempt group, χ^2 = chi square, *p* = p-value.

Table A7.2 *Pairwise analysis following multivariate multinomial logistic regressions between NH, SI, and SA groups (n = 311)*

		NH vs SI[a]					**NH vs SA[a]**					**SI vs SA[b]**				
				95% CI					**95% CI**					**95% CI**		
		B	**OR**	Low	High	***p***	**B**	**OR**	Low	High	***p***	**B**	**OR**	Low	High	***p***
Model 1	Depletion sensitivity	0.037	1.037	0.992	1.084	.104	0.041	1.042	0.995	1.092	.084	0.005	1.005	0.975	1.035	.760
	Cognitive reactivity total score	0.031	1.032	1.002	1.062	.038	0.033	1.034	1.001	1.067	.041	0.002	1.002	0.982	1.022	.852
	Impulsivity total score	**-0.060**	**0.942**	**0.894**	**0.992**	**.025**	-0.024	0.976	0.925	1.031	.390	**0.036**	**1.036**	**1.004**	**1.070**	**.029**
	Entrapment total score	0.122	1.130	0.991	1.288	.068	0.110	1.117	0.972	1.283	.119	-0.012	0.988	0.906	1.078	.792
	Depression	0.063	1.065	0.958	1.184	.242	**0.153**	**1.165**	**1.041**	**1.303**	**.008**	**0.089**	**1.094**	**1.024**	**1.168**	**.008**
	Stress	0.013	1.013	0.842	1.218	.894	-0.054	0.948	0.779	1.153	.592	-0.066	0.936	0.832	1.053	.272
Model 2	Self-regulatory fatigue	0.031	1.031	0.974	1.092	.293	0.050	1.052	0.989	1.118	.106	0.020	1.020	0.983	1.058	.291
	Cognitive reactivity total score	**0.035**	**1.036**	**1.006**	**1.066**	**.017**	**0.036**	**1.036**	**1.005**	**1.069**	**.025**	0.001	1.001	0.981	1.020	.942
	Impulsivity total score	**-0.060**	**0.942**	**0.893**	**0.992**	**.025**	-0.027	0.973	0.921	1.028	.333	**0.033**	**1.033**	**1.001**	**1.067**	**.046**
	Entrapment total score	0.108	1.114	0.975	1.273	.112	0.085	1.088	0.945	1.253	.241	-0.024	0.977	0.893	1.069	.606
	Depression	0.062	1.064	0.953	1.187	.267	**0.147**	**1.158**	**1.031**	**1.301**	**.013**	**0.085**	**1.089**	**1.019**	**1.163**	**.012**
	Stress	0.002	1.002	0.832	1.207	.980	-0.071	0.931	0.764	1.135	.480	-0.074	0.929	0.825	1.047	.226

Note. Depression was measured with the 8-item PHQ9. B = unstandardised beta; OR = odds ratio; CI = confidence interval; *p* = p-value; [a] NH group is reference; [b] SI group is reference. Values highlighted in bold are statistically significant ($p < 0.05$). NH = no history of suicidal ideation or attempts; SI = history of suicidal ideation only; SA = history of suicidal attempt

Appendix 8: Sensitivity analyses on cognitive reactivity

Sensitivity analyses on cognitive reactivity: LEIDS-RR with suicide reactivity items removed vs. with the entire Hopelessness/Suicidality subscale removed

Psychometric properties: The internal consistency was good for the LEIDS-RR total score after excluding the suicide reactivity items and discarding the entire HOP subscale (Cronbach's $\alpha = 0.84$ and 0.82, respectively); the HOP subscale after removing the suicide reactivity items (i.e., Hopelessness Reactivity) also demonstrated acceptable reliability (Cronbach's $\alpha = 0.75$). First, in the univariate model, cognitive reactivity constructed in either way significantly differentiated between suicidal history groups except for the two subscales Acceptance/Coping and Control/Perfectionism. Table 1 presents the pairwise comparisons between suicidal history groups for all cognitive reactivity variables investigated in this study. It reveals that higher cognitive reactivity total scores in both conditions (i.e., with suicide items removed and with the HOP removed) were associated with the SI group (OR = 1.06, 95% CI = 1.03 to 1.09 and OR = 1.06, 95% CI = 1.03 to 1.09, respectively) and the SA group (OR = 1.07, 95% CI = 1.05 to 1.10 and OR = 1.07, 95% CI = 1.04 to 1.10, respectively), compared with the NH group. However, the cognitive reactivity total score could no longer distinguish between the SI and SA groups in both conditions. Additionally, the hopelessness reactivity subscale ($\chi^2 = 55.479$, $p < .001$) performed as effectively as the entire HOP subscale described previously as revealed by pairwise comparisons. Higher hopelessness reactivity was associated with the SI and SA groups, compared to the NH group; moreover, higher hopelessness reactivity was associated with the SA groups, compared to the SI group (NH vs SI: OR = 1.59, 95% CI = 1.35 to 1.87; NH vs SA: OR = 1.81, 95% CI = 1.51 to 2.16; SI vs SA: OR = 1.14, 95% CI = 1.01 to 1.28). Next, in the multivariate model considering only the CR total scores, the pattern of results remained consistent in both conditions. Among the cognitive reactivity total scores (with suicide reactivity items removed and with the HOP removed), self-regulatory fatigue, depletion sensitivity, impulsivity total score, entrapment total score, depression, and stress, only impulsivity total score and depression emerged as

significant predictors of suicidal history group. The results persisted when depletion sensitivity and self-regulatory fatigue were included in separate multivariate models, respectively.

