Understanding the Relationship between Future Thinking and Suicide Risk

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Abstract

Background: Suicide is a major public health problem since approximately 703, 000 people die by suicide every year worldwide according to World Health Organisation statistics. The role of prospective cognitions on mental health and suicide risk has received increasing recognition by researchers in recent years. However, further research investigating the relationship between individuals' thoughts about their own future (i.e., Positive Future Thinking; PFT and Negative Future Thinking; NFT) and suicide risk (i.e., with and without a history of suicidal behaviours and/or suicidal thoughts) is still needed.

Aims: The current series of studies, within the context of the Integrated Motivational-Volitional (IMV) model, aimed to explore the relationship between future thinking and suicidal thoughts and/or suicidal behaviours, along with investigations of established risk factors for suicide, such as depression, entrapment, defeat, and death-related mental imagery. To achieve this aim, the current thesis addressed three main research questions: (1) What is the nature of the relationship between future thinking and suicide risk? (2) Does the relationship between future thinking and suicide vary depending on the content of future thoughts and time periods? (3) What is the nature of the relationship between future thinking and suicide risk in the context of different risk factors (e.g., defeat and entrapment) across two groups of participants (i.e., those who have a history of suicidal thoughts and/or suicidal behaviours and those who have no history of suicidal thoughts or suicidal behaviours)?

Methods: The introductory chapter included describing suicide terminology, the scale of suicide, socio-demographic risk factors, the psychology of suicide risk, psychological models of suicide, and the aims, research questions and structure of the current thesis. Then, different methods were employed to address the research questions. First, Chapter 2 presents a systematic review study summarising what is known about future thinking and suicide risk relationship in the literature. To this end, a keyword search of databases (i.e., Ovid databases: Medline, EMBASE, and PsycINFO) was conducted. Research papers for inclusion were restricted to those written in English and which investigated the relationship between future thinking (i.e., PFT and NFT) and suicide risk (i.e., suicidal ideation and suicidal behaviour).

Second, in Chapter 3, an online cross-sectional survey study examined the relationship between suicide risk and future thinking with the inclusion of the investigation of other psychological factors, such as depression, defeat, entrapment, repetitive future thinking, and consideration of future consequences. Anonymous data were collected from 409 adults (18+ years) with and without any history of suicidal thoughts and/or suicidal behaviours. Third, Chapter 4 described an experimental study in which two groups of individuals with and without a history of suicidal behaviours and/or suicidal thoughts were compared in terms of positive future thinking abilities (i.e., generating things to look forward to across different time periods) and established psychological markers of suicide risk (e.g., depression, defeat, entrapment, and death-related mental imagery). Finally, Chapter 5 synthesised the main findings from the research conducted within this PhD project and assessed these findings in relation to the research questions, as well as addressing the limitations and implications of this project. It ended by proposing future research directions on the future thinking and suicide risk relationship.

Results: 325 potential research papers were yielded from title and abstract screenings, with 30 studies included in the narrative synthesis. Cross-sectional studies (n=15) in our systematic review study with a total of 3633 participants (2002 women, 1190 men, and 441 gender not reported; 114 hospital controls, 1163 undergraduate students, 1490 community controls, and 866 suicide patients) showed that suicidal individuals have a lack of positive future thinking in the absence of any increase in negative future thinking and they estimate future negative events to be more likely to happen to them and positive future events to be less likely to happen to them compared to controls. Six follow-up studies were included in the systematic review study, comprising a total of 1101 participants (664 female and 437 male participants; 504 admitted to hospitals with minor injuries, 143 undergraduate students, and 454 suicide patients). They yielded some evidence supporting the predictive utility of positive future thoughts on suicide risk over time although a few studies found that not all types of positive future thinking (e.g., intrapersonal positive future thinking) may be protective over time and may even act as a risk factor. The samples in other types of studies in the systematic review study covered a wide range of populations including those with different mental health disorders (e.g., personality disorder and psychosis), as well as those with physical illness (i.e., multiple sclerosis). As for the survey study (N=409), there

were 300 participants with a history of suicidal behaviours and/or suicidal thoughts, 98 participants without any history of suicidal thoughts or suicidal behaviours and 11 participants who did not report their suicide status (94 male and 299 female, 6 other and 10 missing). A series of binary logistic regression analyses, univariate and multivariate hierarchical regression analyses, moderation analyses (using the PROCESS macro for SPSS), and a simple mediation analysis (following the PROCESS Macro via the bootstrapping method) were used to test the survey study hypotheses. Although participants with suicidal thoughts and/or suicidal behaviours generated fewer positive future thoughts compared to participants without any suicidal history, this difference was not statistically significant. Participants with past suicidal experiences (i.e., suicidal thoughts and/or suicidal behaviours) reported significantly more negative future thoughts (i.e., interpersonal NFT, intrapersonal NFT, and financial/home NFT) than participants without past suicidal experiences even though there were no significant group differences in terms of achievement, leisure/pleasure, other, and health of others NFT types. For the different time periods, there were no significant group differences for PFT, but for NFTs, the next week, next year, and next 5-10 years were significant predictors of suicidal history, and the most important time period was next NFT over 5-10 years. The strongest measure of future thinking to predict suicide ideation was the Future-oriented Repetitive Thought Scale. For the experimental study (total N=53, mean age=28.42), in the suicidal thoughts and/or suicidal attempts history group, there were 20 females, and 10 males compared to 14 female and nine male participants in the control group (i.e., those with no suicidal thoughts and suicidal attempts history). A series of binary logistic regression analyses, two repeated measures ANOVA, two repeated measures ANCOVA, and an independent samples t-test were performed to test the hypotheses. Participants without any history of suicidal thoughts or suicidal behaviours reported significantly more positive future thoughts (PFT) in comparison to participants with a lifetime history of suicidal thoughts and/or suicidal behaviours. Mean scores for PFT between pre- and post-negative mood induction decreased significantly in both groups; however, this decline was stronger in the participants with a history of suicidal thoughts and/or suicidal behaviours, but only significant when depression and/or suicide ideation were assessed as covariates. Additionally, individuals with a history of suicidal thoughts and/or suicidal behaviours had significantly higher levels of death related mental imagery, depression, entrapment, and defeat than those without a history of suicide.

Conclusion: Despite the heterogeneity across studies (in terms of measures, samples, and methodologies) included in the systematic review study, there was clear evidence that suicidal individuals had a reduced ability to generate positive future thoughts. The results of the survey study indicated that the relationship between future thinking and suicide risk is complicated, and it varies as a function of the content of future thoughts. Nevertheless, future orientation shows promise as a cognitive variable potentially associated with suicide risk, however, its role in suicidality needs to be better understood. Treatments designed to improve thinking in relation to the future (e.g. reducing negative future thoughts and increasing positive future thoughts) may reduce the risk of suicide. As for the experimental study, positive future thinking is affected by a negative mood induction in individuals with and without a history of suicidal thoughts and/or suicidal behaviours, but it is most marked in those with a history of suicidal thoughts and/or suicidal behaviours when depression and suicide ideation are controlled. Several possible explanations for the results are provided, and some future research directions are given across the thesis.

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Author's Declaration

"I hereby declare that I am the only author of this thesis, except where the assistance of other individuals has been acknowledged. It has not been submitted in any form for another degree or professional qualification."

Gonca Kose, October 2024.

Chapter 1: Introduction

1.1 General Overview

Suicide is a major public health concern in all regions of the world. 703,000 individuals die by suicide each year worldwide, with one suicide death reported every 40 seconds and many more individuals attempt suicide (World Health Organisation, 2021). It is also the fourth leading cause of death among 15-29-year-old individuals globally (WHO, 2019). Additionally, many myths about suicide continue to exist and hamper suicide prevention efforts (O'Connor, 2021). For instance, there are some suicide myths that remain relatively common in community samples, such as the belief that asking individuals about suicide could plant the idea in their head (Hjelmeland & Knizek, 2004; Renberg & Jacobsson, 2003; Cwik *et al.*, 2016); and that once they have made up their mind about suicide, no one can stop them from ending their life (Hjelmeland & Knizek, 2004; Renberg & Jacobsson, 2003). The presence of such myths may decrease the likelihood of individuals intervening with someone who may be at risk as they think they could worsen the situation or that suicide cannot be prevented (Nicholas *et al.*, 2020). However, the reality is that opening up a conversation about suicide may help someone feel less isolated and protect against suicide (O'Connor, 2021). Such conversations can help individuals who are silently suffering from suicidal thoughts by encouraging them to reach out for support.

Suicide is a very complex phenomenon, with its causes spanning biological, psychological, and social factors, and their interactions (Ajdacic-Gross, 2015). This makes it difficult to identify who is at risk of suicide. For instance, although the link between suicide and mental disorders, especially depression, is well established in high-income countries, many suicides occur impulsively in times of crisis when the ability to cope with life stressors, such as financial problems, relationship breakdown, chronic pain, or illness, is impaired (Turecki *et al*., 2019). In addition to these factors, having a negative view of the future, reduced positive future thinking, and experiencing death-related mental imagery are also related to suicide risk (O'Connor & Nock, 2014). However, by far the strongest risk factor for suicide is a previous suicide attempt, as there could be a 70-fold rise in the possibility of subsequent suicide attempts and a 40-fold rise in the possibility of death after an attempt (Harris & Barraclough, 1997).

In this PhD thesis, the focus is on psychological factors, including future thinking, defined as one's ability to mentally project the self into possible future events, together with entrapment, defeat, depression, anxiety, stress, optimism/pessimism and death-related mental imagery; each of these factors has been linked to suicidal behaviours or suicidal thoughts (Kelliher Rabon *et al*., 2018; O'Connor & Nock, 2014). Specifically, the focus is on how individuals with and without past suicidal experiences think about their own future and how suicide risk (having a history of suicidal behaviours and/or suicidal thoughts versus not having a history of suicidal behaviours or suicidal thoughts) changes according to these individual differences. The role of future thinking as a factor within the suicidal process has received significant recognition from researchers focusing on the relationship between cognition and suicide in recent years (e.g., Cha *et al*., 2022; Pollak, Guzmán, Shin, & Cha, 2021; O'Connor, Smyth, & Williams, 2015). However, there are still many gaps in our knowledge. For example, to what extent is future thinking associated with suicide risk across the lifespan and among those from different backgrounds? In addition, what is the relationship between future thinking and other established risk and protective factors (e.g., entrapment/defeat, depression, anxiety, optimism/pessimism, and stress) linked with suicide? I will return to these questions later in this chapter and throughout the thesis.

The development of theories of suicide has helped guide new research to understand and better predict suicidal thoughts and suicidal behaviours. For instance, the Cry of Pain hypothesis is among the first theories to emphasise the role of defeat, entrapment, and positive future thinking (Williams, 1997; Williams & Pollock, 2000, 2001) in suicidal behaviours. In the current thesis, however, the theoretical focus is on the Integrated Motivational-Volitional (IMV) model of suicidal behaviour (O'Connor, 2011; O'Connor & Kirtley, 2018) which is described in detail in section 1.6.6. In brief, within the context of the IMV model, this thesis aims to investigate the relationship between future thinking (positive future thinking and negative future thinking) and suicide risk (a history of suicidal thoughts and/or suicidal behaviours). In doing so, we hope to broaden the understanding of the role of differences in individuals' thoughts about their own future in the context of suicide risk.

Before providing more details about the psychology of suicide risk, in the proceeding sections, suicide terminology, the scale of suicide and socio-demographic risk factors are described.

1.2 Suicide Terminology

The knowledge and use of suitable language when addressing issues about suicide are important to decrease the stigma around help-seeking. It is also important to have a shared understanding of what we mean about the different terms used in the suicide research field. The use of appropriate terminology by healthcare professionals and those who refer individuals to care will also contribute to and facilitate adequate and timely care of people who are at risk of suicide and those affected by suicide. Appropriate terminology also helps to convey respect and sensitivity to the experiences of those individuals who are affected by suicide.

Considering the complexity of the debate about terminology, it is important to review the definitions of suicide, suicidal behaviour and suicidal ideation. Etymologically, suicide is derived from the Latin sui- of self and caedere- to cut down (Turecki & Brent, 2016). Suicide is defined by the World Health Organisation as 'the act of deliberately killing oneself, initiated and enacted by the individual concerned in the full expectation regarding its fatal outcome', while suicide attempt is defined as 'any non-fatal suicidal behaviour, referring to deliberate self-inflicted poisoning, injury, or self-harm, which may or may not have fatal intent or outcome' (WHO, 2014). On the other hand, O'Carroll *et al*. (1996) suggested the following definitions: 'Suicide is a self-inflicted death with evidence, whether explicit or implicit, of intention to die. Suicide attempt is a self-injurious behaviour with nonfatal outcomes accompanied by evidence of intention to die.' O'Carroll *et al*. (1996) also proposed a definition for an aborted suicidal attempt and defined it as 'potentially self-injurious behaviour with evidence of intention to die but was stopped before physical damage occurred'. Suicidal ideation is defined as 'thoughts of serving as the agent of an individual's death'. Suicidal intent is 'subjective expectation and desire for a self-destructive action to end in death'.

Additionally, Klonsky, May, and Saffer (2016) defined suicidal thoughts or suicidal ideation as 'thinking about, considering, or planning suicide'. The suicidal process is defined as the development and progression of suicidal ideation and suicidal behaviours within an individual, and in interaction with their environment. This process may move from thoughts about killing oneself, which can grow via often repeated non-lethal suicidal acts with increasing potential fatality and suicide intent, in some cases leading to death by suicide (van Heeringen, 2001).

Previous studies have illustrated that patients who had a history of suicide attempt are at high-risk of future suicide ideation and suicide attempts (Harris & Barraclough, 1997; Hawton & van Heeringen, 2009; Kraijnak, Miranda, & Wheeler, 2013; O'Connor, Smyth, & Williams, 2015). Suicide ideation is also an important predictor of future suicide deaths, alongside previous psychiatric hospitalisations and suicide attempts (Harmer, Lee, Rizvi, & Saadabadi, 2024).

In this thesis, in Chapter 3, we divided participants into two groups (i.e., participants with a history of suicidal thoughts and/or suicidal behaviours versus participants without any history of suicidal thoughts or suicidal behaviours). Then, for the experimental study (Chapter 4), we recruited participants with a history of suicidal behaviours and/or suicidal thoughts and participants without any history of suicidal behaviours or suicidal thoughts to compare these groups in terms of positive future thinking ability, along with some psychological factors involved in the suicidal process. Therefore, in this thesis, the term 'suicide risk' is used to refer to having or not having a history of suicidal thoughts and/or suicidal behaviours.

1.3 The Scale of Suicide Worldwide

1.3.1 Global Rates and Methods of Suicide and Suicide Prevention

In 2019, about 703,000 deaths by suicide were documented worldwide, and overall, suicides accounted for 1.4% of premature deaths globally (WHO, 2021). Moreover, millions of individuals attempt suicide, engage in non-suicidal self-injury, or experience suicidal ideation (O'Connor *et al.*, 2018).

The rates of suicide vary across different regions and countries of the world as well as in terms of age, gender, and socioeconomic status. For example, suicides are three times more common in males than females in high income countries and 77% of all suicides occur in low- and middle-income countries globally (WHO, 2021). This is not surprising given that low- and middle-income countries are home to more than 85% of the world's population (Jacob *et al.,* 2007). The relationship between mental illness and suicide risk is well-established, with clear relationships with depression, substance use, and psychosis (Bachmann, 2018), alongside anxiety, personality disorders, and organic mental disorders (Brådvik, 2018). When considering suicide rates globally, it is also important to remember that there is a significant possibility of under-reporting (Bachmann, 2018).

The most common methods of suicide vary from country to country, with hanging most common in the UK, handguns in USA, and pesticides in Asia (O'Connor & Pirkis, 2016). Indeed, suicides are preventable by limiting access to specific means of suicide (e.g., pesticides, firearms, and certain medications), as well as through training primary care physicians and health workers to identify individuals at risk, by offering compassionate psychosocial assessments for those in crisis, by providing sufficient follow-up care, by fostering adolescents' socio-emotional life skills, and by promoting the responsible reporting of suicide by the media (WHO, 2021). To summarise, suicidality represents a major public health concern; hence it should be a high priority nationally and internationally.

1.3.2 The Burden of Suicidal Behaviour

Suicide is often talked about as a rare event; however, it is obvious from the WHO statistics mentioned under the 'the global epidemiology of suicide' section that this can be misleading. Although the major motivation for suicide is to stop unbearable personal mental suffering (Verrocchio *et al*., 2016), the impact on those left behind is devastating. Of course, every suicide is the result of deep personal suffering and mental anguish, but every life lost to suicide also impacts upon families, communities and entire countries and has long-lasting influences on the individuals left behind, with feelings of shame, guilt, and pain (Cerel, Jordan, & Duberstein, 2008). Feelings of guilt are common among individuals following a suicide bereavement (Wagman, Hofmann, & Grafiadeli, 2021). Additionally, according to findings from a recent systematic review and meta-analysis, experiencing parental suicide is related to an almost three-fold increased risk of dying by suicide and an almost two-fold increased risk of suicide attempt(s) in offspring compared to those with two living parents (Calderaro *et al.*, 2022). At an individual level, the cost of suicide is enormous. However, its cost is also huge from an economic point of view. Suicidal behaviour is a considerable economic burden for society (Shepard *et al*., 2016). For instance, other than causing mental distress, suicides also result in productivity loss and rising medical expenses. Herein, each suicide is estimated to cost about £1.7m (Department of Health and Social Care, 2017), and most of this cost, approximately 70%, is its emotional impact on families and societies in various ways, such as loss of productivity, leaving work or education, and increased need for mental health services (e.g., feeling intense grief, guilt, and hopelessness).

The national cost of suicide in the UK is around £10 billion a year. Lately, there is also a growing cause for concern regarding the increased risk of suicide due to the cost-of-living crisis (Sinyor *et al*., 2023).

In the following sections, although we present demographic, individual, and psychological factors associated with suicide risk in separate sections they are not independent from each other in terms of their relationships to suicide and future thinking. Suicide is a complex phenomenon and the pathways to suicidal ideation and suicidal behaviour involve many domains of factors, such as psychological, clinical, environmental, biological, social, and cultural risk factors and their interactions (Ajdacic-Gross, 2015).

1.4 Demographic Characteristics Associated with Suicide Risk

There is a wide range of sociodemographic factors associated with suicidal thoughts and suicidal behaviours, such as age, gender, socio-economic status, unemployment, levels of education, and geography as summarised below.