Table A8.1 *Univariate multinomial logistic regression pairwise analysis of cognitive reactivity variables associated with suicide history groups (N = 312)*

	NH vs SI[a]					NH vs SA[a]					SI vs SA[b]				
			95% CI					95% CI					95% CI		
	B	OR	Low	High	*p*	B	OR	Low	High	*p*	B	OR	Low	High	*p*
Cognitive reactivity															
Total score[1]	**0.061**	**1.063**	**1.039**	**1.087**	**< .001**	**0.078**	**1.082**	**1.055**	**1.108**	**< .001**	**0.018**	**1.018**	**1.002**	**1.034**	**.027**
Total score[2]	**0.058**	**1.060**	**1.034**	**1.087**	**< .001**	**0.071**	**1.073**	**1.045**	**1.103**	**< .001**	0.013	1.013	0.995	1.031	.161
Total score[3]	**0.057**	**1.058**	**1.029**	**1.088**	**< .001**	**0.068**	**1.071**	**1.040**	**1.102**	**< .001**	0.011	1.011	0.992	1.031	.241
Acceptance/Coping	-0.016	0.984	0.908	1.067	.704	-0.027	0.973	0.894	1.059	.530	-0.012	0.989	0.930	1.051	.711
Avoidant Coping	**0.147**	**1.158**	**1.088**	**1.232**	**< .001**	**0.171**	**1.187**	**1.111**	**1.268**	**< .001**	0.025	1.025	0.980	1.072	.278
Control/Perfectionism	0.071	1.074	0.989	1.166	.089	0.060	1.062	0.975	1.157	.166	-0.011	0.989	0.933	1.047	.700
Aggression	**0.124**	**1.132**	**1.057**	**1.213**	**< .001**	**0.172**	**1.188**	**1.105**	**1.277**	**.001**	**0.048**	**1.050**	**1.004**	**1.097**	**.031**
Hopelessness/ Suicidality	**0.304**	**1.356**	**1.232**	**1.492**	**< .001**	**0.403**	**1.496**	**1.348**	**1.659**	**< .001**	**0.098**	**1.103**	**1.050**	**1.160**	**< .001**
Hopelessness Reactivity	**0.462**	**1.588**	**1.350**	**1.867**	**< .001**	**0.591**	**1.806**	**1.513**	**2.156**	**< .001**	**0.129**	**1.137**	**1.011**	**1.279**	**.032**

Note. [1] Full scale total score; [2] Total score after removing the three suicide reactivity items in the HOP subscale; [3] Total score after removing the entire HOP subscale. Hopelessness Reactivity comprises the HOP subscale excluding the suicide reactivity items. B = unstandardised beta; OR = odds ratio; CI = confidence interval; *p* = p-value; [a] NH group is reference; [b] SI group is reference. Values highlighted in bold are statistically significant (p < .05). NH = no history of suicidal ideation or attempts; SI = history of suicidal ideation only; SA = history of suicidal attempt

Table A8.2 *Univariate multinomial logistic regressions comparing cognitive reactivity (Full Scale) between participants' suicidal history groups (NH, n = 43; SI, n = 154; SA, n = 115), n = 312, df = 2.*

Variable	χ^2	*p*
Cognitive reactivity		
Total score[1]	**49.777**	**< .001**
Acceptance/Coping	0.404	.817
Avoidant Coping	**31.156**	**< .001**
Control/Perfectionism	2.972	.226
Aggression	**25.483**	**< .001**
Hopelessness/Suicidality	**104.969**	**< .001**

[1] Full scale total score. Values highlighted in bold are statistically significant ($p < 0.05$). NH = no history group, SI = history of suicidal ideation only group, SA = history of suicidal attempt group, χ^2 = chi square, *p* = p-value.

Table A8.3 *Univariate multinomial logistic regressions comparing cognitive reactivity (suicide reactivity items removed) between participants' suicidal history groups (NH, n = 43; SI, n = 154; SA, n = 115), n = 312, df = 2.*

Variable	χ^2	*p*
Cognitive reactivity		
Total score[1]	**31.529**	**< .001**
Acceptance/Coping	0.404	.817

Avoidant Coping	**31.156**	**< .001**
Control/Perfectionism	2.972	.226
Aggression	**25.483**	**< .001**
Hopelessness Reactivity	**55.479**	**< .001**

[1] Total score after removing the three suicidality items in the HOP subscale; Hopelessness Reactivity comprises the HOP subscale excluding the suicide reactivity items. Values highlighted in bold are statistically significant ($p < 0.05$). NH = no history group, SI = history of suicidal ideation only group, SA = history of suicidal attempt group, χ^2 = chi square, *p* = p-value.

Table A8.3 *Univariate multinomial logistic regressions comparing cognitive reactivity (HOP subscale removed) between participants' suicidal history groups (NH, n = 43; SI, n = 154; SA, n = 115), n = 312, df = 2.*

Variable	**χ2**	***p***
Cognitive reactivity		
Total score[1]	**23.936**	**< .001**
Acceptance coping	0.404	.817
Avoidant coping	**31.156**	**< .001**
Control/perfectionism	2.972	.226
Aggression	**25.483**	**< .001**
Hopelessness/Suicidality	-	-

[1] Total score after removing the entire HOP subscale. Values highlighted in bold are statistically significant ($p < 0.05$).

NH = no history group, SI = history of suicidal ideation only group, SA = history of suicidal attempt group, χ2 = chi square, p = p-value.