1.4.1 Age

The proportion of all deaths attributed to suicide varies hugely by age. In developed countries, suicide is most common among middle-aged and older males, although rates among young individuals are rising (Bachmann, 2018). Deaths by suicide in individuals aged 15 to 29 years account for 8.5% of all deaths, and suicide is the second leading cause of death in this age group after traffic accidents, while among adults aged 30-49 years, suicide is responsible for 4.1% of all deaths and it is the fifth leading cause of death worldwide (Bachmann, 2018). According to WHO statistics (2021), 58% of all suicide deaths occur before the age of 50, and suicide is the fourth leading cause of death among individuals aged 15-29. In contrast, although adolescents are at high risk of suicide attempts, individuals between the ages of mid 50’s to early 60’s were 41% more likely to die from suicide compared to individuals between the ages of 15 and 24 (Kposowa, 2000).

1.4.2 Gender

There are marked gender differences concerning suicidal thoughts and suicidal behaviour, which contribute to what is known as the gender paradox of suicide. For instance, while women are more likely to experience suicidal thoughts and non-fatal suicidal behaviours, men are much more likely to take their own lives. While women are approximately three times more likely to attempt suicide, men are two to four times more likely to die by suicide (Vijayakumar, 2015). In other words, suicide attempt rates are higher among women than men but deaths by suicide are higher among men than women. In England, about 8% of women and 5% of men state they have attempted suicide at some point throughout their lives (McManus, Bebbington, Jenkins, & Brugha, 2016), while in Scotland, 13.8% of women and 8.8% of men between 18- and 34-years old reported that they had attempted suicide and of those who had attempted suicide, most had also engaged in self-harm (O'Connor *et al.*, 2018). On the other hand, it is important to note that women are commonly over-represented in research studies examining suicide and they are more likely, compared to men, to disclose their suicidal thoughts and behaviours (Lloyd, Blazely, & Phillips, 2018). The difference between suicide attempts and suicides between men and women may be explained, in part, by the method of suicide used, as men tend to use more lethal suicide methods (e.g., firearms and hanging), whereas women tend to use less lethal methods of suicide, such as medications or drugs (Callanan & Davis, 2011).

1.4.3 Socio-economic Status, Unemployment, and Levels of Education

Differences in suicide exist as a function of socio-economic status (SES). Specifically, lower SES has been found to be related to poorer mental and physical well-being outcomes (O'Connor *et al*., 2021), reduced access to affordable healthcare (WHO, 2021) and increased risk of death from suicide (Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005). Unemployment and lower levels of education have also been found to be associated with suicidal thoughts, suicidal behaviours, and suicide death (Lorant *et al*., 2005). In terms of the National Statistics Socio-Economic Classification (NS-SEC), the highest rates of suicide were registered in the group classified as never worked and long-term unemployed (men: 37.14 per 100,000 people, 95% CI: 35.09 to 39.31, women: 12.01 per 100,000 people, 95% CI: 11.00 to 13.10), while the lowest rates were observed in those classified as having higher managerial, administrative, and professional occupations (men: 12.63 per 100,000 people, 95% CI: 11.64

to 13.70, women: 4.56 per 100,000 people, 95% CI: 3.99 to 5.20) in England and Wales from 2011 to 2021.

1.4.4 Geography

The prevalence of deaths by suicide changes appreciably across continents even though there has been a decrease in suicide deaths worldwide over the past three decades (WHO, 2021). When the WHO started documenting such deaths, the highest rates were recorded in Japan, and then the peak shifted to Eastern Europe (from the 1960s to 1980s to Hungary, from the 1990s to the 2010s to Lithuania), and to Asia thereafter (Värnik, 2012) with China and India accounting for 30% of the absolute suicide numbers globally (Bertolote & Fleischmann, 2002). Vijayakumar (2004) also reported that 54% of all suicides worldwide occur in China and India. However, China and India, with a total population of roughly 2.4 billion, were home to more than a third of the world's population of about 6.5 billion in 2004.

Suicide rates in African (11.2 per 100 000), European (10.5 per 100 000) and South-East Asia (10.2 per 100 000) regions were higher in comparison to the worldwide average (9.0 per 100 000) in 2019, and the lowest suicide rate was in the Eastern Mediterranean region (6.4 per 100 000) (WHO, 2021). Moreover, according to WHO (2021), over three-quarters of suicide deaths take place in low- and middle-income countries in comparison to high-income countries, suggesting that financial, nutritional, and health-related factors may also influence the prevalence of suicide. Although Japan is the third largest country in the world by nominal GDP and the fourth largest by purchasing power parity (PPP) in 2019, Japan had 15.3 suicide deaths per 100, 000 of the whole population, significantly exceeding the world average of 9.0 deaths per 100,000 (WHO, 2021).

Of course, demographic characteristics alone can only provide a crude assessment of the risk of suicide, and so other factors, such as individual differences and psychological variables that may lead to suicide need to be considered to understand why suicide occurs and to improve the identification of high-risk groups.

1.5 Individual Differences

Individual differences span a wide range of variables including sexuality, ethnicity, psychiatric disorders, physical or mental illnesses and personality factors, some of which are summarised below in the context of suicide risk.

1.5.1 Sexuality and Ethnicity

High-quality registry-based studies indicate that suicide is more common in sexual minority groups (Erlangsen *et al.,* 2020). Although research suggests that suicide risk is higher in sexual minority groups it is not possible to investigate this in the national statistics in the UK, as routine mortality statistics do not record sexuality (Plöderl & Tremblay 2015). This hampers our understanding of suicide risk in terms of sexual minority status in Britain. Nonetheless, Chum *et al*. (2023) found that sexual minority individuals were 2.10 to 4.23 times more likely to report suicide-related behaviour events in comparison to their heterosexual counterparts. In this latter study, bisexual individuals had the highest risk as they were 2.98 times (95% CI=2.08–4.27) more likely to have suicidal experiences, followed by gay/lesbian individuals who were 2.10 times (95% CI=1.18–3.71) more likely compared to their heterosexual counterparts, and this disparity relative to heterosexual comparisons was greatest for women. What is more, according to the findings from a systematic review, there is also evidence supporting an excessive risk of mental health problems in sexual minority groups compared to those who identify as heterosexual (Plöderl & Tremblay 2015).

In terms of ethnicity, data from England and Wales suggest that suicide age-standardised mortality rates (ASMRs) in males were higher in White and Mixed ethnic groups compared to suicide ASMRs in other groups (i.e., Bangladeshi, Indian, Pakistani, Asian, Black African, Black Caribbean, Black other, and other ethnic groups); and in females, the suicide rate for the Mixed ethnic group was higher in comparison to other groups (Office for National Statistics, 2021). Results from a recent literature overview also suggest that among specific migrant populations and ethnic minorities, young women of South Asian and black African origin, present a higher risk of suicidal behaviour and death by suicide compared to native populations (Forte *et al.*, 2018).

1.5.2 Psychiatric Disorders: Depression, Bipolar, and Personality Disorders

It has been well established that depressed mood is often a key component of the suicidal mind (Turecki *et al*., 2019). According to psychological autopsy studies, approximately half of all suicides are associated with mood disorders (Cho, Na, Cho, Im, & Kang, 2016). More generally, psychological autopsy studies have also shown that in Western countries, psychiatric disorders are evident in around 90% of suicide deaths. It is estimated that the risk of suicide increases in individuals with certain psychiatric disorders, such as major depressive disorder (Cai *et al*., 2021), personality disorders (Bertolote, Fleischmann, De Leo, & Wasserman, 2004; Bertolote & Fleischmann, 2002), and bipolar disorder (Baldessarini, Pompili, & Tondo, 2006). For instance, long-term cohort studies have demonstrated that the standardised suicide death rate for individuals with major depressive disorder diagnoses is 20-fold and 15-fold for individuals with bipolar disorder diagnoses compared to the general population (Rihmer & Döme, 2016). Suicidal behaviour also seems to be more common among those with Bipolar II than Bipolar I diagnoses (Schaffer *et al*., 2015). Thus, monitoring suicide mortality, understanding risk factors that might lead to suicide, and providing adequate treatment to individuals with mood disorders are important to prevent suicide in general.

In the following section, we present psychological models of suicide before describing some psychological variables associated with suicide.

1.6 Psychological Models of Suicide

There has been a growing interest in theories and models of suicidal ideation and suicidal behaviour in recent years (O'Connor & Nock, 2014). This interest is welcome and necessary as it informs the assessment of risk for suicide and it informs the design of interventions and treatments (Barzilay & Cohen, 2017; O'Connor & Nock, 2014). This section provides a brief description of the main diathesis-stress models and theories of suicidal behaviour.

The diathesis-stress models posit that dispositional psychological (or biological) vulnerabilities, when activated by stress, render a person at risk of suicide (Baumeister, 1990; Chang & Sanna, 2001; O'Connor, O'Connor, & Marshall, 2007). Diathesis represents an individual's vulnerability to suicide risk and such vulnerability can be genetic, biological, or

psychological, and include a history of mental illness, personality traits, or past trauma. Traits such as impulsivity and aggression can also increase the possibility of acting on suicidal thoughts (Fazel & Runeson, 2020). All of the main psychological models of suicide risk included here are diathesis-stress models.

1.6.1 Hopelessness Theory (Abramson et al., 1998; Abramson, Metalsky, & Alloy, 1989)

According to hopelessness theory, both elevated levels of stable and unchangeable negative future expectancies and decreased positive future expectancies – hopelessness – have been related to suicide ideation (e.g., Rosario-Williams, Rombola, & Miranda, 2021). According to this theory, individuals may have a negative attributional style, which refers to the tendency to attribute negative events to internal, stable, and global causes, making them vulnerable to developing depression in the presence of negative life events, and then, this attributional bias and negative thoughts may lead to suicidal ideation (O'Connor, Connery, & Cheyne, 2000; Abramson *et al.,* 1998).

1.6.2 Escape from Self-model (Baumeister, 1990)

Baumeister's (1990) escape from self-model posits that failure to achieve unrealistic standards or expectations (both self- or socially imposed) triggers a chain-like process, involving self-blame, negative affect and self-awareness, and a desire to escape from painful self-awareness, making suicide more acceptable and likely, and so leading to suicidal behaviour. Suicide is an escape from the self, where an individual flees from intense overwhelming negative affect to less intense negative affect in the present, but with a long-term cost, i.e., potentially death (Baumeister, 1990; Heatherton & Baumeister, 1991). It seems that when individuals are unable to foresee a more positive future without pain, then suicide is seen as a viable option to end this unbearable pain. For such individuals, suicide is seen as a means of escape from aversive self-awareness regarding their failures and/or the inadequacies that led to their psychological pain.

1.6.3 The Cry of Pain Hypothesis (Williams, 1997; Williams & Pollock, 2000, 2001)

This model emphasises a mediating role of entrapment on the defeat and suicidal ideation relationship, and a moderating role of rescue factors on the entrapment and suicidal ideation

relationship. The Cry of Pain hypothesis defines suicidal behaviour as reactive, as a response to a stressful situation that has three elements: (1) Sensitivity to signals of defeat, (2) no escape/entrapment, and (3) no rescue (e.g., low levels of social support and positive future thinking):

(1) Sensitivity to signals of defeat: Williams, van Der Does, Barnhofer, Crane, and Segal (2008) investigated attentional biases in relation to suicidal behaviours using the emotional Stroop task. An involuntary hypersensitivity to stimuli signalling the "loser" status increases the risk that a defeat response will be triggered (van Heeringen, 2018). Moreover, some individuals may be more sensitive to signals of defeat, making them more prone to perceiving even neutral events as humiliating or defeating, especially while they are low in mood (van Heeringen, 2018). For example, lower than expected performance on a task may lead an individual who is sensitive to defeat to feel that they have failed and therefore, they may feel defeated. This kind of sensitivity has the potential to increase feelings of a need to escape, thereby kick-starting the pathway to suicidal thoughts.

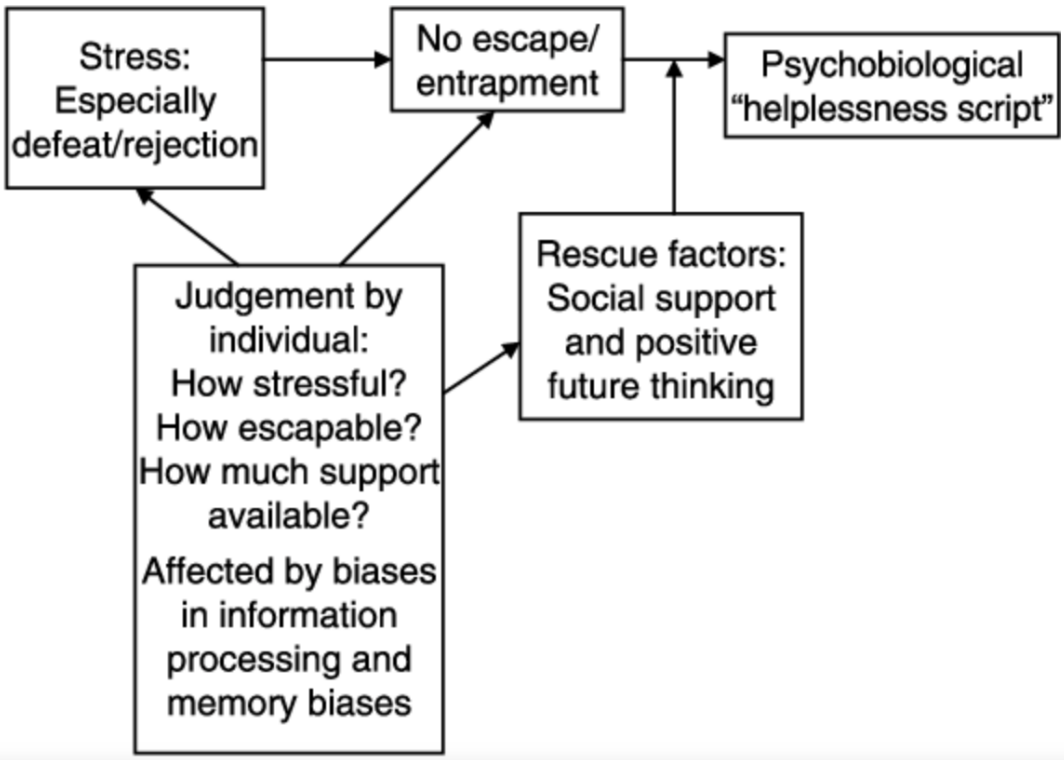
(2) No Escape/Entrapment: Individuals with limited problem-solving skills may see no way to escape from problematic or stressful life events and difficulties in problem-solving are known to be closely associated with the tendency to be over-general while recalling personal past events (Dwivedi, 2012). Retrieving events from the past is important to guide our ongoing behaviours and as a result, if one's memories are less detailed or over-general in content, problem-solving is adversely affected which could increase the likelihood of experiencing entrapment (Dwivedi, 2012).

(3) No Rescue: Limited fluency in generating possible positive future events is reflected in one's perception that there is no escape from problematic life events thereby increasing one's belief that future rescue is not possible. As noted above, having reduced positive future thinking (MacLeod *et al*., 1997; O'Connor *et al*., 2000) is associated with suicide risk (Please see Chapter 2).

Williams and Pollock (2001) posit that biases in information processing and memory deficits (e.g., impaired positive future thinking - low potential for rescue) may affect suicidal behaviour directly. Herein, the Cry of Pain hypothesis states that the existence of factors that increase perception of potential for rescue (e.g., positive future thinking) ought to moderate or

attenuate the impact of inescapability on an individual's wish to die. For instance, if an individual has fewer positive future expectations (which may rescue a person from an unwanted psychologically painful situation and so decrease the levels of feelings of entrapment), this can elevate the likelihood of perceiving the self to be in a state of inescapable entrapment, and that this feeling of entrapment may be due to increased hopelessness about the future (Williams & Pollock, 2000, 2001). Even in the presence of impairments in problem-solving ability, if an individual has things to look forward to or reasons for living, this may abate the likelihood of having a state of mind captured by suicidal feelings along with feelings of defeat and entrapment.

Figure 1.1 *The Cry of Pain Model (CoP; Williams, 2001)*



The following three theories employ the ideation-to-action framework. This framework focuses on understanding how individuals move from contemplating suicide to engaging in suicidal behaviour. They recognise that suicidal thoughts and attempts are related but separate terms. A central argument of such models is that the factors that lead to suicidal thoughts are distinct from the factors associated with suicidal behaviour.

1.6.4 The Three Step Theory (3ST; Klonsky & May, 2015)

The 3-step theory of suicide explains the progression from suicidal thoughts to suicidal behaviours. This theory has three different elements: (1) The combination of physical and/or emotional pain and hopelessness; (2) a sense of connectedness outweighed by pain; (3) the capability to attempt suicide. This theory posits that experiencing both pain, especially psychological pain, and hopelessness can cause suicidal thoughts, which escalates to greater levels of suicidal ideation when pain exceeds an individual's sense of connectedness. Herein, suicidal ideation may lead to a suicide attempt if a person experiences factors that escalates their acquired (i.e., overcoming biological impulses to harm oneself), dispositional (e.g., low pain sensitivity and genetic factors), and practical (e.g., ability to access and use lethal means, and knowledge and proficiency regarding lethal means) capability for suicide (Klonsky & May, 2015; Klonsky, Pachkowski, Shahnaz, & May, 2021).

Briefly, the theory proposes that people first experience intense psychological pain and hopelessness, resulting in contemplating suicide as an escape (i.e., first step). The second step includes feelings of disconnection and perceiving oneself as a burden to other individuals, and this exacerbates the initial distress. Lastly, the third step is the development of a capability for suicide that is characterised by coping with the fear of death and obtaining the means to attempt suicide.

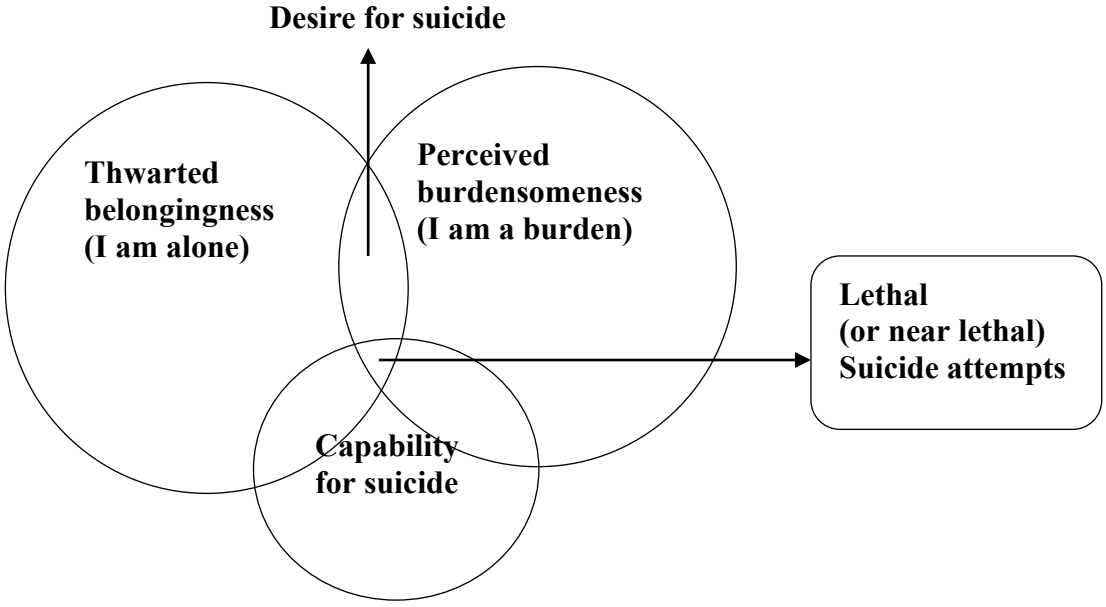
1.6.5 Interpersonal Theory of Suicide (IPT; Joiner, 2005; van Orden et al., 2010)

The interpersonal theory of suicide was developed by Joiner (2005) and further expanded upon by van Orden and colleagues (2010). The Interpersonal Theory of Suicide attempts to explain why most individuals with suicidal thoughts do not attempt suicide by focusing on the 'unmet need to belong' and positing distinct pathways by which suicidal desire and both nonfatal and fatal suicide attempts emerge (Joiner, 2005; van Orden *et al*., 2010). In this respect, the interpersonal theory is the first suicide theory positioned within what would afterwards be called the ideation-to-action framework; distinguishing between factors related to the emergence of suicidal thoughts from factors related to suicidal behaviour (Klonsky & May, 2014; Klonsky, May, & Saffer, 2016).

As demonstrated in Figure 1.2, the IPT posits that desire for suicide emerges through the existence of both thwarted belongingness, the feeling of alienation from others, and perceived

burdensomeness, the feeling of being a burden on others, leading to the desire to die. This model overlooks some key drivers of suicide, such as defeat and entrapment which were involved in the CoP model.

Figure 1.2 *Causal pathways to lethal or near-lethal suicidal behaviour from the perspective of the Interpersonal Theory of Suicide (Joiner, 2005; van Orden et al., 2010)*



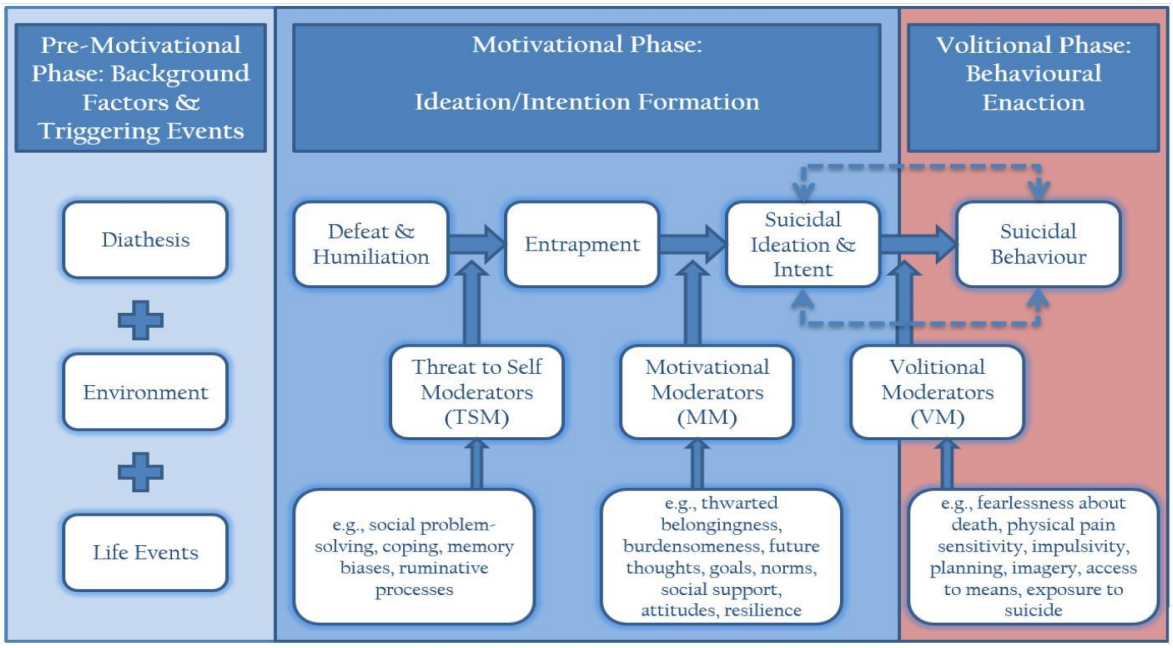
1.6.6 The Integrated Motivational-Volitional (IMV) Model of Suicidal Behaviour (O'Connor, 2011; O'Connor & Kirtley, 2018)

The Integrated Motivational-Volitional (IMV) Model (O'Connor, 2011; O'Connor & Kirtley, 2018) of suicidal behaviour describes the process through which an individual moves from feelings of defeat or humiliation to feelings of entrapment, which may be followed by suicidal thoughts and suicidal intent and that various factors, including cognitive biases, may affect the transition through these paths (Figure 1.3). As the name suggests, the IMV model integrates factors from existing theoretical models and includes the conceptualisation of suicide as a behaviour developing through the pre-motivational phase (e.g., genetics, life events and environment), the motivational phase (e.g., ruminative processes, future thinking, and social support) and the volitional phase (e.g., impulsivity, mental imagery, and implementation intentions) rather than being a result of mental disorders. In the pre-motivational phase, biology, genetics, and negative life events may play a role in predisposing the person towards suicidal thoughts and acts. Within the motivational phase, suicidal thoughts and plans start

developing owing to the impact of negative beliefs, feelings, and appraisals (e.g., defeat, humiliation, and entrapment).

In the final phase, namely the volitional phase, variables, such as access to means or impulsivity increase the likelihood that someone acts on their thoughts of suicide, i.e., engaging in suicidal behaviour. Each phase is described in detail in the following sections.

Figure 1.3 *The Integrated Motivational-Volitional Model (O'Connor, 2011; O'Connor & Kirtley, 2018)*



1.6.6.1 Pre-motivational Phase: Background Factors and Triggering Events.

The pre-motivational phase of the IMV model describes the stress-diathesis interaction. It comprises elements which may lead to suicidal thoughts and suicidal behaviours by elevating one's sensitivity to stress (O'Connor & Kirtley, 2018). These background factors or triggering events may emerge before birth, have an organic (e.g., genetic) origin, or may develop later in life via environmental or psychological experiences or exposures (O'Connor & Kirtley, 2018). Herein, diatheses consist of biological, genetic, or cognitive vulnerability factors or individual differences that increase suicide risk. Understanding triggering events (i.e., the social and environmental factors, such as an economic recession) leading to suicide has a long history (e.g., Durkheim, 1897). Additionally, negative life events that occur at any stage of

life are also risk factors (McLaughlin, O'Carroll, & O'Connor, 2012; Serafini *et al*., 2015). The overarching premise of the IMV model is that the pre-motivational factors influence suicide risk via their effects on the elements within the motivational and volitional phases.

1.6.6.2 Motivational Phase: Ideation/Intention Formation.

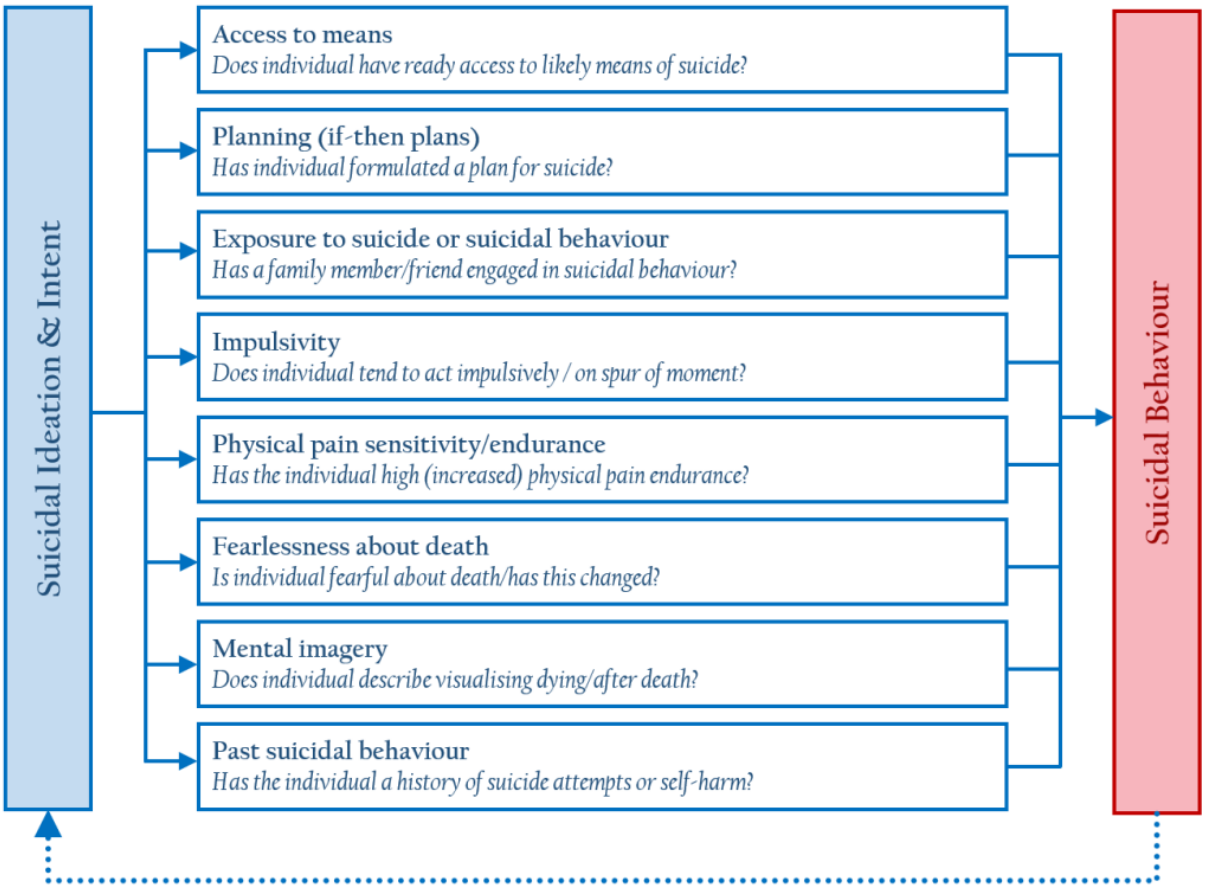
The motivational phase involves three key elements (i.e., defeat, entrapment, and suicidal ideation), all of which are studied within this thesis. Feelings of defeat and/or humiliation and a sense of entrapment are the proximal predictors of suicidal ideation. In this phase, threat to self-moderators can increase or decrease the likelihood of the transition between defeat and entrapment. These moderators include factors, such as memory biases, social problem-solving, coping, and ruminative processes. The IMV model posits that having adaptive coping strategies, such as effective social problem-solving abilities, may protect an individual from making the transition from defeat to entrapment; while impairments in such abilities may worsen the situation and lead to entrapment (McMahon *et al*., 2013). Brooding rumination is also posited to be an important threat to self-moderator of the relationship between defeat and entrapment. Additionally, it is posited that while the existence or absence of risk and/or protective factors renders defeat more or less likely to lead to entrapment, the presence of motivational moderators buffers or catalyses the likelihood that entrapment leads to suicidal ideation. For instance, future thinking, which is the capacity to mentally project oneself into possible future scenarios, especially disrupted positive future thinking is hypothesised to be one of the most important motivational moderators within the suicidal process (as summarised above).

According to the IMV model, the motivational phase is triggered via a stress-diathesis interactive effect between pre-motivational factors and current stressors (O'Connor & Kirtley, 2018). Such stressors can be either internal (e.g., memories and illness) or external (e.g., injury and social rejection) stimuli which resonate, consciously or unconsciously, with an individual's early life exposures and core beliefs. This, therefore, makes triggers of the stress diathesis unique to everyone (O'Connor *et al*., 2020).

1.6.6.3 Volitional Phase: Behavioural Enaction.

The final phase of the IMV model is comprised of volitional moderators (behavioural enaction factors, Figure 1.3.1) which determine whether an individual acts on their thoughts of suicide or not. In short, these are the factors that govern the transition from suicidal ideation to suicidal attempts. Although factors such as entrapment may be associated with suicide attempts, owing to their association with suicidal thoughts, the basic principle of the IMV model is that volitional moderators are central to transition. The IMV model proposes that the components of the acquired capability for suicide (e.g., access to means) are volitional moderators. According to the IMV model, however, factors that govern the transition from ideation to behaviours are broader than capability as volitional moderators may also be environmental, psychological, social, or physiological in nature.

Figure 1.3.1 *Volitional Factors of the Integrated Motivational-Volitional Model*



Different aspects of the IMV model have already been examined empirically and found to explain a considerable amount of variance in suicide attempts, suicidal thoughts, defeat, and entrapment (Dhingra, Boduszek, & O'Connor, 2015). Examining the theories/models mentioned above, the IMV model (O'Connor, 2011; O'Connor & Kirtley, 2018) seems to explicitly characterise future orientation. Therefore, as the IMV model is more comprehensive and explicitly characterises future orientation we have focused on it here as the overarching framework for the PhD.

1.7 Psychological Factors and Suicide Risk

The sociodemographic and psychiatric factors mentioned in sections 1.4 and 1.5 do not fully explain why suicide occurs. As a result, it is important to investigate psychological factors, such as defeat, entrapment, optimism/pessimism, death-related mental imagery, hopelessness, mental pain, future-oriented repetitive thinking and future thinking to help to make sense of the suicidal process.

1.7.1 Defeat and Entrapment

Defeat and entrapment are important factors within the suicidal process (O'Connor & Nock, 2014). The sensitivity to signals of defeat, which is defined as failed social struggle and feelings of being brought down, may be influenced by several factors, such as pessimism and negative affect (O'Connor & Kirtley, 2018). Entrapment is defined as the perceived inability to escape or be rescued from aversive situations and it has two components: Internal entrapment which is about being trapped by pain triggered by internal thoughts and feelings, while external entrapment refers to situations or individuals in the outside world that trigger motivation for escape (Gilbert & Allan, 1998). Defeat and entrapment have received great attention within social-rank theories of depression. However, discussions of arrested flight that describes a situation in which someone is defeated but cannot escape (Rasmussen *et al*., 2010) have been applied to understanding suicide risk (Williams, 2001; Gilbert & Allan, 1998; O'Connor, 2011; Taylor, Gooding, Wood, & Tarrier, 2011). For instance, Wetherall, Robb, and O'Connor (2018) showed that entrapment was a mediator of the defeat and suicidal ideation relationship, and it was also found to be directly associated with suicidal behaviour in adolescents (Park *et al*., 2010). In addition to this, in a study of community-based adolescents carried out by Pollak, Guzmán, Shin, and Cha (2021), defeat/entrapment was found to be

associated specifically with a history of suicidal ideation, but not with a history of suicide attempt. Defeat/entrapment was also associated with baseline suicidal ideation severity above and beyond depressive symptoms, while defeat/entrapment predicted future suicidal ideation while controlling for history of suicidal ideation. In another recent study conducted by Höller Kremers, Schreiber, and Forkmann (2022), defeat and internal, but not external entrapment was found to be associated with (a change in) suicidal ideation while internal entrapment was found to predict suicidal ideation. This study also showed that internal entrapment and defeat predicted a change in suicidal ideation over time.

1.7.2 Optimism and Pessimism

Positive and negative expectations about the future are important to understanding vulnerability to mental health problems. Optimism, a tendency to expect good things in the future, is a mental attitude that greatly affects physical and mental health as well as coping with daily social and working life (Conversano *et al*., 2010). Herein, Conversano *et al.* (2010) highlighted that optimism may impact upon mental and physical well-being significantly through the promotion of a healthy lifestyle along with adaptive behaviours and cognitive responses, associated with greater flexibility, problem-solving ability, and a more efficient elaboration of negative information. In addition, Chang *et al.* (2013) found optimism/pessimism to be a robust predictor of suicide risk in adult primary care patients, and that the optimism/pessimism and future orientation interaction significantly augmented the prediction of both depressive symptoms and suicidal behaviour. Later, Yu and Chang (2016) also showed that optimism/pessimism and future orientation are important positive cognitions associated with suicidal ideation for specific ethnic minority college students such as Asian Americans, African Americans, and Latino Americans. Finally, in another study, college students with high optimism had reduced risk of suicidal ideation or attempts when faced with negative life events in comparison to those with low optimism (Hirsch, Wolford, LaLonde, Brunk, & Parker, 2007).

1.7.3 Death-related Mental Imagery

Mental imagery is defined as experiencing a form of mental representation of the same type that emerges when a stimulus or an object actually exists and is perceived (Moulton & Kosslyn, 2009). It is usually measured by asking participants to form mental images of

possible positive and negative future events and rate those in terms of vividness or the ease with which they think of the image. Constructing images of the future requires perceptual representations of past events stored in long-term memory (Byrne, Becker, & Burgess, 2007).

Suicidal mental imagery, which is defined as mentally imagining suicide-related content (e.g., mentally imagining hanging oneself) (Lawrence *et al*., 2021) has been found to predict the more intense and longer duration of suicidal cognitions, a higher likelihood of having made a suicide plan, and a higher likelihood of having made a suicide attempt over and above suicidal verbal thoughts in undergraduate students with a lifetime history of suicidal cognitions (Lawrence, Nesi, & Schwartz-Mette, 2022). In addition to this, in comparison to adults who have not attempted suicide, adults who have attempted suicide reported more suicidal mental imagery (Crane, Shah, Barnhofer, & Holmes 2012). Self-harm and suicide related imagery can also play a role in the transition from thoughts to suicidal acts. For example, mental imagery around attempting suicide has been shown to be associated with 'worst ever' suicidal ideation in a clinical sample of depressed individuals (Holmes, Crane, Fennell, & Williams, 2007). Being less distressed by mental images of self-harm and suicide is also related to greater levels of suicidality (Crane, Shah, Barnhofer, & Holmes, 2012). Therefore, variables, such as mental imagery, suicidal mental imagery, or death-related mental imagery should be targeted for suicide assessment and intervention in individuals with suicidal experiences (Lawrence, Nesi, & Schwartz-Mette, 2022). In this thesis, we used the term of ‘death-related mental imagery’ to refer to suicidal mental imagery and non-suicidal but death-related mental imagery.