Table A8.4 *Multivariate multinomial logistic regression between NH, SI, and SA groups (n= 311, df = 2). Cognitive reactivity was examined by LEDIS-RR with suicide reactivity items removed.*

Variables	**χ2**	***p***
Cognitive reactivity (total score1)	1.494	.474
Self-regulatory fatigue	1.740	.419
Depletion sensitivity	2.473	.290
Impulsivity (total score)	7.999	.018
Entrapment (total score)	3.497	.174
Depression	10.516	.005
Stress	1.645	.439

Note. Depression was measured with the 8-item PHQ9. 1 Cognitive reactivity total score after removing the three suicidality items in the HOP subscale. Values highlighted in bold are statistically significant ($p < 0.05$). NH = no history group, SI = history of suicidal ideation only group, SA = history of suicidal attempt group, χ2 = chi square, p = p-value.

Table A8.5 *Pairwise analysis following the multivariate multinomial logistic regression between NH, SI, and SA groups (N = 311)*

	NH vs SI[a]					NH vs SA[a]					SI vs SA[b]				
			95% CI					95% CI					95% CI		
	B	**OR**	Low	High	***p***	**B**	**OR**	Low	High	***p***	**B**	**OR**	Low	High	***p***
Cognitive reactivity (total score[1])	0.018	1.019	0.986	1.052	.264	0.010	1.010	0.976	1.046	.566	-0.008	0.992	0.970	1.014	.469
Self-regulatory fatigue	0.016	1.016	0.956	1.080	.614	0.038	1.039	0.973	1.109	.256	0.022	1.022	0.982	1.065	.287
Depletion sensitivity	0.037	1.038	0.989	1.090	.129	0.038	1.039	0.986	1.093	.150	0.000	1.000	0.968	1.034	.981
Impulsivity (total score)	**-0.057**	**0.945**	**0.897**	**0.994**	**.029**	-0.021	0.979	0.928	1.033	.442	**0.036**	**1.037**	**1.003**	**1.071**	**.030**
Entrapment (total score)	0.128	1.137	0.993	1.301	.063	0.110	1.116	0.968	1.287	.131	-0.018	0.982	0.898	1.073	.686
Depression	0.068	1.070	0.961	1.192	.218	**0.155**	**1.168**	**1.042**	**1.309**	**.008**	**0.088**	**1.092**	**1.022**	**1.167**	**.010**
Stress	0.006	1.006	0.837	1.209	.952	-0.071	0.932	0.766	1.133	.480	-0.076	0.927	0.822	1.044	.209

Note. Depression was measured with the 8-item PHQ9. [1] Cognitive reactivity total score after removing the three suicidality items in the HOP subscale. B = unstandardised beta; OR = odds ratio; CI = confidence interval; *p* = p-value; [a] NH group is reference; [b] SI group is reference. Values highlighted in bold are statistically significant (p < 0.05). NH = no history of suicidal ideation or attempts; SI = history of suicidal ideation only; SA = history of suicidal attempt.

Table A8.6 *Multivariate multinomial logistic regression between NH, SI, and SA groups (n= 311, df = 2). Cognitive reactivity was examined by LEDIS-RR with the entire Hopelessness/Suicidality subscale removed*

Variables	**χ2**	***p***
Cognitive reactivity (total score[1])	1.087	.581
Self-regulatory fatigue	1.806	.405
Depletion sensitivity	2.808	.246
Impulsivity (total score)	**8.047**	**.018**
Entrapment (total score)	3.709	.157

Depression	**10.769**	**.005**
Stress	1.700	.427

Note. Depression was measured with the 8-item PHQ9. [1] Total score after removing the entire HOP subscale. Values highlighted in bold are statistically significant ($p < 0.05$). NH = no history group, SI = history of suicidal ideation only group, SA = history of suicidal attempt group, χ^2 = chi square, *p* = p-value.

Table A8.7 *Pairwise analysis following multivariate multinomial logistic regressions comparing between suicidal history groups (N = 311)*

	NH vs SI[a]					**NH vs SA[a]**					**SI vs SA[b]**				
			95% CI					**95% CI**					**95% CI**		
	B	**OR**	Low	High	***p***	**B**	**OR**	Low	High	***p***	**B**	**OR**	Low	High	***p***
Cognitive reactivity (total score[1])	0.013	1.013	0.979	1.049	.451	0.003	1.003	0.966	1.041	.881	-0.011	0.99	0.966	1.013	.385
Depletion sensitivity	0.039	1.040	0.991	1.092	.109	0.040	1.041	0.989	1.096	.123	0.001	1.001	0.968	1.035	.953
Self-regulatory fatigue	0.017	1.017	0.958	1.081	.574	0.039	1.040	0.975	1.110	.236	0.022	1.022	0.981	1.065	.292
Impulsivity (total score)	**-0.056**	**0.945**	**0.898**	**0.995**	**.031**	-0.020	0.981	0.929	1.035	.477	**0.037**	**1.037**	**1.004**	**1.072**	**.028**
Entrapment (total score)	0.132	1.141	0.997	1.306	.056	0.113	1.120	0.972	1.292	.118	-0.018	0.982	0.898	1.073	.688
Depression	0.070	1.073	0.964	1.195	.199	**0.159**	**1.172**	**1.045**	**1.313**	**.006**	**0.088**	**1.092**	**1.022**	**1.167**	**.009**
Stress	0.007	1.007	0.838	1.210	.944	-0.071	0.931	0.766	1.133	.476	-0.078	0.925	0.821	1.042	.202

Note. Depression was measured with the 8-item PHQ9. [1] Total score after removing the entire HOP subscale. B = unstandardised beta; OR = odds ratio; CI = confidence interval; *p* = p-value; [a] NH group is reference; [b] SI group is reference. Values highlighted in bold are statistically significant ($p < 0.05$). NH = no history of suicidal ideation or attempts; SI = history of suicidal ideation only; SA = history of suicidal attempt.