1.7.4 Hopelessness and Mental Pain

Consideration of cognitive-emotional factors, such as hopelessness and mental pain or psychache/emotional-psychological pain are also important to understand suicidal behaviour (Troister & Holden, 2010). For example, we know that suicide is an escape from mental pain (Baumeister, 1990). Hopelessness is also really important when we are considering suicide risk as it confers risk for suicide ideation, attempt, and death (Ribeiro, Huang, Fox, & Franklin, 2018). It is a broad construct defined as generalised pessimism for the future, which has cognitive, affective, and attitudinal elements (Pan & Chiou, 2004). Hopelessness has been widely studied and it has been found to predict suicidal thoughts (Sareen *et al*., 2005), suicide attempts (Klein, Schwartz, Rose, & Leader, 2000) and deaths by suicide (O'Connor, Smyth,

Ferguson, Ryan, & Williams, 2013). Hopelessness has also been found to predict suicidal behaviour independently of depression (O'Connor & Nock, 2014). As many studies have investigated the relationship between hopelessness and suicide risk, it is not the focus of this thesis, but it is important to highlight its role here.

1.7.5 Future-oriented Repetitive Thinking

Future-oriented repetitive thinking, which refers to a more general process of repetitive thinking about the future (Miranda, Wheeler, Polanco-Roman, & Marroquín, 2017), may also confer a risk for suicidal behaviour. For instance, individuals with a lifetime history of a suicide attempt and/or suicidal thoughts have been shown to have higher levels of pessimistic repetitive future thinking than those with no history of suicide attempt (Miranda *et al*., 2023; Miranda, Wheeler, Polanco-Roman, & Marroquín, 2017).

1.7.6 Future Thinking and Suicide Risk

As noted earlier, future thinking is defined as the capacity to mentally project the self into possible future scenarios and it has two types in terms of valence: Positive future thinking (i.e., things that someone is looking forward to) and negative future thinking (i.e., things that someone is not looking forward to) (MacLeod *et al*., 1993). As noted above, pessimism for the future, characterised by reduced positive future thinking in the absence of any increase in negative future thinking, has long been associated with suicidal ideation and suicidal attempts, and this difference in positive future thinking in suicidal individuals is independent of depression (e.g., MacLeod *et al*., 1993; MacLeod, Pankhania, Lee, & Mitchell, 1997; MacLeod *et al*., 1998; Conaghan & Davidson, 2002; Hunter & O'Connor, 2003; O'Connor, Fraser, Whyte, Machale, & Masterton, 2008).

The most common method of investigating future thinking is to use a form of the verbal fluency task (MacLeod, Pankhania, Lee, & Mitchell, 1997). Traditional forms of verbal fluency tasks involve asking participants to generate as many words as possible in one minute within a semantic category, such as categories of fruits (category fluency), or starting with a given letter, such as words beginning with the letters of F, A, and S (letter fluency) (Please see Strauss, Sherman, & Spreen, 2006, for specific administration instructions). Here, the number of unique correct words constitutes the participant's score in each task. However, in

the 1990s, MacLeod and colleagues (MacLeod, Rose, & Williams, 1993; MacLeod, Pankhania, Lee, & Mitchell, 1997; MacLeod *et al*., 1998) developed a Future Thinking Task (FTT) in which individuals are asked to think of possible future positive events and negative events for a range of future time frames (e.g., next week, next month, next year, and next 5-10 years). It was developed to specifically investigate valence differences (i.e., positive and negative) in individuals' cognitions regarding the future. The administration of the standard FTT involves explicitly asking participants to suggest possible future positive events that an individual is looking forward to or they will enjoy and future negative events that an individual is not looking forward to or they will worry about. MacLeod *et al.* (1998) later added an assessment of two other aspects of future thinking to the standard future thinking task, namely asking about the perceived likelihood of an outcome and its emotional value or importance.

The relationship between future thinking and suicide risk will be further addressed in detail in the second chapter of this thesis, so only an overview of this association is provided here. Across a range of studies, a distinct pattern of future thinking has been documented in individuals with suicidal experiences (MacLeod & O'Connor, 2018). The literature generally shows that the future thinking of individuals with suicidal experiences is characterised mainly by a reduced ability to think of possible future positive events in the absence of any increase in the ability to produce possible future negative events even after controlling for depression, hopelessness, verbal fluency, or an overall negative cognitive style (Hunter & O'Connor, 2003; MacLeod *et al*., 1997; O'Connor, Connery, & Cheyne, 2000; Williams, van Der Does, Barnhofer, Crane, & Segal, 2008). In other words, the research suggest that, in general, compared to controls, individuals with suicidal experiences generate fewer events that they are looking forward to (i.e., positive future thinking; PFT) but do not differ from controls in generating events that they are not looking forward to (i.e., negative future thinking, NFT) (Conaghan & Davidson, 2002; MacLeod *et al*., 1997; MacLeod *et al*., 1993). A composite measure which includes the likelihood and value ratings also demonstrated that individuals with suicidal experiences were characterised by reduced positive future thinking in the absence of any increase in negative future thinking (MacLeod *et al*., 1998).

Suicide risk, therefore, is thought to be related to a valence-dependent imbalance in the relative certainty of future beliefs and sensory-contextual input. Specifically, suicidal beliefs

about the self, the world and the future are considered to be negatively biased beliefs that are held with extreme certainty and hence be impermeable to positive information (van Heeringen, 2018). It seems that the vulnerability to suicide is related to not being capable of processing positive information about the future, and therefore negative life events are more likely to trigger suicidal thoughts through feelings of defeat (van Heeringen, 2018). Individuals with current suicidal ideation and/or recent suicide attempts often have deficits in future thinking, as they appear to be less future-oriented in their thinking (MacLeod *et al*., 1993). Additionally, they tend to generate less detailed or specific future event descriptions. Moreover, in some studies they have been shown to generate fewer future-tense verbs in sentence completion tasks (Greaves, 1971; Yufit, Benzies, Fonte, & Fawcett, 1970). It is also known that suicidal behaviour is associated with fluency deficits, including positive future thinking abilities (van Heeringen, Bijttebier, & Godfrin, 2011).

More recent research has shown that the content, likelihood, certainty, and emotional value ratings of future thoughts are also important. For example, in several studies it has been shown that individuals with suicidal experiences have reduced levels of positive future thoughts for the self but not for others, which may not be protective (MacLeod & Conway, 2007; O'Connor, Smyth, & Williams, 2015). The certainty regarding the probability that a particular outcome will happen also seems to be important along with the type of future thinking (i.e., positive, and negative future thoughts) (Andersen, Spielman, & Bargh, 1992). A study conducted by MacLeod *et al.* (2005) showed that the extent to which individuals with suicide attempts estimated their negative future events as likely to happen was positively associated with levels of hopelessness. This pessimistic certainty about the occurrence of negative outcomes seems to elucidate why the history of suicidal behaviours may be a risk factor for suicide attempts in the future (Krajniak, Miranda, & Wheeler, 2013). Additionally, a study including a detailed investigation of the cognitive content of future anticipations of healthy adults, found that the certainty concerning the lack of positive outcomes predicts suicidal thoughts, beyond the effects of pessimism regarding negative outcomes (Rosario-Williams, Rombola, & Miranda, 2021).

A range of prospective and case control studies have used the future thinking task in individuals with suicidal experiences (e.g., O'Connor, Fraser, Whyte, Machale, & Masterton, 2008; Sidley, Calam, Wells, Hughes, & Whitaker, 1999). However, these participants have mostly been recruited from hospital emergency departments after overdoses and often tested

within a day following the episode. As for control groups, the participants are often those presenting to hospital with minor injuries (to control for the study setting) or are drawn from the general population. As for prospective studies, a 2.5-month longitudinal study of participants with a suicide attempt history found that positive future thinking predicts suicide ideation at follow-up, even after controlling for both baseline suicide ideation and self-reported hopelessness (O'Connor, Fraser, Whyte, Machale, & Masterton, 2008). This finding is consistent with the findings of a study conducted by O'Connor and Hunter (2003) who found that positive future thinking added significantly to global hopelessness scores in being able to better differentiate suicidal participants from controls. However, a one-year follow-up study of 36 individuals at high risk of suicide attempts found that positive future thinking did not predict future suicidal behaviours (Sidley, Calam, Wells, Hughes, & Whitaker, 1999). Additionally, there was one study in the literature reporting no difference across suicidal and non-suicidal participant groups in terms of both types of future thinking, but this study had low statistical power and included participants with intravenous drug use, thereby making the group comparison difficult (i.e., O'Connor, Connery, & Cheyne, 2000).

Overall, there is reliable evidence supporting the idea that individuals with suicidal experiences have a reduced ability to think of things that they are looking forward to. However, the relationship between future thinking and suicide risk is complex and requires further investigations as there are still gaps in the current literature -as will be addressed in the systematic review in Chapter 2. For example, studies examining the relationship between future thinking and suicide risk are mostly cross-sectional in nature (e.g., MacLeod, Rose, & Williams, 1993; MacLeod, Pankhania, & Mitchell, 1997; Hunter & O'Connor, 2003; MacLeod & Conway, 2007). In these studies, to assess future thinking ability, the standard future thinking task was mostly administered using face-to-face interviews with each participant individually, as a result, the labour-intensive nature of completion may have led to too many studies with small sample sizes. Additionally, scant attention has been paid to different aspects of future thinking, such as repetitive future thinking and consideration of future consequences with large sample sizes using online questionnaires (e.g., Gorday, Rogers, & Joiner, 2018). Online administration of future thinking task or measures would make it possible to recruit larger samples and afford the opportunity to investigate more complicated hypotheses. As there are two studies showing that positive future thinking may not be protective against suicide risk over time (i.e., O'Connor, Smyth, & Williams, 2015; Pollak, Guzmán, Shin, & Cha, 2021), we require future research to focus on more diverse and

larger samples. We also need to explore the nature of the relationship between death-related mental imagery and positive future events (e.g., Holmes, Crane, Fennell, & Williams, 2007; Selby, Anestis, Joiner, & Jr, 2007) in individuals with and without suicidal experiences.

1.8 Gaps in the Current Literature Relevant to the Present Research

Although substantial research efforts have focused on understanding the factors associated with suicide risk, our knowledge of the key elements in the transition from suicidal thoughts to suicidal behaviours remains limited. However, as noted above, recent theoretical developments have helped to understand and predict suicidal thoughts and suicidal behaviours, thereby improving prevention strategies and developing interventions (Millner, Robinaugh, & Nock, 2020). Nevertheless, although the complex nature of suicide makes integrated models especially appropriate, there are still many gaps in suicide research as existing theories of suicidal behaviours often focus on a single domain, such as psychological, biological, or environmental factors as was elaborated in section 1.6. There is also a need for further investigation of whether the relationship between positive future thinking and suicide risk varies according to content of positive future thoughts in individuals with and without past suicidal experiences, along with the examination of death-related mental imagery, images about acting out future suicide plans or being dead. There are also only two studies in the literature focusing on the content of future thoughts (i.e., O'Connor, Smyth, & Williams, 2015; Pollak, Guzmán, Shin, & Cha, 2021). Additionally, as is outlined in Chapter 2, most of the studies are cross-sectional and no experimental study has investigated the relationship between future thinking and suicide risk in individuals with and without past suicidal thoughts and suicidal behaviours using a mood induction procedure. Most of the studies have been cross-sectional and they have tended to administer the standard future thinking task to assess future thinking capacity using face-to-face interviews with each participant individually. This has led to many studies with small sample sizes, thereby limiting potential analyses involving multiple variables.

1.9 Current Thesis and Aims

This introductory chapter has summarised the global epidemiology of suicide, along with its impact on society and as well as on individuals. As can be seen from the information presented in this chapter there are particular demographic factors and individual differences

factors which may increase or decrease suicide risk, although these factors do not explain the reasons for all deaths by suicide. The role of psychological factors within the suicidal process has also been highlighted. Within the context of the IMV model (O'Connor, 2011; O'Connor & Kirtley, 2018), this PhD project aims to investigate the relationship between future thinking (positive future thinking and negative future thinking) and suicide risk (a history of suicidal thoughts and suicidal behaviours). Across a range of studies, we aim to explore how people with and without a history of suicidal thoughts and/or suicidal behaviours think about their own future and how this is associated with the risk of suicide.

Several models of suicidal behaviour have been summarised in this chapter. These models suggest that several risk and protective factors interact to increase or decrease the likelihood of suicide. However, the nature of the relationship between future thinking and suicide risk has yet to be fully understood. Therefore, in the current thesis, the main focus will be on future thinking as well as an examination of other variables derived from the IMV model of suicidal behaviour (O'Connor, 2011; O'Connor & Kirtley, 2018).

In brief, first, this thesis aims to present what we know about the relationship between future thinking and suicide risk through a systematic review of the literature. Second, we aim to examine this relationship in the context of existing risk factors for suicide and investigate the nature of this relationship as a function of the content of future thinking and different background characteristics via an online survey study. Thirdly, employing an experimental research design, this thesis aims to investigate the extent to which positive future thinking (PFT) distinguishes between adults with and without a history of suicidal thoughts and/or suicidal behaviours and to examine to what extent established psychological correlates of suicide risk are associated with PFT in adults, following minor fluctuations in mood.

1.10 Research Questions

This thesis consists of three inter-related studies and aims to answer the following research questions:

Study 1. The systematic review study addresses the following research question:

1.) What is the nature of the relationship between future thinking and suicide risk?

Study 2. The survey study addresses five research questions:

1.) What is the relationship between future thinking and suicide risk in the context of existing risk factors (e.g., depression, anxiety, stress and pessimism)?

2.) What is the influence of different types of future thinking in terms of valence (i.e., positive future thinking and negative future thinking), content (e.g., intrapersonal, interpersonal, and achievement), and time periods (i.e., next week, next year, and next 5-10 years) on suicidal risk?

3.) What is the influence of positive future thinking independent of depression in predicting suicide risk (i.e., with a history of suicidal thoughts and/or suicidal behaviours versus without a history of suicidal thoughts or suicidal behaviours)?

4.) Which measure of future thinking (i.e., adapted future thinking task by study authors, Gonca Kose, Rory O'Connor, and Jonathan Evans, from the original standard future thinking task developed by Macleod *et al*. (1993), future-oriented repetitive thought scale by Miranda, Wheeler, Polanco-Roman, and Marroquin (2017), and the considerations of future consequences scale by Strathman, Gleicher, Boninger, and Edwards (1994)) is a stronger predictor of suicide risk?

5. The extent to which other measures of future thinking (i.e., future-oriented repetitive thinking (Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017) with its subdimensions which are pessimistic repetitive future thinking, repetitive thinking about future goals, and positive indulging about the future, and the considerations of future consequences (CFC; Strathman, Gleicher, Boninger, & Edwards, 1994)) with its subdimensions of CFC-Future and CFC-Immediate) moderate the relationship between entrapment (i.e., total entrapment, internal entrapment and external entrapment) and suicide ideation?

Study 3. The experimental study addresses the following research questions:

1. Will there any differences between groups (with and without a history of suicidal thoughts and/or suicidal behaviours) in terms of verbal fluency/cognitive performance?

2.Will individuals with a history of suicidal thoughts and/or suicidal behaviours show a deficit in being able to think of future positive events compared to those without a history of suicidal thoughts and/or suicidal behaviours?

3.Will this PFT deficit exist in individuals with a history of suicidal thoughts and/or suicidal behaviours both for the near- and distant-future (next week or next month versus next year or next 5-10 years)?

4.After a negative mood induction, will the level of PFT decrease more in the group with a lifetime history of suicidal thoughts and/or suicidal behaviours compared to a control group (without suicidal history) and will this effect be independent of depression and/or suicidal ideation?

5.Will individuals with a history of suicidal thoughts and/or suicidal behaviours score significantly more highly than controls on the measures of death related mental imagery, depression, entrapment, and defeat?

1.11 Thesis Structure

Chapter two presents a systematic review study summarising what is known about the relationship between future thinking and suicide risk in the literature. In chapter three, an online cross-sectional survey study examining the relationship between suicide and future thinking with the inclusion of the investigation of other psychological factors, such as depression, defeat, entrapment, repetitive future thinking, and the consideration of future consequences will be reported. Chapter four describes an experimental study comparing two groups of individuals with and without suicidal thoughts and/or suicidal behaviours in terms of positive future thinking abilities (i.e., generating things to look forward to), and established psychological markers of suicide risk (e.g., depression, defeat, entrapment, and death-related mental imagery). Finally, chapter five will synthesise the main findings of the research conducted within this PhD project and discuss these findings in relation to the research questions listed above. This final chapter also addresses the limitations, strengths, and implications of the current research, as well as proposing future research directions on the future thinking and suicide risk relationship.

Chapter 2: A Systematic Review of the Relationship between Future Thinking and Suicide Risk

2.1 Abstract

Background. Suicide is a major public health concern, with one individual dying by suicide every 40 seconds globally. The pathways to suicidal ideation and suicidal behaviour are complex and not yet fully understood, involving psychological, clinical, environmental, biological, social, and cultural risk factors, and their interactions. In this systematic review, we focused on future thinking, an important psychological factor, defined as the capacity to project oneself into possible future scenarios, which is implicated in the suicidal process. We specifically aimed to summarise what is known about the nature of the relationship between future thinking (i.e., positive future thinking and negative future thinking) and suicide risk (i.e., suicidal thoughts and/or suicidal behaviours) in the literature.

Methods. A keyword search of databases (i.e., Ovid databases: Medline, EMBASE, and PsycINFO) was carried out. Research papers for inclusion were restricted to those written in English and that examined future thinking (i.e., positive future thinking - PFT and negative future thinking - NFT) and suicide risk (i.e., suicidal ideation and/or suicidal behaviour).

Results. 325 potential research papers were identified from title and abstract screenings, with 30 studies meeting the inclusion criteria. Fifteen of these were cross-sectional studies with a total of 3633 participants (2002 women, 1190 men, and 441 gender not reported; 114 hospital controls, 1163 undergraduate students, 1490 community controls, and 866 suicide patients). There was clear evidence from these cross-sectional studies that suicidal individuals tend to report a lack of positive future thinking in the absence of any increase in negative future thinking. In addition, suicidal individuals estimate future negative events to be more likely to happen to them and positive future events to be less likely to happen to them compared to controls. Six follow-up studies were included in the systematic review study, comparing a total of 1101 participants (664 female and 437 male participants; 504 admitted to hospitals with minor injuries, 143 undergraduate students, and 454 suicide patients). They yielded some evidence supporting the predictive utility of positive future thoughts on suicide risk over time although a few studies found that not all types of positive future thinking (e.g., intrapersonal positive future thinking) may be protective over time and may even act as a risk factor.

The samples in other types of studies included in this systematic review covered a wide range of populations including those with different mental health disorders, such as personality disorder, psychosis, as well as those with physical illness (e.g., multiple sclerosis; MS).

Conclusions. Despite the heterogeneity of studies in terms of measures, samples and methodologies used, there was clear evidence that impaired positive future thinking is implicated in suicide risk (i.e., suicidal thoughts and/or suicidal behaviours). The clinical and theoretical implications are discussed.

2.2 Introduction

Suicide risk, including suicidal ideation and suicidal behaviour is a major public health problem. Approximately 703,000 individuals die by suicide every year worldwide and it was the fourth most common cause of death among 15-29-year-olds in 2019 (World Health Organization, 2021). However, the aetiology of suicide is complex, with the pathways to suicide, including psychological, clinical, environmental, biological, social, and cultural risk factors, and their interactions. Although considerable progress has been made in understanding suicide in recent decades, our ability to predict suicidal behaviour is reported to be no better than chance (Franklin *et al*., 2017). In addition, much of the past research on suicide has focused on sociodemographic and clinical risk factors with psychological factors being largely ignored until relatively recently (O'Connor & Nock, 2014).

To this end, several psychological models have been developed to better understand the aetiology of suicidal thoughts and suicidal behaviours (O'Connor & Nock, 2014). One such recent model is the Integrated Motivational-Volitional (IMV) Model (O'Connor & Kirtley, 2018; O'Connor, 2011). The IMV model appraises the process by which an individual progresses from feelings of defeat or humiliation to feelings of entrapment, with the latter being part of the final common pathway to suicidal thoughts and suicidal behaviours. The IMV model offers a comprehensive explanation of psychological, clinical, biological, social, and cultural factors, and spans three different phases: (1) The pre-motivational phase includes biological, genetic, or cognitive vulnerability factors or individual differences characteristics that elevate suicide risk (e.g., genetic factors, life events and environment); (2) The motivational phase focuses on the psychological processes leading to the occurrence of suicidal ideation and suicidal intent (e.g., future thinking, ruminative processes, and social support); (3) The volitional phase comprises the factors that govern the transition from suicidal thoughts or suicidal intent to suicidal acts (e.g., social learning, imagery, and implementation intentions).

Hopelessness, a negative view of the future, is thought to be a key element of depression generally (Abramson, Metalsky, & Alloy, 1989). In particular, it has been found to mediate the relationship between depression and suicidal intent in suicidal individuals (Salter & Platt, 1990), and to predict both suicide repetition and its completion (Beck, Brown, & Steer, 1989).

Studies examining hopelessness have, however, mostly relied on a measure of global hopelessness about the future, the Beck Hopelessness Scale (Beck, Weismann, Lester, & Trexler, 1974). This global self-report measure can be influenced by more general factors, such as social desirability (Linehan & Nielson, 1981) and it gives information about individuals' generalized attitudes towards the future rather than more specific, direct information. Therefore, until the 1990s, it was not clear whether a lack of positive future thinking is equivalent to the existence of negative future thinking or whether these two components of future thinking are differentially associated with the risk of suicide. To explore this issue, MacLeod, Rose, and Williams (1993) developed a measure of future cognitions of suicidal individuals, namely the future thinking task based on a verbal fluency paradigm. Within this task, they asked individuals to produce things that they were looking forward to or they would enjoy (i.e., Positive Future Thinking, PFT), and things that they were not looking forward to or they would worry about (i.e., Negative Future Thinking, NFT) across different future time periods (e.g., next week, next month, next year, and next 5-10 years).

Future thinking, a psychological factor, is considered to play an important role within the suicidal process and refers to the ability to mentally simulate the self into the future (D'Argembeau, 2021). Existing research to investigate the relationship between thinking about the future and suicidal thoughts and/or suicidal behaviours does not offer a complete insight into this relationship, even though suicidal behaviour is often conceptualized in terms of a lack of hope for the future. Moreover, although an absence of positive future thinking rather than the presence of elevated negative future thoughts has long been associated with suicidal ideation and suicidal behaviour, a recent study has indicated that not all instances of positive future thinking may be protective towards suicidal behaviours over time. O'Connor, Smyth, and Williams (2015) showed that high levels of intrapersonal positive future thinking (i.e., thoughts concerning oneself, such as being happier and less depressed in the future) predicted repeated suicidal attempts in a prospective study over 15 months within a sample of 388 suicide attempters. Hence, this study demonstrates that the future thinking and suicide risk relationship may be more complex than previously envisaged as it may change as a function of future thoughts' content.

Additionally, mental disorders, especially depression, anxiety and other mood disorders have been also linked to suicide risk (i.e., suicidal thoughts and/or suicidal behaviours). Indeed, according to psychological autopsy studies, more than 90% of individuals whose cause of death is recorded as suicide also have a mental disorder (Cavanagh, Carson, Sharpe, &

Lawrie, 2003). It is also well known from the literature that suicide is more common among individuals who suffer from major depression or other types of mental disorders than individuals without any mental disorders (Blair-West & Mellsop, 2001). Therefore, existing research investigating future thinking in suicidal individuals and/or in different clinical groups should be assessed together. For example, reduced positive future thoughts are related to depression, elevated negative future thoughts have been linked to both anxiety and depression, and diminished positive future thoughts have been reported in those with a suicidal history (Conaghan & Davidson, 2002; MacLeod *et al.*, 1998; MacLeod, Pankhani, Lee, & Mitchell, 1997; Bjarehed, Sarkohi, & Andersson, 2010). Thus, the existence of comorbidity between suicide and mental disorders makes it more difficult to understand the unique role of future thinking in suicidal individuals.

A comprehensive exploration of all studies that have addressed the relationship between future thinking and suicidal thoughts and/or suicidal behaviours (i.e., suicide risk) is warranted. Herein, with this systematic review, we will try to reveal what is known about the relationship between future thinking and suicide risk, such as what points are agreed upon, on which points there are conflicting findings, why there may be conflicting findings, and what are the questions remain to be answered.

2.2.1 Current Aims

This systematic review aims to demonstrate what is known about the relationship between future thinking (positive future thinking and negative future thinking) and suicide risk (suicidal behaviour and/or suicidal ideation).

2.3 Methods

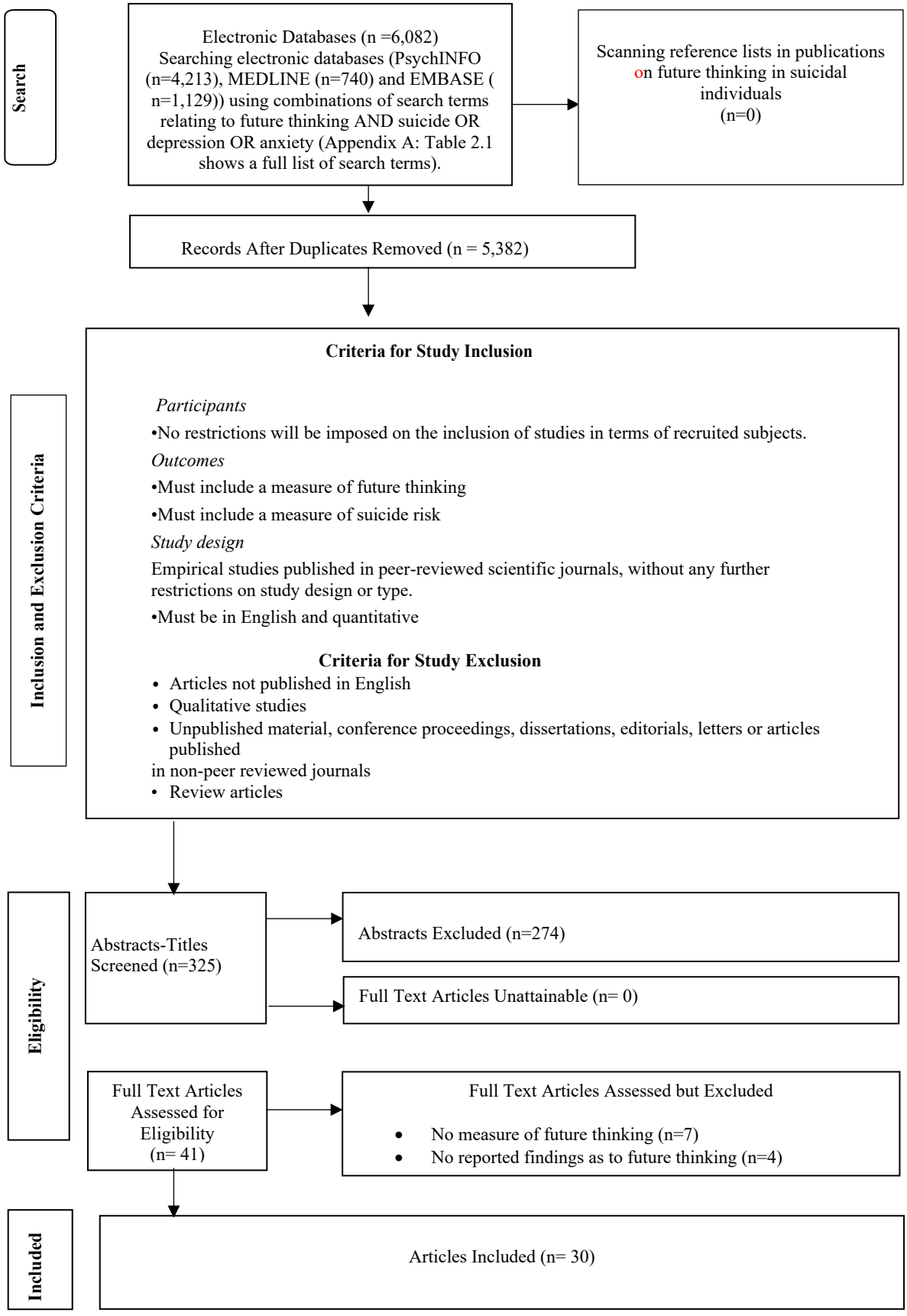
2.3.1 Research Strategy

A systematic search of the following electronic databases was conducted: MEDLINE, EMBASE, and PsycINFO.

The following search terms were used: **(i)** (future thinking or future exp* or future imag* or future event* or prospection or episodic future thinking or future-directed thinking or future-oriented thinking or future anticipation* or mental imag* or mental time travel or prospective memor* or future foresee* or future forecast* or future thought*).tw. and **(ii)** exp Self-Injurious Behavior/ or (suicid* or parasuicid* or self injur* or self injur* behavio?r* or self harm*OR self-mutilation).tw. or Depression/ or depress*.tw. or Anxiety/ or anxi*.tw.

As different terms are used to describe future thinking, a range of keywords were used (Appendix A). Relevant thesaurus terms were also added, as appropriate for each database. PRISMA guidelines (Moher *et al.*, 2015) were followed (Figure 2.1), as such titles and abstracts were initially screened by the first author after duplicates were removed. Then, full texts were assessed for eligibility in addition to screening reference lists of the identified articles to detect further eligible studies. Furthermore, an inter-rater check of 20% of all papers included in this review was conducted to ensure the appropriate inclusion or exclusion of studies by a second reviewer and consensus was reached.

Figure 2.1 *Flow chart of the selection process*



2.3.2 Inclusion and Exclusion Criteria

The inclusion criteria were empirical studies examining future thinking and suicide risk (i.e., suicidal thoughts and/or suicidal behaviours) and published in scientific peer-reviewed journals. No restrictions were imposed on the inclusion of studies in terms of recruited subjects, their designs, or types. Exclusion criteria were studies being qualitative and not published in the English language, unpublished materials, review articles, conference proceedings, dissertations, editorials, letters, or articles published in non-peer-reviewed journals.

2.3.3 Study Selection and Data Extraction

Study selection:

EndNote 9 was used to record the search results and their subsets and to remove duplicates. Next, the titles and abstracts of the remaining studies were screened for possible inclusion and then, the full texts of these remaining studies were screened by the main author. Finally, the references of the articles identified for inclusion were screened by the main author to detect any further eligible material for inclusion.

Data extraction:

A standardised data extraction tool (Appendix B) was prepared to collect data concerning study design and setting, participant demographics, outcomes, conclusions, and study funding sources.

2.3.4 Risk of Bias (Quality) Assessment

Three different quality rating tools were combined (i.e., the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool (Sterne *et al*., 2016), a critical appraisal tool to assess the quality of cross-sectional studies (AXIS) (Downes, Brennan, Williams, & Dean, 2016), and the Cochrane Collaboration's Handbook for Systematic Reviews of Interventions (Higgins *et al.*, 2011) to develop a single quality assessment tool (Appendix C) for this review study. The quality assessment framework appraised the study designs, participants, how the

study outcomes have been defined and measured, and the intervention types. The main reviewer completed quality assessments and a subset of 20% of the included studies both after abstract-title screenings and full-text reviews was sent to a researcher outside the review team to check for inter-rater reliability. Any disagreements between the researchers were solved by discussion and a consensus was reached. Quality assessment scores were computed with higher totals showing higher quality studies (max score = 10).

2.3.5 Strategy for Data Synthesis

Given the heterogeneity of the designs of the included studies and studies focusing on several aspects of future thinking (e.g., PFT and NFT, only PFT, only NFT, and likelihood, emotional value, and number of future thoughts), we did not conduct a meta-analysis. Accordingly, the data synthesis was qualitative overall, focusing on psychological outcome measures, the methodology used, and the description of potential relationships between the findings reported and study characteristics. In order to express, summarise, and interpret the data, tables and figures were used in the narrative synthesis, and the descriptive summary and explanation of the study characteristics and findings were provided using tables and text (e.g., Appendix D - Table 2.4 A Summary Table of Included Studies).

The steps of the narrative synthesis were as follows:

1. A preliminary synthesis of the findings within included studies was developed by the evaluation of the results of each study systematically and comprehensively, and by highlighting the major characteristics of the studies (e.g., emphasizing important similarities and differences regarding study designs, populations, and the measures of study variables).
2. Relationships in the data within and between studies were investigated in detail, and any similarities or differentiations noticed in the findings through the review, which might be owing to the use of different study designs, variations in populations, interventions, settings, and outcomes, were emphasized.

2.4. Results

A total of 6082 studies were initially identified via database searches for potential inclusion in the systematic review (Figure 2.1). 700 duplicates were removed by the search engine and 5382 research papers remained for eligibility. Next, 325 of these studies remained after the title and abstract reviews. After full text evaluation, 30 of these studies met the review criteria and were included in the narrative synthesis. Further information concerning these studies is summarised in Table 2.4 in Appendix D, including the characteristics of each study in terms of measures, participants, and risk of bias (quality) assessment scores.

2.4.1 Methodological Quality

The assessment of the relationship between future thinking and suicide risk (i.e., suicidal thoughts and/or suicidal behaviours) across the studies was quite diverse since the measures varied greatly (e.g., self-report scales, interviews, single item or question, hospital admissions or records as seen in Appendix D). The qualities of studies varied and were mostly rated at a medium level. The majority of the included studies used a cross-sectional design; hence, this renders commenting about causality difficult. Quality assessment scores for each study are included in Appendix D.

Future Thinking Measures

To better understand the influence of future thinking on suicide risk, it is worth taking into account how future thinking was measured. Ten different measures (i.e., self-report questionnaires and/or tasks) were used to assess future thinking within the included studies of this review. The Future Thinking Task (FTT; The Standard Future Thinking Task or The Future Fluency Task or The Personal Future Task - the same tasks with different names; Macleod *et al.*, 1993, 1997, 1998; MacLeod & Byrne, 1996) was the most widely used tool to evaluate future thinking (n=17). There were two studies each using the Impact of Future Events Scale (IFES; Deeprose & Holmes, 2010) and Future Events Questionnaire (FEQ; Miranda & Mennin, 2007). Other questionnaires and tasks were as follows: The Future-Oriented Repetitive Thought Scale (FoRT; Miranda, Wheeler, Polanco-Roman, & Marroquín, 2017); UTSA Future Disposition Inventory-24 (FDI-24; Osman *et al*., 2010); 6 items from the Reasons for Living Inventory (RFL-OA; Edelstein, Kalish, Drozdick, & McKee, 1999); the

Heimberg (1963) Future Time Perspective (FTP) Inventory; Future Self-Projections Tasks (O'Connor, Smyth, & Williams, 2015); and Judgement Task (MacLeod, Williams, & Bekerian, 1991). These measures were used to assess different components of future thinking. Measured constructs via these tools were positive future thinking and/or negative future thinking, future orientation, the probability judgements of the likelihood of positive and/or negative future events, and subjective probabilities of future negative and/or positive events, along with accessibility ratings of explanations for why those events would or would not occur.

Suicide Risk Measures

Participant reports, asking one or more questions, questionnaires, admissions to hospital were the tools to examine suicide risk. The Beck Scale for Suicide Ideation (Beck & Steer, 1991) (n=6), and Admission(s) to the hospital (n= 14), were the most common ways to measure suicidal behaviours and suicidal ideation. The Scale for Suicide Ideation (Beck, Kovacs, & Weissman, 1979), 6 questions from the Diagnostic Interview Schedule for Children (Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000), the Suicide Probability Scale (Suicidal ideation-T1; Cull & Gill, 1989), the Hopelessness/Suicidality Subscale of the Leiden Index of Depression Sensitivity (LEIDS; van der Does, 2002), the Strength of Motivation for Reducing Self-Harm Scale (Parham *et al*., 2017; Robinson, Kavanagh, Connor, May, & Andrade, 2016), Self-Efficacy for Control of Self-Harm (Bandura & Bandura, 2006), the Colombia Suicide Severity Rating Scale (C-SSRS, Posner *et al*., 2011), Self-Harm Imagery Interview (adapted from Hales, Deeprose, Goodwin, & Holmes, 2011) were other tools. Measured constructs were suicide ideation, suicide intent, suicidal history/lifetime suicide attempts, suicidal behaviour, suicide severity, deliberate or non-deliberate self-harm, parasuicide, motivation to control self-harm, self-harm frequency, suicidality, and suicide reactivity.