Appendix 9: Simple linear regression

Table A9.1 *Simple linear regression results predicting the frequency of suicidal ideation (N = 269)*

Variable	B	SE	95% CI		*β*	*p*
			LL	*UL*		
Cognitive reactivity						
Total score	**0.015**	**0.006**	**0.004**	**0.026**	**0.162**	**.008**
Acceptance/Coping	-0.044	0.023	-0.089	0.001	-0.117	.055
Avoidant Coping	0.030	0.017	-0.003	0.063	0.110	.071
Control/Perfectionism	0.002	0.021	-0.040	0.044	0.006	.922
Aggression	0.032	0.016	0.000	0.064	0.119	.051
Hopelessness/Suicidality	**0.093**	**0.016**	**0.061**	**0.125**	**0.333**	**< .001**
Depletion sensitivity	**0.028**	**0.008**	**0.011**	**0.045**	**0.196**	**.001**
Self-regulatory fatigue	**0.034**	**0.009**	**0.017**	**0.052**	**0.232**	**< .001**
Entrapment						
Total score	**0.094**	**0.019**	**0.056**	**0.132**	**0.286**	**< .001**
Internal entrapment	**0.144**	**0.033**	**0.080**	**0.208**	**0.261**	**< .001**
External entrapment	**0.175**	**0.039**	**0.098**	**0.252**	**0.264**	**< .001**
Impulsivity						
Total score	**0.030**	**0.010**	**0.011**	**0.049**	**0.183**	**.003**
Negative urgency	**0.113**	**0.033**	**0.047**	**0.178**	**0.203**	**< .001**
Positive urgency	**0.079**	**0.029**	**0.022**	**0.135**	**0.166**	**.006**
Lack of perseverance	**0.106**	**0.038**	**0.167**	**0.031**	**0.167**	**.006**
Lack of premeditation	0.038	0.037	-0.034	0.111	0.064	.298
Sensation seeking	0.007	0.029	-0.051	0.064	0.014	.813
Depression	**0.077**	**0.015**	**0.048**	**0.106**	**0.302**	**< .001**
Stress	**0.096**	**0.026**	**0.044**	**0.148**	**0.218**	**< .001**
Mindfulness	**-0.036**	**0.011**	**-0.057**	**-0.015**	**-0.201**	**< .001**
Resilience	**-0.073**	**0.018**	**-0.108**	**-0.038**	**-0.245**	**< .001**

Note. Depression was measured with the 8-item PHQ9. B = unstandardised coefficients; SE = standard error; CI = Confidence interval; *β* = standardised coefficients; *p* = p-value. Values highlighted in bold are statistically significant ($p < 0.05$).

Table A9.2 *Simple linear regression results predicting the duration of suicidal ideation (N = 269)*

Variable	B	SE	95% CI		*β*	*p*
			LL	*UL*		
Cognitive reactivity						
Total score	**0.018**	**0.005**	**0.009**	**0.027**	**0.237**	**< .001**
Acceptance/Coping	0.012	0.019	-0.025	0.049	0.039	.524
Avoidant Coping	0.018	0.014	-0.009	0.045	0.080	.191
Control/Perfectionism	0.032	0.017	-0.002	0.066	0.111	.068
Aggression	**0.040**	**0.013**	**0.014**	**0.066**	**0.184**	**.002**
Hopelessness/Suicidality	**0.073**	**0.013**	**0.047**	**0.099**	**0.320**	**< .001**
Depletion sensitivity	0.013	0.007	-0.001	0.027	0.114	.062
Self-regulatory fatigue	**0.029**	**0.007**	**0.015**	**0.043**	**0.240**	**< .001**

Entrapment						
Total score	**0.063**	**0.016**	**0.032**	**0.094**	**0.235**	**< .001**
Internal entrapment	**0.100**	**0.027**	**0.047**	**0.153**	**0.222**	**< .001**
External entrapment	**0.113**	**0.032**	**0.050**	**0.177**	**0.209**	**< .001**
Impulsivity						
Total score	**0.018**	**0.008**	**0.002**	**0.034**	**0.135**	**.027**
Negative urgency	0.037	0.028	-0.017	0.092	0.082	.178
Positive urgency	**0.061**	**0.023**	**0.015**	**0.107**	**0.158**	**.009**
Lack of perseverance	0.053	0.032	-0.009	0.115	0.102	.095
Lack of premeditation	0.039	0.030	-0.020	0.098	0.079	.198
Sensation seeking	0.009	0.024	-0.038	0.056	0.023	.706
Depression	**0.059**	**0.012**	**0.035**	**0.083**	**0.282**	**< .001**
Stress	**0.101**	**0.021**	**0.060**	**0.143**	**0.281**	**< .001**
Mindfulness	**-0.039**	**0.009**	**-0.056**	**-0.022**	**-0.264**	**< .001**
Resilience	**-0.041**	**0.015**	**-0.070**	**-0.012**	**-0.168**	**.006**

Note. Depression was measured with the 8-item PHQ9. B = unstandardised coefficients; SE = standard error; CI = Confidence interval; β = standardised coefficients; p = p-value. Values highlighted in bold are statistically significant ($p < 0.05$).