2.4.2 Study Characteristics

Details of the 30 studies included in the narrative synthesis were shown in Appendix D. In summary, seven studies were published in the 1990s (1993-1999), nine studies were published between 2002 and 2008, with the remaining 14 studies published after 2010. Eighteen studies were conducted in the United Kingdom, 10 in the United States, and only two studies in Western Europe. There were more females (n = 3455) than males (n = 2943) in

the included studies and participants were mostly adults. The study design/method(s) of included studies were cross-sectional, prospective/follow-up, clinical trial/randomised controlled trial, experimental, case report, mixed method (both quantitative and qualitative), and correlational. Fifteen of these studies were cross-sectional with a total of 3633 participants (2002 women, 1190 men, and 441 gender not reported; 114 hospital controls, 1163 undergraduate students, 1490 community controls, and 866 suicide patients). Six follow-up studies were included in the systematic review, which reported on a total of 1175 participants (664 female, 437 male and 74 gender not reported; 504 admitted to hospitals with minor injuries, 143 undergraduate students, 74 community-based adolescents, and 454 suicide patients). Two correlational studies were conducted with individuals who were admitted to hospitals with suicidal behaviours and hospital controls (441 with repeated suicide attempts, 140 suicide patients, and 37 hospital controls; ages ranged from 16 to 65; 203 men and 378 women). There was only one case report describing a 63-year-old man with semantic dementia who was admitted to hospital after attempting suicide by medication overdose. Additionally, there were three mixed studies (with a mean age of 48.5; 272 men and 328 women; 588 community controls, 56 suicide patients, and 22 participants treated for depression). One experimental study investigated the relationship between future thinking and suicidal behaviour in adolescents with a mean age of 15 and recruited 22 girls and 17 boys (N=39). Lastly, two randomised controlled trials with a total of 84 participants were included (61 women and 23 men; age range of 16-25 for 38 participants who recruited via community self-referral and mental health services, and remaining with a mean age of 40).

2.4.3 Narrative Summary of Study Findings

Database searches with the keywords of future thinking, suicide, and related terms (Appendix A) yielded a few cross-sectional studies (n=15) investigating thoughts about the future in the context of suicide using future thinking tasks (e.g., Van Beek, Kerkhof, & Beekman, 2009). Most of these studies administered the standard future thinking task (MacLeod *et al*., 1993) or its adapted versions through face-to-face interviews. These studies assessed (1) participants' subjective probabilities (or the likelihood ratings) of future negative and positive events, (2) their accessibility of explanations for why those events would or would not occur, (3) the number of future positive and negative events, and (4) mean value ratings for future positive and negative events. Only one of them discussed personal experiences in terms of future thinking and suicide risk during training workshops in addition to the administration of an

adapted version of the future thinking task via interviews (van Beek, Kerkhof, & Beekman, 2009).

2.4.3.1. Identification of a Future Thinking and Suicide Risk Relationship.

There were 15 cross-sectional studies that included measures of future thinking and suicide. First, we will focus on the studies assessing the relationship between future thinking and suicide risk (n=7). Then, we will focus on the remaining studies looking at the relationship between different aspects of future thinking and suicide risk (n=8).

Cross-sectional studies of future thinking and suicide risk

MacLeod, Rose, and Williams (1993) found a deficit in positive future thinking abilities in suicidal patients, both for the near-and distant-future time periods compared to both hospital and nonhospital controls, but they found no differences in negative future thinking abilities across groups. MacLeod, Pankhania, Lee, and Mitchell (1997) further supported PFT deficits in suicidal individuals and showed that the lack of positive future thinking in the absence of increased negative future thinking is an independent feature of suicidal individuals. Herein, depressed- and nondepressed suicidal individuals, and matched controls were compared on their ability to think of both negative and positive future events. Suicidal groups (both depressed- and nondepressed) had an overall reduced anticipation of positive events, but no increased anticipation of negative events. However, for only the near future, suicidal groups did demonstrate increased anticipation of negative events.

It is also worth mentioning here that future thinking also contributed to hopelessness of suicidal individuals independently of depression in a study comparing suicidal patients with matched hospital controls (O'Connor, Connery, & Cheyne, 2000). Herein, the comparison of suicidal individuals and hospital controls shows that the relationship between future thinking and suicide is also independent of the hospital setting. In this study, however, positive future thinking was not correlated with depression, although suicidal individuals scored significantly more highly on the measures of depression, hopelessness, and anxiety.

There are a few more cross-sectional studies, which focused on the future thinking and suicide risk relationship, and they also examined other factors (e.g., social perfectionism, personality

status, whether the events are self-related/episodic or other-related/semantic). These studies further supported a lack of PFT in the absence of any increase in NFT in suicidal individuals.

First, a study focused on socially prescribed perfectionism (Hunter & O'Connor, 2003). In this study, social perfectionism and positive future thinking did discriminate hospital suicide patients from controls (i.e., community and hospital controls) beyond measures of hopelessness, depression, and anxiety. Suicidal individuals had significantly fewer positive future thoughts than community controls, with no differences in negative future thinking, but socially prescribed perfectionism also differentiated them from matched controls. Importantly, this study showed the role of social perfectionism in addition to the importance of positive future thinking within the suicidal process.

Second, a study conducted by MacLeod *et al.* (2004) showed the importance of another factor, personality disorder status, in influencing positive future thinking abilities of repeat suicide patients. Repeat suicide patients with cluster B personality disorders (i.e., borderline or dissocial) were found to be significantly lower in positive future thinking than repeat suicide patients with no cluster B symptoms or repeat suicide patients with cluster B personality difficulty. Negative future thinking, however, was not significantly associated with any personality disorder or difficulty. This study showed the role of personality disorder status in the reduced ability of positive future thinking of suicidal individuals and highlighted the importance of conducting future research to explore which factors might underlie the lack of positive future thinking in repeat suicide patients.

Third, another study conducted by MacLeod and Conway (2007) demonstrated that personal/self-related episodic positive future thinking was impaired in suicidal individuals, but other-related semantic positive future thinking was not. Suicidal individuals compared to non-suicidal individuals had reduced ability to think of self-related positive future events, but no difference was found in terms of other-related positive future thinking ability between two groups. If deficits in positive future thinking in suicidal individuals were due to an impoverished cognitive representation of possible positive future experiences, this deficit must be shown in general, for both the self and others. However, this study showed that the deficits were seen for only self-related/episodic future positive events in suicidal individuals, so we cannot explain these PFT deficiencies shown in people with suicidal history with a poor cognitive representation of possible positive future experiences.

Cross-sectional studies looking at the relationship between different aspects of future thinking and suicide risk

Compared to matched controls, suicidal patients judged negative future events to be more likely to happen to them and found thinking of why those events might not occur more difficult but did not differ from controls in terms of thinking of why those events might occur to them (MacLeod & Tarbuck, 1994). This study showed that although suicidal individuals may not actively expect future negative events occurring in general, they assess future negative events to be more likely to occur themselves when presented with a list of possible future negative events. This was linked to their inability to think of their positive aspects or circumstances which may prevent the occurrence of such events. Additionally, thinking about the reasons why possible future negative events may not occur has been found to reduce suicidal patients' pessimism (i.e., by assessing possible future negative events as more likely to occur in the future).

In addition to these, Williams *et al.*'s study (1996) indicated that suicidal patients, compared to non-depressed controls, produced more generic possible future events in response to cues. This study shows that the treatment of suicidal individuals should aim to improve the detailed and more specific generation of possible actual future events in addition to aiming to increase positive future thoughts.

Higher future orientation scores in depressed patients over 50 years-old were related to lower current suicide ideation, less intense suicide ideation at its worst point, and lower probability of suicide attempt history after accounting for covariates of age, gender, hopelessness, depression, education proxy/socioeconomic status (Hirsch *et al*., 2006). However, future orientation was not related to current suicide attempt status. This study is important in that it covers the sample between the ages of 50 and 88 to investigate the relationship between an aspect of future thinking, future orientation, and suicide risk (i.e., suicide ideation and suicide attempts) as well as investigating the relationship between future thinking and current suicide status and suicide attempt history. This study showed the protective effect of being future oriented in individuals aged over 50-years. Certainty about the absence of positive future events (Certainty-AP), but not certainty about negative future events (Certainty-N), statistically predicted concurrent suicide ideation, beyond the effects of simple pessimism regarding positive and negative future events, and hopelessness partially mediated the

relationship between Certainty-AP and suicide ideation (Sargalska, Miranda, & Marroquín, 2011). However, even after adjusting for hopelessness and depression symptoms, Certainty-AP statistically predicted suicide ideation. This study showed that how certain a person is about the absence of positive future events also affects the relationship between future thinking and suicide risk (i.e., suicide ideation). Therefore, interventions or treatments, which seek to increase the reasons or resources of such individuals to soften this certainty about the absence of PFT in addition to enabling them to focus on their available resources that may be effective in breaking this certainty, might be beneficial.

Furthermore, dysphoric suicide attempters and dysphoric non-attempters estimated future negative events to be more likely and positive future events to be less likely compared to controls but did not differ from each other (Marroquín, Nolen-Hoeksema, & Miranda, 2013). In addition to this, compared to controls, dysphoric suicide attempters and dysphoric non-attempters made lower positive affect forecasts, and dysphoric suicide attempters forecasted lower positive affect than dysphoric non-attempters. This study showed that low affective forecasting for positive events is a characteristic of individuals with suicide attempts. Moreover, the results of this study regarding the estimation of future negative events to be more likely in dysphoric participants with suicide attempts are in line with the findings of MacLeod and Tarbuck's (1994) study in which self-poisoning/suicide patients judged negative future events to be more likely to happen to them compared to matched controls. As the well-being (i.e., the level of happiness) is the result of individuals being engaged in pursuing towards valued goals that they think are likely to occur to themselves (Schmuck & Sheldon, 2001), it is extremely important to increase their belief that positive events are likely to happen to them.

There were two studies focusing on different aspects of future thinking and suicide risk relationship on student samples. For example, in first-year college students with increased suicidal thoughts and depression symptoms, future thinking, optimism, and future connectedness were each found to weaken the relationship of suicide motivation with depressive symptoms and hopelessness (Chin & Holden, 2013). Additionally, future thinking did moderate the impact of depression symptoms on suicide preparation (more active and severe form of suicide ideation). This study showed that future thinking, one of the future time perspective components, can buffer against the worst impacts of well-established suicide predictors (i.e., depression and hopelessness) amongst high-risk students. In addition to this,

in undergraduate students with moderate to severe depression symptoms, subjective depression mediated the relationship between positive future disposition (hopeful and optimistic future thoughts/ positive future thinking) and suicide ideation while self-blame mediated the relationship between negative future disposition (negative future thinking) and suicide ideation (Ballard, Patel, Ward, & Lamis, 2015). This study suggests two possible pathways to suicide ideation with implications and treatment: (1) Having interventions focusing on the subjective feelings of depression in depressed individuals with reduced positive future thinking and (2) focusing on self-blame in depressed individuals with increased negative future thinking may be beneficial to reduce suicide ideation.

Surprisingly, Gorday, Rogers, and Joiner (2018) found that lifetime suicide attempts were non-significant predictors of suicide ideation in a large sample of community participants. In addition to this, future-oriented repetitive thinking was positively associated with depressive symptoms and anxiety in the first model step (including age, gender, negative affect, and repetitive future thinking) and associated with only depressive symptoms in the second model step where four worry components (i.e., duration, controllability, frequency, and content) were added to the model.

Follow-up studies of future thinking and suicide risk

There are six longitudinal studies examining future thinking and suicide.

First, in a 12-month follow-up study conducted by Sidley, Calam, Wells, Hughes, and Whitaker (1999), previous suicidal behaviours were found to be the most salient/potent predictor in the longer term in suicide patients who were at high risk of repetition. Crucially, over generality of future fluency for positive events was not found to enhance the prediction of suicide repetition in this heterogeneous group of high-risk suicide patients over and above hopelessness (in the short term) and number of previous suicide attempts (in the longer term). However, there were significant differences between repeaters and non-repeaters on future-fluency for positive events, as repeaters had poorer future fluency for positive events. The over generality of positive future thinking finding was compatible with Williams *et al.*'s (1996) cross-sectional study indicating that suicidal patients, compared to non-depressed controls, produced more generic possible future events in response to cues. Thus, having more

generic positive future thoughts in suicidal individuals appears to be independent of the use of cues in future thinking tasks.

In a more recent short-term (2-month) follow-up study carried out by O'Connor *et al.* (2007), outcome in well-being among low social perfectionists who had repetitive suicidal behaviours was better for ones high on positive future thoughts relative to ones low on positive future thoughts. The findings of this study yielded evidence that social perfectionism and positive future thinking, but not negative future thinking, are implicated in outcome following repetitive suicidal behaviours. These findings further supported the findings of a cross-sectional study carried out by Hunter & O'Connor (2003) where social perfectionism and positive future thinking were found to discriminate hospital suicide patients from controls (community and hospital controls) beyond measures of hopelessness, depression, and anxiety. In line with findings of these two studies, in another short-term follow-up study of 2.5 months, positive future thinking was found to be stronger predictor of Time 2 suicide ideation than hopelessness in repeat suicide patients, independent of age, sex, baseline mood and suicide ideation (O'Connor, Fraser, Whyte, MacHale, & Masterson, 2008). The findings of this study yielded good evidence that specific, ideographic positive future thoughts (but not negative future thoughts) are stronger predictors of suicide ideation than global hopelessness.

As for long-term follow-up studies, in a 2-3-year follow-up of young adults conducted by Krajniak, Miranda, and Wheeler (2013), higher levels of rumination and certainty about pessimistic future expectations mediated the relationship between baseline lifetime suicide attempts and suicide ideation at follow-up. These findings are consistent with the findings of a cross-sectional study conducted by Sargalska, Miranda, and Marroquín (2011) showing that certainty about the absence of positive future events statistically predicts concurrent suicide ideation, even after adjusting for hopelessness and depression symptoms.

In O'Connor, Smyth, and Williams' medium-term follow-up study (2015), approximately 26% of overdose/suicide patients were readmitted to hospitals with suicide attempts during a 15-month follow-up period. While previous suicide attempts, suicide ideation, hopelessness, and depression, as well as low levels of achievement and financial, and high levels of intrapersonal positive future thinking were predictors of repeat suicide attempts in univariate logistic regression analyses; only previous suicide attempts, suicide ideation, and high levels of intrapersonal positive future thinking (i.e., only self-related thoughts) predicted repeat

suicide attempts. This study showed the predictive utility of positive future thinking over time, but it also made a unique contribution to the future thinking and suicide literature by demonstrating that not all forms of positive future thinking (e.g., intrapersonal positive future thinking) may be protective against suicide risk over time.

In addition to these, in adolescents, defeat/entrapment was found to be associated with baseline severity of suicide ideation independent of depression symptoms, and a predictor of future suicide ideation controlling for baseline suicide ideation (but not after controlling for depression symptoms) (Pollak, Guzmán, Shin, & Cha, 2021). This relation was strongest among those with higher levels of positive future thinking due to tendency to have more positive future thoughts, especially less realistic and achievable positive future thoughts. This study highlights the importance of focusing on how realistic or achievable future thoughts are in addition to the importance of the contents of positive future thoughts as shown by O'Connor, Smyth, and Williams (2015).

Mixed design studies of future thinking and suicide risk

Three mixed design studies investigated the relationship between future thinking and suicide risk.

Compared to matched controls, suicidal individuals with a history of suicidal behaviour and personality disturbance had reduced positive future thinking (but no increased negative future thinking) (MacLeod *et al*., 1998). Herein, participants receiving Manual Assisted Cognitive Behaviour Therapy (MACT, focusing on dealing with negative thinking, managing emotions, problem solving skills, controlling alcohol/drug use etc.) registered significant improvement in positive future thinking during the follow-up, but participants receiving Treatment as Usual (TAU) did not show such an improvement. However, the control group also had a surprisingly significant improvement in positive future thinking. This study showed that suicidal individuals' positive future thinking abilities may be improved by brief interventions like MACT. The findings of this study are in line with two cross sectional studies: (1) Repeat suicide patients with cluster B personality disorders (borderline or dissocial) had significantly lower scores in positive future thinking task than repeat suicide patients with no cluster B symptoms or repeat suicide patients with cluster B personality difficulty (Macleod *et al.*, 2004). (2) Higher future orientation scores were related to lower probability of suicide attempt

history in over 50 years-old depressed patients. In another mixed design study, we also see that relative to community volunteers, both older individuals with non-fatal suicidal behaviours and older depression patients had reduced ability of positive future thinking (but not increased negative future thinking) and that this can be accounted by depression instead of hopelessness (Conaghan & Davidson, 2002).

First-episode psychosis patients showed a general disengagement with the future as they were impaired in future thinking (positive and negative) abilities, especially with respect to the next year, but negative future thinking was also found to be associated with suicide ideation (Goodby & MacLeod, 2016). This contrasts with a longitudinal study (O'Connor, Fraser, Whyte, MacHale, & Masterson, 2008) which showed that NFT was not a significant predictor of T2 suicide ideation in adults with repetitive suicidal behaviours. However, this discrepancy might be linked to the sample characteristics, as the participants in Goodby and MacLeod (2016) were first episode psychosis patients. This study was important since it is the only study looking at future thinking and suicide risk relationship in first-episode psychosis patients.

Randomised controlled trials (RCTS) on future thinking and suicide risk

There are only two RCTs focusing on future thinking and suicide risk relationship.

The first study (De Jaegere *et al*., 2023) included an investigation of the effectiveness of a training aimed at increasing future-oriented thinking in suicidal individuals by dividing participants into two groups. In the first group, individuals with mild-to-severe suicidal thoughts received the Future-oriented Group Training (FOGT) and Treatment as Usual (TAU). Those in the second group of participants with mild-to-severe suicide ideation received TAU only. The first group of participants (i.e., the FOGT and TAU group) showed significant increases in future-oriented thinking at follow-up compared to those in the second group who only received TAU. They had also decreased suicide ideation at Time 2 (post-treatment, 9-week) and Time 3 (12-week follow-up). This study showed that suicidal individuals' future thinking abilities may be improved by an intervention like FOGT over time and this may lead to reduced suicide ideation.

The second RCT study indicated that hopeless/suicidal cognitions reactivity, in individuals reporting suicidal ideation when depressed in the past, predicts alterations in generating positive future events following sad mood induction (Williams, Van Der Dose, Barnhofer, Crane, & Segal, 2008). Higher hopelessness/suicidal cognitions reactivity scores were found to be associated with greater decreases in positive future fluency from pre-to-post mood induction, and lower positive future events fluency following a sad mood induction. This study contributed to the literature by showing that suicidal ideation history is associated with a specific cognitive response pattern, which can be reactivated by mild mood fluctuations.