Table A9.3 *Simple linear regression results predicting the intensity of suicidal ideation (N = 269)*

Variable	B	SE	95% CI		β	p
			LL	*UL*		
Cognitive reactivity						
Total score	**0.024**	**0.006**	**0.013**	**0.036**	**0.250**	**< .001**
Acceptance/Coping	-0.026	0.024	-0.073	0.021	-0.067	.277
Avoidant Coping	**0.055**	**0.017**	**0.021**	**0.088**	**0.192**	**.002**
Control/Perfectionism	0.010	0.022	-0.034	0.054	0.028	.648
Aggression	**0.050**	**0.017**	**0.017**	**0.083**	**0.179**	**.003**
Hopelessness/Suicidality	**0.115**	**0.016**	**0.083**	**0.148**	**0.396**	**< .001**
Depletion sensitivity	**0.037**	**0.009**	**0.020**	**0.055**	**0.254**	**< .001**
Self-regulatory fatigue	**0.050**	**0.009**	**0.032**	**0.067**	**0.323**	**< .001**
Entrapment						
Total score	**0.110**	**0.020**	**0.071**	**0.149**	**0.322**	**< .001**
Internal entrapment	**0.169**	**0.034**	**0.103**	**0.235**	**0.294**	**< .001**
External entrapment	**0.206**	**0.040**	**0.126**	**0.285**	**0.298**	**< .001**
Impulsivity						
Total score	**0.028**	**0.010**	**0.008**	**0.048**	**0.165**	**.007**
Negative urgency	**0.108**	**0.035**	**0.040**	**0.177**	**0.187**	**.002**
Positive urgency	**0.070**	**0.030**	**0.011**	**0.129**	**0.141**	**.020**
Lack of perseverance	0.068	0.040	-0.011	0.147	0.103	.093
Lack of premeditation	**0.089**	**0.038**	**0.015**	**0.164**	**0.143**	**.019**
Sensation seeking	-0.006	0.030	-0.066	0.054	-0.013	.836
Depression	**0.080**	**0.015**	**0.050**	**0.111**	**0.303**	**< .001**
Stress	**0.136**	**0.027**	**0.084**	**0.189**	**0.297**	**< .001**
Mindfulness	**-0.050**	**0.011**	**-0.072**	**-0.028**	**-0.267**	**< .001**
Resilience	**-0.090**	**0.018**	**-0.126**	**-0.054**	**-0.291**	**< .001**

Note. Depression was measured with the 8-item PHQ9. B = unstandardised coefficients; SE = standard error; CI = Confidence interval; β = standardised coefficients; p = p-value. Values highlighted in bold are statistically significant ($p < 0.05$).

Appendix 10: Sensitivity analysis of the effect of cognitive reactivity on parameters of suicidal ideation

Sensitivity analyses examining the effect of cognitive reactivity on the parameters of suicidal ideation: LEIDS-RR with suicide reactivity items removed vs. with the entire Hopelessness/Suicidality subscale removed

Frequency. After removing suicide items in the HOP subscale, the remaining two items assessing hopelessness (i.e., Hopelessness Reactivity) individually predicted the frequency of suicidal ideation ($F(1, 267) = 11.921$, $p < .001$, $\beta = 0.21$), while the cognitive reactivity total scores (with suicide reactivity items removed and with the entire HOP subscale removed) were not significant predictors of the frequency of suicidal ideation. Furthermore, hopelessness reactivity was no longer a significant predictor of the frequency of suicidal ideation, after depression was controlled for.

Duration. In the simple linear regression analysis, both forms of the CR total score significantly predicted the duration of suicidal ideation (Total score after removing the suicide reactivity items: $F(1, 267) = 10.134$, $p = .002$, $\beta = 0.19$; Total score after removing the entire HOP subscale: $F(1, 267) = 7.679$, $p = .006$, $\beta = 0.17$). Hopelessness reactivity was also a significant predictor of the duration of suicidal ideation ($F(1, 267) = 16.619$, $p < .001$, $\beta = 0.24$). After controlling for depression, the effect of hopelessness reactivity on predicting duration of suicidal ideation remained significant ($t = 2.141$, $p = .033$, $\beta = 0.14$), while neither form of the CR total score was a significant predictor.

Intensity. Similar to the results predicting SI duration, both forms of the CR total score individually predicted the intensity of suicidal ideation (Total score after removing the suicide reactivity items: $F(1, 267) = 9.041$, $p = .003$, $\beta = 0.18$; Total score after removing the entire HOP subscale: $F(1, 267) = 6.330$, $p = .012$, $\beta = 0.15$). However, neither of them continued to predict the intensity of suicidal ideation when the effect of depression was considered. Additionally, hopelessness reactivity was significantly associated with the intensity of suicidal ideation ($F(1, 267) = 20.047$, $p < .001$, $\beta = 0.26$), even after controlling for depression ($t = 2.403$, $p = .017$, $\beta = 0.16$).

Table A10.1 *Simple linear regression examining cognitive reactivity on predicting the frequency of suicidal ideation*

Variable	B	SE	95% CI		*β*	*p*
			LL	*UL*		
Cognitive reactivity						
Total score[1]	**0.015**	**0.006**	**0.004**	**0.026**	**0.162**	**.008**
Total score[2]	0.010	0.007	-0.003	0.023	0.093	.128
Total score[3]	0.008	0.007	-0.006	0.022	0.066	.281
Acceptance/Coping	-0.044	0.023	-0.089	0.001	-0.117	.055
Avoidant Coping	0.030	0.017	-0.003	0.063	0.110	.071
Control/Perfectionism	0.002	0.021	-0.040	0.044	0.006	.922
Aggression	0.032	0.016	0.000	0.064	0.119	.051
Hopelessness/Suicidality	**0.093**	**0.016**	**0.061**	**0.125**	**0.333**	**< .001**
Hopelessness Reactivity	**0.143**	**0.041**	**0.061**	**0.224**	**0.207**	**< .001**

[1] Full scale total score; [2] Total score after removing the three suicidality items in the HOP subscale; [3] Total score after removing the entire HOP subscale. Hopelessness Reactivity comprises the HOP subscale excluding the suicide reactivity items. B = unstandardised coefficients; SE = standard error; CI = Confidence interval; *β* = standardised coefficients; *p* = p-value. Values highlighted in bold are statistically significant ($p < 0.05$).

Table A10.2 *Simple linear regression examining cognitive reactivity on predicting the duration of suicidal ideation*

Variable	B	SE	95% CI		*β*	*p*
			LL	*UL*		
Cognitive reactivity						
Total score[1]	**0.018**	**0.005**	**0.009**	**0.027**	**0.237**	**< .001**
Total score[2]	**0.017**	**0.005**	**0.006**	**0.028**	**0.191**	**.002**
Total score[3]	**0.016**	**0.006**	**0.005**	**0.028**	**0.167**	**.006**
Acceptance/Coping	0.012	0.019	-0.025	0.049	0.039	.524
Avoidant Coping	0.018	0.014	-0.009	0.045	0.080	.191
Control/Perfectionism	0.032	0.017	-0.002	0.066	0.111	.068
Aggression	**0.040**	**0.013**	**0.014**	**0.066**	**0.184**	**.002**
Hopelessness/Suicidality	**0.073**	**0.013**	**0.047**	**0.099**	**0.320**	**< .001**
Hopelessness Reactivity	**0.137**	**0.033**	**0.071**	**0.202**	**0.242**	**< .001**

[1] Full scale total score; [2] Total score after removing the three suicidality items in the HOP subscale; [3] Total score after removing the entire HOP subscale. Hopelessness Reactivity comprises the HOP subscale excluding the suicide reactivity items. B = unstandardised coefficients; SE = standard error; CI = Confidence interval; *β* = standardised coefficients; *p* = p-value. Values highlighted in bold are statistically significant ($p < 0.05$).

Table A10.3 *Simple linear regression examining cognitive reactivity on predicting the intensity of suicidal ideation*

Variable	B	SE	95% CI		*β*	*p*
			LL	*UL*		
Cognitive reactivity						
Total score[1]	**0.024**	**0.006**	**0.013**	**0.036**	**0.250**	**< .001**
Total score[2]	**0.021**	**0.007**	**0.007**	**0.034**	**0.181**	**.003**
Total score[3]	**0.019**	**0.007**	**0.004**	**0.034**	**0.152**	**.012**
Acceptance/Coping	-0.026	0.024	-0.073	0.021	-0.067	.277
Avoidant Coping	**0.055**	**0.017**	**0.021**	**0.088**	**0.192**	**.002**
Control/Perfectionism	0.010	0.022	-0.034	0.054	0.028	.648
Aggression	**0.050**	**0.017**	**0.017**	**0.083**	**0.179**	**.003**
Hopelessness/Suicidality	**0.115**	**0.016**	**0.083**	**0.148**	**0.396**	**< .001**
Hopelessness Reactivity	**0.190**	**0.042**	**0.106**	**0.273**	**0.264**	**< .001**

[1] Full scale total score; [2] Total score after removing the three suicidality items in the HOP subscale; [3] Total score after removing the entire HOP subscale. Hopelessness Reactivity comprises the HOP subscale excluding the suicide reactivity items. B = unstandardised coefficients; SE = standard error; CI = Confidence interval; *β* = standardised coefficients; *p* = p-value. Values highlighted in bold are statistically significant ($p < 0.05$).

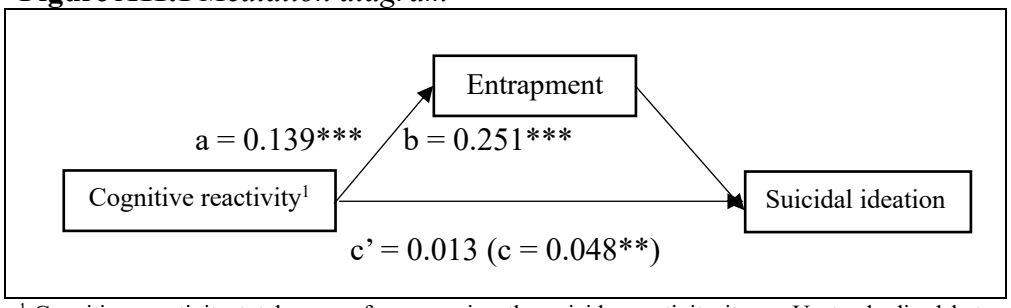
Appendix 11: Sensitivity analysis on the effect of cognitive reactivity in mediation analysis

Table A11.1 *Meditation analysis examining the indirect effect of cognitive reactivity on suicidal ideation, with entrapment as the mediator (cognitive reactivity was assessed by the LEIDS-RR total score after removing the suicide reactivity items)*

Antecedent		M (Entrapment)					Y (Suicidal Ideation)			
		b	SE	*p*	*β*		*b*	SE	*p*	*β*
X (Cognitive Reactivity[1])	a	0.139	0.018	< .001	0.420	c'	0.013	0.016	.423	0.051
M (Entrapment)		-				b	0.251	0.048	< .001	0.330

[1] Cognitive reactivity total score after removing the suicide reactivity items. X: Independent variable; Y: Dependent variable; M: mediator. *b*: unstandardised coefficients; SE: standard error; p = p-value; β = standardised coefficients