Correlational studies investigating future thinking and suicide risk

Only two correlational studies investigated the relationship between thinking about the future and the risk of suicide (i.e., suicide ideation and/or suicidal behaviours).

Hopelessness about the future in repeat suicide patients is a multi-faceted construct but absence of positive future thinking is more important than the existence of negative future thinking (MacLeod *et al.*, 2005). This finding is consistent with cross-sectional studies (e.g., MacLeod, Rose, & Williams, 1993; MacLeod, Pankhania, Lee, & Mitchell, 1997; Hunter & O'Connor, 2003; MacLeod & Conway, 2007) indicating that suicidal individuals had a lack of positive future thinking in the absence of any increase in negative future thinking.

In another correlational study, reduced positive future thinking moderated the relationship between total and internal entrapment and suicide ideation in suicidal patients (Rasmussen *et al*., 2010). Additionally, no significant difference was found in terms of positive future thinking between first-time and repeat self-harm patients and repeat self-harmers had significantly lower positive future thoughts compared to hospital controls.

A case study with the examination of the relationship between future thinking and suicide risk

A 63-year-old man with semantic dementia attributed his suicide attempts to his inability to visualise himself even passively in future event scenarios and he had concrete and specific self-representations (Hsiao, Kaiser, Fong, & Mendez, 2013). He reported impaired future thinking but no deficiency in retrieving personal events from his past. This contradicts with

the established relationship between retrieval processes requiring autobiographical memory and future thinking that individuals with autobiographical memory impairments also demonstrate deficits in future event generations (e.g., Addis, Hach, & Tippett, 2016; Huddy, Drake, & Wykes, 2016). This is generally attributed to the same brain regions' activations (the left hippocampus and posterior visuospatial regions) when imagining and remembering events. The contradictory findings with the literature may be due to the study type (i.e., case report) and the patient's diagnosis of Multiple Sclerosis (MS). However, this study showed that in semantic dementia, impairments in future thinking that leads some patients to suicide attempts may be observed.

2.4.3.2 Overall Findings.

Cross-sectional studies of future thinking and suicide risk

There is sufficient evidence from cross-sectional studies of future thinking and suicide risk (i.e., suicidal thoughts and/or suicidal behaviours) that suicidal individuals had a lack of positive future thinking in the absence of any increase in negative future thinking (e.g., MacLeod, Rose, & Williams, 1993; MacLeod, Pankhania, Lee, & Mitchell, 1997; Hunter & O'Connor, 2003; MacLeod & Conway, 2007).

Cross-sectional studies looking at different aspects of future thinking and suicide risk

The cross-sectional studies examining different aspects of future thinking found evidence that suicidal individuals estimate future negative events to be more likely to happen to them and positive future events to be less likely to happen to them compared to controls (e.g., MacLeod & Tarbuck, 1994; Sargalska, Miranda, & Marroquín, 2011; Marroquín, Nolen-Hoeksema, &, Miranda, 2013).

Follow-up studies of future thinking and suicide risk

We see some evidence supporting the predictive utility of positive future thinking on suicide risk (i.e., future suicide attempts) over time (O'Connor, Smyth, & Williams, 2015; Pollak, Guzmán, Shin, & Cha, 2021; O'Connor, Fraser, Whyte, MacHale, & Masterson, 2008). At the same time, however, we see that not all kinds of positive future thinking (e.g., intrapersonal

positive future thinking) may be protective over time and even it can be a risk factor (e.g., Pollak, Guzmán, Shin, & Cha, 2021; O'Connor, Smyth, & Williams, 2015).

As for the other types of studies, we could not make clear comparisons in terms of similarities and differences as the number of studies was quite small and each was focused on different matters (e.g., different mental health disorders, such as personality disorder, psychosis, and MS).

2.5 Discussion

This is the first systematic review study to systematically synthesise results across existing studies with different designs about the relationship between future thinking (positive and/or negative) and suicide risk (suicidal ideation and/or suicidal behaviour).

What the findings of the included studies mean and their contributions to the literature

Findings from quantitative research generally demonstrate that having fewer positive things to look forward to rather than having more negative thoughts for the future are related to suicidal thoughts and suicidal behaviours. There is also evidence indicating that not all forms of positive future thinking (e.g., intrapersonal positive future thinking) may be protective over time (O'Connor, Smyth, & Williams, 2015). In addition to this, at this point, it would also be appropriate to mention a longitudinal study again as it points to a potential explanation for why positive future thoughts may act as a risk factor over time. In a 6-month follow-up study carried out by Pollak, Guzman, Shin, and Cha (2021), inconsistent with the literature, the association between defeat/entrapment and suicide ideation was found to be strongest among adolescents (n=74) with higher positive future thinking abilities. At 3-month follow-up, participants were given a list of future events they had generated at baseline and asked to indicate if the events had actually happened within the three months prior to calculating the proportion of the events that did not occur (De Jaegere *et al*., 2023). In this way, the study contributed to the literature by showing that this contradictory finding regarding the moderating effect of positive future thinking was due to the tendency to imagine more unrealistic and unachievable positive future events in suicidal individuals. Nevertheless, this finding may also be due to using a sample of adolescents, rather than adults as in other studies

in the field. Herein, it has been shown that both the content of future positive thoughts and how achievable or realistic these thoughts are important.

On the other hand, in a study conducted by O'Connor, Connery, and Cheyne (2000), there was no difference between controls and suicidal adults in terms of future thinking in addition to contradictory results with previous literature (e.g., MacLeod *et al*., 2005), relating PFT to depression (e.g., Bjarehed, Sarkohi, & Andersson, 2010) and NFT to anxiety, as PFT was not associated with depression in this study. However, there were deficits in suicidal participants' ability to generate positive thoughts for the future. O'Connor, Connery, and Cheyne (2000) propose that this unexpected finding may be because some of the hospital controls who had been admitted to hospital had very serious physical health problems (e.g. intravenous drug use) which affected their responses. Indeed, this sample is markedly different from the hospital controls recruited in previous studies (MacLeod *et al*., 1993; 1997) who tended to have been admitted to hospitals with minor injuries. As a result, we believe that further research investigating future thinking in an intravenous drug using population, compared with individuals with a history of suicidal behaviours and controls (i.e., presenting hospital with minor injuries and from the community) is warranted.

In relation to how thoughts about the future over different time periods (i.e., next week, next day, next year, and next 5-10 years) affect the relationship between suicide risk (suicidal ideation and/or suicidal behaviour) and future thinking, only two studies compared adults who had been hospitalised with self-poisoning (i.e., suicidal behaviour) with control groups. One of them included suicidal adults with depression, suicidal adults without depression, and a control group (MacLeod, Pankhani, Lee, & Mitchell, 1997). Herein, for the time period of over the next year, depressed participants with suicide attempts had significantly higher scores in negative future thinking compared to non-depressed participants with suicide attempts. This is somewhat consistent with a well-established finding, namely that increased negative future thoughts are associated with depression (MacLeod *et al*., 1998; MacLeod, Pankhani, Lee, & Mitchell, 1997). However, it was surprising that the elevated levels of negative future thinking in depressed participants with suicide attempts was only for the next year NFT. The results from the study of MacLeod, Rose, and Williams (1993), however, showed that both for near- and distant-future time periods, suicidal individuals are impaired in being able to think of possible positive future event scenarios, but not in negative future thinking although for the next day, participants generated more negative future thoughts. This study also

reported no difference between individuals who has attempted suicide first-time and individuals who have attempted suicide repeatedly in terms of their future thinking abilities. Herein, there is no general pattern emerged in terms of the effect of different time periods and whether individuals with suicidal behaviours have only one or repeated attempts. However, individuals with suicidal behaviours are impaired in future thinking capacity and for the near (next day) and medium distance future, they tend to generate more negative future thoughts. It is essential that further research is conducted to explore the effect of time period in the relationship between future thinking and suicide. This could usefully be done by comparing depressed participants with suicide attempts, and non-depressed participants with suicide attempts, and individuals without any history of suicide attempts and depression.

As for self-versus other-related future thinking, in a study conducted by Macleod and Conway (2007) in which future thinking abilities of adults who had taken an overdose (n=48) were assessed through the future thinking task implementations, participants had a decreased ability to think of self-related future thoughts but there was no impairment in their ability to think of other-related future thoughts. This requires further investigation of the self-related versus other-related positive and negative future thinking abilities of individuals who have had suicidal behaviours and/or suicidal thoughts by using different methodologies, especially experimental research since we could not reach a conclusion with the current evidence in the literature. Although existing studies have indicated that PFT deficiencies shown in people with suicidal history cannot be explained simply by having a poor cognitive representation of possible positive future experiences as they have a lack positive future thoughts for themselves but not for other individuals this should be further investigated.

There was only one study of older adults. Conaghan and Davidson (2002) compared three groups of people aged 65 years and older on the future thinking task: (i) Those who had attempted suicide, (ii) those who were depressed, and (iii) community controls. In this mixed-design study, consistent with the findings of MacLeod *et al*.'s studies in adults (e.g., MacLeod, Rose, & Williams, 1993; MacLeod, Pankhania, Lee, & Mitchell, 1997; MacLeod & Conway, 2007), diminished PFT in the absence of any rise in NFT was found in those who were depressed and in those who were suicidal.

Blunted affective forecasts for positive future events (expecting less positive affect if future positive events happen) distinguished prospective cognitions of individuals with suicide

attempts than both healthy controls and controls matched in symptoms of depression but without suicide attempt history (Marroquín, Nolen-Hoeksema, & Miranda, 2013). This study showed the importance of focusing on affective forecasting processes (e.g., emotion-cognition interactions) in treatments of individuals at risk of escape behaviour like individuals with a history of suicide attempt(s). It was also shown that certainty about the absence of positive future events statistically predicts concurrent suicide ideation, beyond the effects of simple pessimism regarding positive and negative future events, and even after adjusting for hopelessness and depression symptoms (Sargalska, Miranda, & Marroquín, 2011). In another study, compared to matched controls, self-poisoning/suicide patients judged negative future events to be more likely and found thinking of why those events might not occur more difficult (MacLeod & Tarbuck, 1994). Herein, aiming at expanding the list of reasons individuals with suicidal behaviours have against negative future events happening to them, and pro reasons for the occurrence of future positive events to them and reducing blunted affective forecasts for future positive events might be useful.

Socially prescribed perfectionism is one of the factors that needs to be considered while examining the relationship between future thinking and suicide risk (suicide ideation and/or suicidal behaviours). Here, a follow-up study (O'Connor *et al*., 2007) indicated that patients with repetitive suicidal behaviours and low social perfectionism and high positive future thinking, following a suicidal behaviour, had the best outcome for hopelessness and suicide ideation two months later. In other words, positive future thinking and socially prescribed perfectionism interaction predicts suicide risk (i.e., future suicide ideation) over time. Herein, high PFT decreases the state of entrapment, and this leads to persons who believe they have more to look forward to, and thus they have reasons to live which are related to better outcomes. This is also supported by the results from the Rasmussen *et al*. study (2010) showing that reduced PFT moderates the relationship between both total and internal entrapment and suicide ideation. Additionally, a cross-sectional study carried out by Hunter and O'Connor (2003) demonstrated that social perfectionism and PFT distinguish suicidal adults from controls independent of depression, hopelessness, and anxiety. Herein, suicidal individuals were more socially perfectionists than hospital controls along with being significantly more impaired in PFT than community controls. But there was no significant difference between suicidal individuals and hospital controls in terms of PFT. This might be due to the higher rates of depression among hospital controls as PFT is generally associated with depression in the future thinking literature. However, the results of the Rasmussen *et al.*

study (2010) showed that repeat self-harmers have significantly lower levels of positive future thoughts than hospital controls. At this point, there are early findings (MacLeod, Rose, & Williams, 1993) showing that there is no significant difference in future thinking ability between repeat suicide attempters and first-time suicide attempters. However, lifetime suicide attempts at baseline were significant predictors of suicidal ideation (Kraijnak, Miranda, & Wheeler, 2013) and suicidal behaviour (O'Connor, Smyth, & Williams, 2015) at follow-up in longitudinal studies.

In relation to the means of suicide, acute self-poisoning, overdose, cutting, and ingestion were the most common methods of suicidal behaviour across included studies in this systematic review. However, it would be great if suicide survivors who used the methods of hanging, shooting, drowning, collision with or of a vehicle, starvation, and dehydration to end their lives were included in the studies since only approximately 20% of global suicides are owing to self-poisoning (WHO, 2021).

The implications of the findings for interventions or treatments in suicidal individuals

All of these studies indicate the protective role of having things to look forward to (i.e., PFT), and believing that these things are likely to happen. Therefore, interventions or treatments with suicidal individuals should focus on increasing positive future thoughts, helping suicidal individuals to focus on the existing and possible resources or reasons that may increase the likelihood of such positive expectations being realised.

Research findings show also the importance of having realistic/achievable positive future thoughts in preventing future suicide attempts. Therefore, treatments of suicidal individuals should involve interventions designed to enhance the capacity for adaptive positive future thinking that might decrease suicide risk (i.e., future suicide attempts).

On the other hand, as thinking about the reasons against negative events happening is associated with a decrease in the pessimism of suicidal individuals (Macleod & Tarbuck, 1994), this also needs to be addressed. Indeed, tailored therapeutic future thinking interventions may be effective in the treatment of suicidal hopelessness/pessimism in suicidal individuals. However, this is an area of research that still needs to be further investigated to

improve current interventions or treatment methodologies targeting reducing pessimistic views of the future in suicidal individuals.

Finally, throughout treatments or interventions aimed at improving future thinking skills in suicidal patients, health professionals must consider the many other psychological factors that may have an impact on the relationship between future thinking and suicide risk. For example, it has been shown that hopelessness (Chin & Holden, 2013), subjective feelings of depression and self-blame (Ballard, Patel, Ward, & Lamis, 2015), having higher levels of socially prescribed perfectionism (O'Connor, O'Connor, & Marshall, 2007), components of worry (i.e., duration, controllability, frequency, and content) (Gorday, Rogers, & Joiner, 2018), and personality disorder status (i.e., borderline or dissocial) (MacLeod *et al*., 2004) may all play a role in this relationship.

The implications of the findings for future research

Pollak *et al.*'s (2021) study of positive future thinking and recurrent suicide ideation in adolescents was not consistent with O'Connor *et al.*'s (2015) study which investigated the relationship between positive future thinking and future suicide attempts in hospitalised patients with suicide attempts. Therefore, future research on the relationship between the contents of future thinking and suicide risk (i.e., suicidal ideation and/or suicidal behaviour) across different age groups (e.g., adolescents) is urgently needed.

Additionally, as we highlighted in the sections above, there was only one study of older adults (i.e., Conaghan & Davidson, 2002). Moreover, there is also a dearth of studies exploring future thinking in children. Therefore, future studies focusing on different age groups, such as elderly people and children are vital to better understand the relationship between future thinking and suicide.

The extent to which future thinking across different time periods (i.e., next week, next day, next year, and next 5-10 years) influences the relationship between the risk of suicide (suicidal ideation and/or suicidal behaviour) and future thinking is unclear as the findings are inconsistent (e.g., MacLeod, Rose, & Williams, 1993; MacLeod, Pankhania, Lee, & Mitchell, 1997). Hence, further research on the influence of different time periods in the relationship between future thinking and suicide is required.

The effect of the self-related versus other-related positive and negative future thinking abilities of individuals who have had suicidal behaviours and/or suicidal thoughts should also be further investigated by using different methodologies, especially experimental research. Indeed, there is only one such study focusing on the impact of whether thoughts are self- or other-related on the relationship between future thinking and suicide in the literature (i.e., Macleod & Conway, 2007). This study showed that suicidal individuals generated significantly fewer positive self-related future thoughts, and they had decreased ability to think of future self-related events. Therefore, it is not obvious if future thinking deficits in suicidal individuals are only related to self-related anticipations.

We need more research on affective forecasting processes, such as blunted affective forecasts for positive future events (i.e., expecting less positive affect if future positive events happen), to better untangle the complexity of the relationship between positive future thinking and suicide risk. Although certainty about the absence of positive future events (but not certainty about negative events) was a significant predictor of concurrent suicide ideation there was only one study (i.e., Sargalska, Miranda, & Marroquín, 2011). In addition to a lack of positive future thinking, certainty about the lack of positive future events may be a risk factor for suicide, and thus Sargalska and colleagues' study (2011) in undergraduates needs to be replicated in different age groups. As MacLeod and Tarbuck (1994) showed that suicide patients found thinking about reasons why future negative events might not occur difficult, interventions aimed at tackling such a difficulty may be a useful direction for future research.

The nature of the relationship between the number of previous suicide attempts, future thinking and suicide risk (suicide ideation and/or suicidal behaviours) needs further exploration. Additionally, there is a clear need for further research to explore how the relationship between future thinking and suicide risk varies as a function of the content of future thoughts, history of personality disorder (having a diagnosis of a personality disorder, such as dissocial or borderline), socially prescribed perfectionism, and the existence of other diagnoses, such as dementia and psychosis. Lastly, future research should focus on suicide survivors who used the methods of hanging, shooting, drowning, collision with or of a vehicle, starvation, and dehydration to end their lives as the overwhelming majority of research is focused on those following self-poisoning or self-cutting.

To conclude, the inclusion of future thinking in interventions and treatments in suicidal individuals to reduce suicide risk (suicidal behaviours and/or suicidal thoughts) seems to be promising as a preventive strategy. However, there is a clear need to systematically investigate future cognitions of suicidal individuals and examine the mechanisms which may lead to future thinking impairments to schedule the contents of future thinking interventions considering contrasting results and limitations or scarcity of existing studies. Overall, the relationship between future thinking and suicide risk (suicidal behaviours and/or suicidal thoughts) seems to be more complex than previously envisaged. There are many gaps in the literature that need to be addressed. Specifically, further research should focus on the effect of different time periods, the contents of both negative and positive future thoughts and the use of different future thinking measures together. As a result, in the next chapter, we will present a comprehensive survey study investigating the relationship between future thinking (positive and negative) and suicide risk (i.e., having a history of suicidal thoughts and/or suicidal behaviours versus not having any history of suicidal thoughts or suicidal behaviours).

Chapter 3: Understanding the relationship between future thinking in terms of valence, content, and time periods and suicide risk: A comprehensive cross-sectional study

3.1 Abstract

Background: Suicide is a public health concern globally which affects individuals across the lifespan. Although there is a body of evidence indicating that reduced positive future thinking is associated with suicide risk, the relationship between the content of positive future thinking (things to look forward to; PFT) and negative future thinking (things to not look forward to; NFT) across different time periods (next week, next year, and next 5-10 years) and suicidal thoughts and/or suicidal behaviours has yet to be fully understood. Therefore, the current survey study investigated the relationship between different types of future thinking in terms of valence (i.e., PFT and NFT), time periods (i.e., next week, next year, and next 5-10 years), and content (i.e., interpersonal/social, achievement, leisure/pleasure, intrapersonal, health of others, financial/home, and other) and suicide risk.