Figure A11.1 *Mediation diagram*



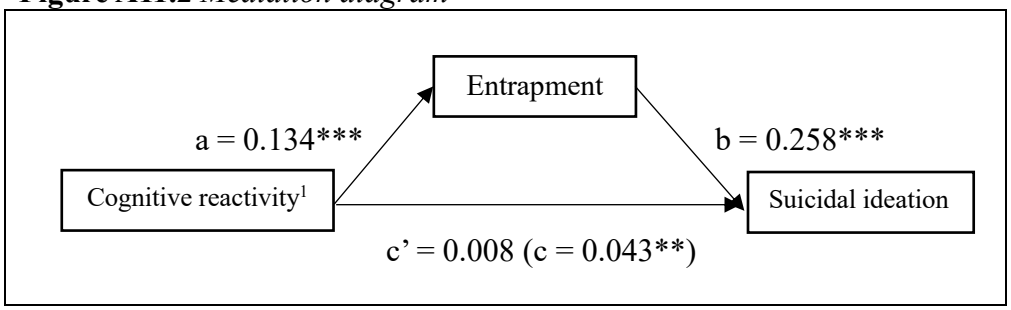
[1] Cognitive reactivity total score after removing the suicide reactivity items. Unstandardised beta reported. *$p < .05$, **$p < .01$, ***$p < .001$

Table A11.2 *Meditation analysis examining the indirect effect of cognitive reactivity on suicidal ideation, with entrapment as the mediator (cognitive reactivity was assessed by the LEIDS-RR total score after removing the HOP subscale)*

Antecedent		M (Entrapment)					Y (Suicidal Ideation)			
		b	SE	p	β		b	SE	p	β
X (Cognitive Reactivity[1])	a	0.134	0.021	< .001	0.369	c'	0.008	0.017	.622	0.031
M (Entrapment)		-				b	0.258	0.047	< .001	0.340

[1]Cognitive reactivity total score after removing the HOP subscale. X: Independent variable; Y: Dependent variable; M: mediator. b: unstandardised coefficients; SE: standard error; p = p-value; β = standardised coefficients

Figure A11.2 *Mediation diagram*



[1]Cognitive reactivity total score after removing the HOP subscale. Unstandardised beta reported. *p < .05, **p < .01, ***p < .001

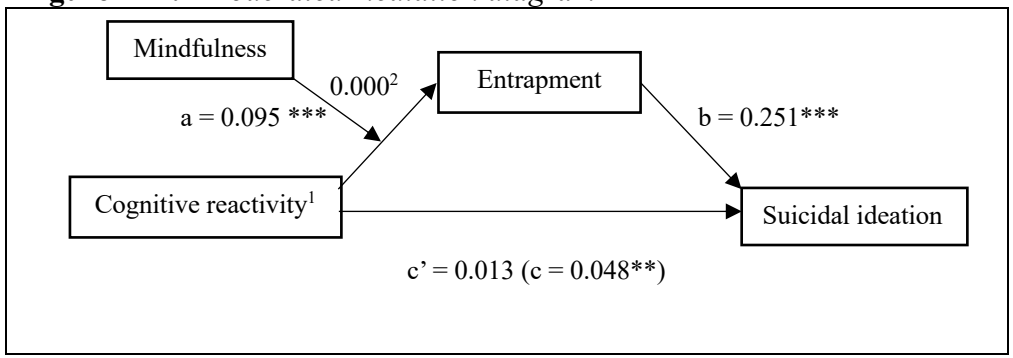
Appendix 12: Sensitivity analysis on the effect of cognitive reactivity in moderated mediation analysis

Table A12.1 *Moderated meditation analysis examining the mediating effect of entrapment on the relationship between cognitive reactivity and suicidal ideation, with mindfulness as a moderator of the cognitive reactivity-to-entrapment pathway (cognitive reactivity was assessed by the LEIDS-RR total score after removing the suicide reactivity items)*

Antecedent		W (Mindfulness)				M (Entrapment)				Y (Suicidal Ideation)		
		b	SE	*p*		*b*	SE	*p*		*b*	SE	*p*
X (Cognitive Reactivity[1])	X*W	0.000	0.002	.901	a	0.095	0.018	< .001	c'	0.013	0.016	.423
M (Entrapment)		-				-			b	0.251	0.048	< .001
W (Mindfulness)		-				-0.241	0.028	< .001		-		

[1] Cognitive reactivity total score after removing the suicide reactivity items. X: Independent variable; Y: Dependent variable; M: mediator; W: moderator. *b*: unstandardised coefficients; SE: standard error; p = p-value; β = standardised coefficients

Figure A12.1 *Moderated mediation diagram*



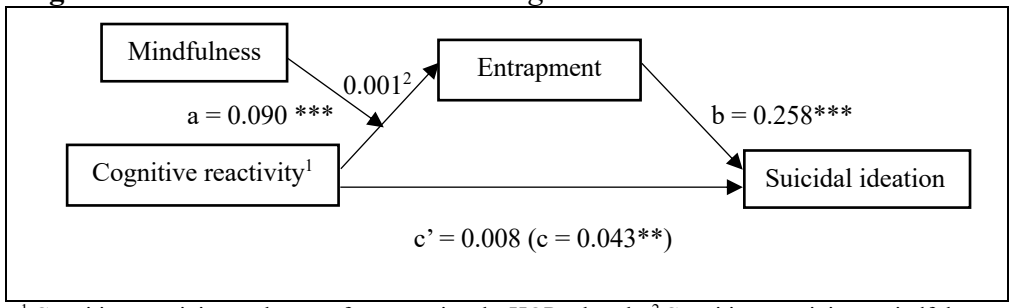
[1]Cognitive reactivity total score after removing the suicide reactivity items. [2] Cognitive reactivity × mindfulness interaction. Unstandardised beta reported. *$p < .05$, **$p < .01$, ***$p < .001$

Table A12.2 *Moderated meditation analysis examining the mediating effect of entrapment on the relationship between cognitive reactivity and suicidal ideation, with mindfulness as a moderator of the cognitive reactivity-to-entrapment pathway (cognitive reactivity was assessed by the LEIDS-RR total score after removing the HOP subscale).*

Antecedent		W (Mindfulness)				M (Entrapment)				Y (Suicidal Ideation)		
		b	SE	*p*		*b*	SE	*p*		*b*	SE	*p*
X (Cognitive Reactivity[1])	X*W	0.001	0.002	.743	a	0.090	0.019	< .001	c'	0.008	0.017	.622
M (Entrapment)		-				-			b	0.258	0.047	< .001
W (Mindfulness)		-				-0.253	0.028	< .001		-		

[1] Cognitive reactivity total score after removing the HOP subscale. X: Independent variable; Y: Dependent variable; M: mediator; W: moderator. *b*: unstandardised coefficients; SE: standard error; p = p-value; β = standardised coefficients

Figure A12.2 *Moderated mediation diagram*



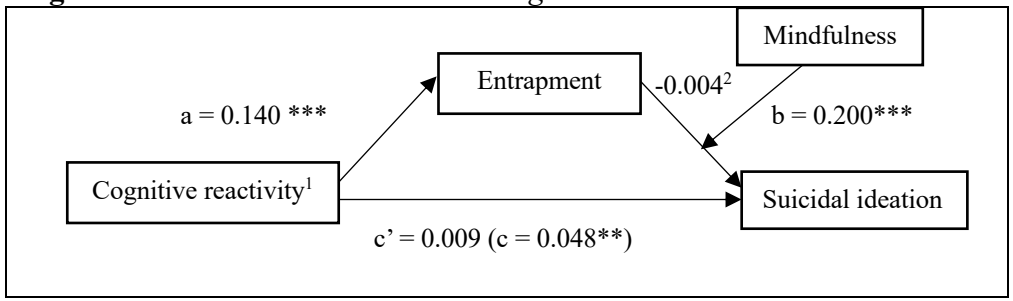
[1] Cognitive reactivity total score after removing the HOP subscale. [2] Cognitive reactivity × mindfulness interaction. Unstandardised beta reported. *$p < .05$, **$p < .01$, ***$p < .001$

Table A12.3 *Moderated meditation analysis examining the mediating effect of entrapment on the relationship between cognitive reactivity and suicidal ideation, with mindfulness as a moderator of the entrapment-to-suicidal ideation pathway (cognitive reactivity was assessed by the LEIDS-RR total score after removing the suicide reactivity items)*

Antecedent		W (Mindfulness)				X (Entrapment)				Y (Suicidal Ideation)		
		b	SE	*p*		*b*	SE	*p*		*b*	SE	*p*
X (Cognitive Reactivity[1])		-			a	0.140	0.018	< .001	c'	0.009	0.016	.568
M (Entrapment)	M*W	-0.004	0.005	.450		-			b	0.200	0.054	< .001
W (Mindfulness)		-				-				-0.067	0.028	.018

[1] Cognitive reactivity total score after removing the suicide reactivity items. X: Independent variable; Y: Dependent variable; M: mediator; W: moderator. *b*: unstandardised coefficients; SE: standard error; p = p-value; β = standardised coefficients

Figure A12.3 *Moderated mediation diagram*



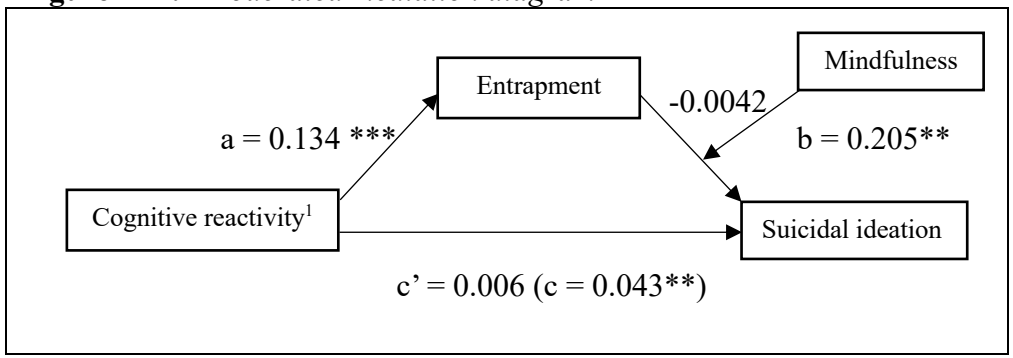
[1]Cognitive reactivity total score after removing the suicide reactivity items. [2] Entrapment × mindfulness interaction. Unstandardised beta reported. *$p < .05$, **$p < .01$, ***$p < .001$

Table A12.4 *Moderated meditation analysis examining the mediating effect of entrapment on the relationship between cognitive reactivity and suicidal ideation, with mindfulness as a moderator of the cognitive reactivity-to-entrapment pathway (cognitive reactivity was assessed by the LEIDS-RR total score after removing the HOP subscale)*

Antecedent		W (Mindfulness)				M (Entrapment)				Y (Suicidal Ideation)		
		b	SE	*p*		*b*	SE	*p*		*b*	SE	*p*
X (Cognitive Reactivity[1])		-			a	0.134	0.021	< .001	c'	0.006	0.017	.744
M (Entrapment)	M*W	-0.004	0.005	0.451		-			b	0.205	0.054	< .01
W (Mindfulness)		-				-				-0.068	0.028	.017

[1] Cognitive reactivity total score after removing the HOP subscale. X: Independent variable; Y: Dependent variable; M: mediator; W: moderator. *b*: unstandardised coefficients; SE: standard error; p = p-value; β = standardised coefficients

Figure A12.4 *Moderated mediation diagram*



[1]Cognitive reactivity total score after removing the HOP subscale. 2 Entrapment × mindfulness interaction. Unstandardised beta reported. *p < .05, **p < .01, ***p < .001