Methods: Anonymous data were collected between July 2021 and December 2021 from 409 adults aged 18 years or older through an online survey, including a range of self-reported measures (i.e., repetitive future thinking, consideration of future consequences, suicidal history, suicide ideation, defeat, entrapment, depression, anxiety, optimism/pessimism, and stress) and an adapted online version of the standard future thinking task.

Results: There were 300 participants with suicidal behaviours and/or suicide ideation, 98 participants without any history of suicide, and 11 participants who did not report their suicide status (94 male and 299 female, 6 other and 10 missing). A series of binary logistic regression analyses, univariate and multivariate hierarchical regression analyses, moderation analyses (using the PROCESS macro for SPSS), and a simple mediation analysis (following the PROCESS Macro via the bootstrapping method) were employed to investigate the survey study hypotheses. Although participants with suicidal thoughts and/or suicidal behaviours generated fewer positive future thoughts compared to participants without any suicidal history, this difference was not statistically significant. Overall, participants with past suicidal experiences (i.e., suicidal thoughts and/or suicidal behaviours) reported significantly more negative future thoughts (i.e., interpersonal NFT, intrapersonal NFT, and financial/home

NFT) than participants without previous suicidal experiences although there were no significant group differences in terms of achievement, leisure/pleasure, other, and health of others NFT types. As for the different time periods, no significant group differences were found for PFT, but NFTs, over the next week, next year, and next 5-10 years were significant predictors of suicidal history, and the most important time period was next NFT over 5-10 years. The strongest measure of future thinking to predict suicidal ideation was the Future-oriented Repetitive Thought Scale.

Conclusions: The relationship between future thinking and suicide risk is complex and it changes as a function of the content of the thoughts. Future orientation shows promise as a cognitive variable potentially associated with suicide risk (i.e., suicidal behaviours and/or suicide ideation), however, its role in suicidality needs to be better understood. Treatments designed to modify thinking in relation to the future may reduce the risk of suicide. A number of possible explanations for the results are provided, and some suggestions are given for future research.

3.2 Introduction

Suicide is a serious public health concern in all regions of the world (World Health Organisation, 2021). Approximately 703,000 individuals die by suicide annually, and for each suicide, there are at least 20 suicide attempts (WHO, 2019). Indeed, a history of suicidal behaviour is one of the most potent predictors of suicide (Hawton & van Heeringen, 2009). In addition to this, the factors underpinning suicide are multi-faceted and complex (O'Connor & Nock, 2014). Suicidal ideation is common; approximately one in ten individuals has experienced suicidal ideation at some stage in their lives (Nock *et al*., 2008), and some of those who think about suicide may attempt suicide in the future (Reinherz *et al*., 2006), as described in the introductory chapter of this thesis (Chapter 1).

As it remains difficult to predict who is at the highest risk of ending his/her life (Franklin *et al*., 2017) considerable research effort has focused on advancing understanding of the aetiology and course of suicide attempts and suicidal thoughts. To this end, it is generally recognised that identifying more specific psychological markers of suicide risk (i.e., suicide ideation and/or suicidal behaviour), such as future thinking, is essential (O'Connor & Nock, 2014; O'Connor, Smyth, Ferguson, Ryan, & Williams, 2013; van Heeringen, 2001). Future thinking is one's ability to mentally project the self into possible scenarios that may or may not happen in the future (Atance & O'Neill, 2001). Additionally, although different aspects of future thinking have been associated with suicide risk (Kirtley, Melson, & O'Connor, 2019) there are many unanswered questions which require attention. The current study, therefore, aims to provide a detailed exploration of the relationship between future thinking and suicidal ideation and/or suicidal behaviour, alongside other established risk factors.

Future thinking supports important aspects of everyday functioning, such as decision-making, goal setting, and intention formation (Schacter, Benoit, & Szpunar, 2017). Future thinking is also a component of safety planning in which individuals are asked to mentally simulate situations where they may experience suicide warning signs or triggers, imagine enacting coping strategies, and foresee obstacles to implementing such strategies (Stanley *et al*., 2018). Therefore, the ability to generate detailed possible future events can be particularly important since specificity and concreteness of details are highlighted in safety planning.

Hopelessness, future thinking, and suicide risk

Although the relationship between hopelessness, defined as general pessimism regarding the future, and suicide risk (suicidal behaviours and/or suicidal ideation) is robust (e.g., Brezo, Paris, & Turecki, 2006; Hawton, Saunders, & O'Connor, 2012), the work of MacLeod and colleagues has highlighted that hopelessness characterised by reduced positive future thinking, rather than the predominance of negative future thinking, is especially important within the suicidal process (Hunter & O'Connor, 2003; MacLeod, Pankhania, Lee, & Mitchell, 1997; MacLeod *et al*., 1998; O'Connor, Fraser, Whyte, MacHale, & Masterton, 2008). Positive future thinking, defined as anticipation of positive experiences about the future, is usually evaluated through the future thinking task (MacLeod *et al*., 1997) where participants are asked to produce (i) as many future events as possible that they are looking forward to or that they will enjoy (i.e., Positive Future Thinking; PFT) and (ii) to generate as many future events as possible that they are not looking forward to or that they will worry about (i.e., Negative Future Thinking; NFT).

Evidence from both clinical and nonclinical populations and different research groups consistently indicates that reduced positive future thinking is associated with suicide risk (i.e., suicide ideation and/or suicidal behaviour) independent of depression, verbal fluency, and negative attributional style (MacLeod *et al*., 1997; O'Connor, Connery, & Cheyne, 2000; Hunter & O'Connor, 2003; Williams, van der Does, Barnhofer, Crane, & Segal, 2008). Nevertheless, the nature of the relationship between future thinking and suicide risk has yet to be fully addressed. In addition to this, not everyone who experiences low levels of positive future thinking has suicidal thoughts, and not everyone who has a history of suicidal behaviour has reduced positive future thinking. Hence, other situational and/or psychological factors, which may affect the association between future thinking and suicide risk, should be considered. In other words, an inter-play of other variables should be taken into consideration when exploring the role of future thinking in the emergence of suicidal cognitions.

Numerous studies have shown that future thinking appears to be impaired in suicidal individuals (MacLeod *et al*., 1998; O'Connor *et al*., 2007; O'Connor *et al*., 2008). Specifically, it has been shown that reduced positive future thinking is consistently associated with suicidal ideation and suicidal behaviour (Chang *et al*., 2013; Chin & Holden, 2013; Kirtley *et al*., 2019; O'Connor, O'Carroll, Ryan, & Smyth, 2012). For example, MacLeod and

Conway (2007) demonstrated that suicidal patients who previously engaged in suicidal behaviour without the intent to die had fewer positive future thoughts compared to a control group. However, there was no significant difference between suicidal patients and controls in terms of rating the likelihood of these positive future thoughts happening to other individuals. In addition to this, O'Connor *et al.* (2008) found that an individual's ability to engage in positive future thinking might be a better predictor of future suicide attempts than hopelessness. Once again, deficits in positive future thinking seem to be implicated in suicide risk. Overall, previous research has highlighted that individuals with a history of suicidal behaviours or suicidal thoughts produce fewer positive, but not higher numbers of negative future thoughts in comparison to individuals without a history of suicidal thoughts and suicidal behaviours (MacLeod *et al*., 1993; MacLeod *et al*., 1997; O'Connor *et al*., 2007; O'Connor *et al*., 2015).

For the most part, research has focused on the relationship between the frequency of positive and negative future thoughts or the likelihood of possible future thoughts happening and suicide ideation and/or suicidal behaviour (i.e., suicide risk). Almost none of the previous studies has been set up to explore whether the content of both positive future thinking and negative future thinking impacts upon the relationship between future thinking and suicide risk, along with the assessment of established risk factors (e.g., anxiety, depression, entrapment, defeat, stress, and pessimism). One of the few exceptions was O'Connor, Williams, and Smyth (2015) who demonstrated that high levels of intrapersonal positive future thinking (e.g., being healthier, being more confident, and being happier) may be problematic in some circumstances. Intrapersonal future thoughts are thoughts focused on the individual and make no mention of anyone else.

The present study was framed in the context of the Integrated Motivational–Volitional model of suicidal behaviour (IMV; O'Connor, 2011) with O'Connor and colleagues positing that intrapersonal positive future thinking, if experienced simultaneously with feelings of entrapment, defined as the inability to escape from defeating or stressful life events (Gilbert & Allan, 1998; Williams, 2001), may increase the likelihood of suicidal ideation emerging. The IMV model also posits that when feelings of entrapment escalate and no solutions are apparent, the likelihood that suicide will be considered the only escape strategy also rises (Gilbert & Allan, 1998; O'Connor *et al*., 2013). Additionally, two studies have shown that positive future thinking declines following a negative mood manipulation (O'Connor &

Williams, 2014; Williams, van Der Does, Barnhofer, Crane, & Segal, 2008), suggesting that the ability to expect positive future events may be a dynamic process that fluctuates with minor alterations in negative affect.

In summary, although the positive future thinking and suicide risk relationship seems to be robust, the effect of the content of positive future thinking on suicidal thoughts and suicidal behaviours needs more attention.

As outlined in the introduction (Chapter 1), a number of theories have been developed to explain the emergence of suicidal thoughts, and the transition from suicidal thoughts to suicidal behaviours (e.g., Interpersonal Psychological Theory of Suicide; Joiner, 2005; van Orden *et al*., 2010; Three-Step Theory; Klonsky & May, 2015; Integrated Motivational-Volitional model of suicidal behaviour - IMV; O'Connor, 2011; O'Connor & Kirtley, 2018). Indeed, several suicide theories have posited that deficits in future thinking ability can impede one's problem-solving ability and so impact upon an individual's ability to 'rescue' oneself from such a scenario, which may contribute to a transition from feelings of entrapment to suicidal ideation and then to suicidal behaviours (Williams, 2001; O'Connor, 2011).

For instance, the IMV model (O'Connor, 2011; O'Connor & Kirtley, 2018) posits that the combination of an individual's past experiences (the pre-motivational phase) and their current situational factors (the motivational phase) may lead to the emergence of suicidal ideation, which in turn, dependent on the presence of a range of volitional moderators may lead to suicidal behaviour. Within the motivational phase, feelings of defeat (failed social struggle and feelings of collapse) triggered by stressful life circumstances or other environmental risk factors can lead to entrapment (being unable to escape or be rescued from stressful situations) and finally suicidal ideation (O'Connor & Kirtley, 2018). The model further postulates that transitions within the motivational phase are moderated by several factors, including future thinking. As a motivational moderator, future thinking would be anticipated to differentiate between those with a history of suicidal thoughts and/or suicidal behaviours from those without any history of suicide. By contrast, future thinking would not be thought to play a key role in differentiating those with a history of suicidal thoughts from those with a history of suicidal behaviours. However, exactly how future thinking interacts with other factors to contribute to the development of suicidal ideation remains unclear and so the relationship between future thinking and suicide risk requires further investigation.

In the present study, to investigate the role of the content of future thinking on the relationship between future thinking and suicide risk, we adapted an existing coding frame for positive future thinking (Godley, Tchanturia, MacLeod, & Schmidt, 2001) consistent with O'Connor *et al*. (2015). This involves coding the content of both positive future thinking and negative future thinking into seven different categories, spanning social/interpersonal, achievement, intrapersonal, leisure/pleasure, health of others, financial/home, and other future thoughts. The full coding of future thoughts is described in the methods (Please see 3.3.2. Measures, *Future Thinking (positive future thinking and negative future thinking*).

Although most research on future thinking and suicide risk has employed the future thinking task, other measures, such as the Future-oriented Repetitive Thought (FoRT) scale (Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017) and the Consideration of Future Consequences scale (CFC; Strathman, Gleicher, Boninger, & Edwards, 1994) have also been used. Therefore, in this study, we also aim to explore the relative associations between these different measures and suicide risk. In so doing, we are conducting a more comprehensive exploration of the relationship between future thinking and suicide ideation and/or suicidal behaviour than has been previously reported.

3.2.1 Current Study Aims, Research Questions and Hypotheses

The overarching aim of this survey study was to drive further our understanding of the relationship between future thinking and suicidal thoughts and suicidal behaviours within the context of the IMV model. The current study addressed five research questions and associated hypotheses.

1. To investigate the relationship between future thinking and suicide risk in the context of existing risk factors (i.e., depression, anxiety, stress and pessimism).

Hypotheses

1a) Those with a history of suicidal ideation and/or suicidal behaviours will report fewer positive future thoughts (PFT) than those without suicidal ideation and suicidal behaviours.

1b) However, there will be no difference in the number of negative future thoughts between those with a history of suicidal behaviours and/or suicide ideation and those without a history of suicidal behaviours or suicide ideation.

2. To explore the relationship between different types of future thinking in terms of valence (i.e., positive, and negative future thinking), content (e.g., intrapersonal, interpersonal, and achievement), time periods (i.e., next week, next year, next 5-10 years) and suicide risk.

Hypotheses

2a) Consistent with the findings of O'Connor, Smyth, and Williams (2015), intrapersonal positive future thinking scores will be higher, whereas the other contents/types of positive future thinking (i.e., interpersonal/social, achievement, leisure/pleasure, financial/home, health of others, and other) scores will be lower for those with a history of suicidal thoughts and/or suicidal behaviours than those without suicidal ideation or suicidal behaviours.

2b) There will be no difference between groups in terms of different contents/types of negative future thinking scores.

2c) The different time frames of future thoughts (i.e., next week, next year, and next 5-10 years) should not be differentially associated with suicide status (i.e., with or without a history of suicidal thoughts and/or suicidal behaviours).

3. To examine the influence of positive future thinking independent of depression in predicting suicide risk (i.e., having or not having a history of suicidal thoughts and/or suicidal behaviours).

Hypotheses

3a) Low levels of positive future thinking (i.e., few positive future thoughts) will be associated with suicide risk independent of depression, consistent with the literature (e.g., MacLeod *et al*., 1997; O'Connor, Connery, & Cheyne, 2000; Hunter & O'Connor, 2003; Williams, Van der Does, Barnhofer, Crane, & Segal, 2008).

3b) Positive future thinking will operate as a motivational moderator by moderating the relationship between entrapment (i.e., entrapment total, internal entrapment, and external entrapment) or defeat and suicide ideation.

3c) Entrapment will mediate the relationship between defeat and suicide ideation.

4. To investigate which measure of future thinking (i.e., an online adapted future thinking task by study authors from the original standard future thinking task developed by Macleod *et al*. (1993), future-oriented repetitive thought scale by Miranda, Wheeler,

Polanco-Roman, and Marroquin (2017), and the considerations of future consequences scale by Strathman, Gleicher, Boninger, and Edwards (1994)) is a stronger predictor of suicide risk.

As there has been little relevant previous research, no hypothesis has been specified.

5. To explore the extent to which other measures of future thinking (i.e., future-oriented repetitive thinking (Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017) with its subdimensions, namely pessimistic repetitive future thinking, repetitive thinking about future goals, and positive indulging about the future, and the considerations of future consequences (CFC; Strathman, Gleicher, Boninger, & Edwards, 1994) with its subdimensions of CFC-Future and CFC-Immediate) moderate the relationship between entrapment (i.e., total entrapment, internal entrapment and external entrapment) and suicide ideation.

   Since there has been very little relevant previous research, no specific hypothesis has been formulated.

3.3. Methods

3.3.1 Recruitment and Procedure

This study employed a cross-sectional design using an online survey administered via the Gorilla Experiment Builder. 409 individuals who were 18 years or older were recruited between June 2021 and December 2021. The study was advertised via a snowballing approach on social media profiles held by the research team (e.g., Twitter and Facebook), public websites (e.g., Gumtree and Reddit), and the Suicidal Behaviour Research Laboratory (SBRL) website (i.e., www.suicideresearch.info). Individuals who saw the study advert (Appendix E) were also invited to share the advert with their own contacts.

The initial survey screen included the participant information sheet (Appendix F) and consent form (Appendix G). Participants gave consent and eligibility was determined by clicking an electronic checkbox under the consent form. They were then directed to the next page to start the anonymous survey. Ethical approval was granted by the University of Glasgow's Medical, Veterinary and Life Sciences Ethics Committee (Approval number: 200200072).

Study involvement took approximately 30 minutes. Each participant was asked to complete a demographics form, the Adapted Future Thinking Task (AFTT, see Appendix H) and a series of questionnaires at a single time point online. At any time throughout the survey, participants had the chance to modify their responses if they wished, except for the timed questions in the AFTT. A Support Sheet with information on support services was also provided including contact details, such as links to their websites, phone numbers and e-mail addresses (Appendix I). After completing the survey, participants were shown a page with thanks for their participation and if they wished to, they had the option to share their contact details (e.g., e-mail addresses) so that they would be contacted if they won a prize draw (a voucher for the value of £200). The winner of this draw was selected randomly when recruitment was completed. Participants contact details were never linked to their responses.

3.3.2 Measures

All measures included in this survey study are listed below and included in Appendix H.

Demographics. Age, gender, sex, sexual orientation, ethnicity, employment, marital status, history of psychiatric illness and level of education were recorded.

Suicidal ideation. Suicidal ideation was assessed via the Suicide Ideation subscale of the Suicide Probability Scale (SPS; Cull & Gill, 1989). This scale is a valid and reliable measure of suicide risk in adults and adolescents over the age of 13 years (Tatman, Greene, & Karr, 1993; Go, Kim, & Lee, 2000). In this study, we used the suicide ideation subscale which consists of eight items from the main instrument. The 8-item suicide ideation subscale (score range 8-32) evaluates several thoughts of suicide, such as 'I feel the world is not worth continuing to live in' and participants indicate how often each statement applies to them on a 4-point scale from 'None of the Time' (1), to 'Most or All of the Time' (4). Higher scores indicate greater levels of suicidal ideation. The measure showed excellent internal consistency in the current study (Cronbach's α=0.91).

Suicidal History. This was assessed via items from the Adult Psychiatric Morbidity Survey (McManus, Bebbington, Jenkins, & Brugha, 2016) which evaluates death-related thoughts, suicidal ideation, and suicidal behaviours across the lifetime and within the last 12 months. The items used in this study include two groups of questions to ascertain whether participants have (i) ever thought of taking their life, and (ii) attempted to take their own life. These are:

“Have you ever seriously thought of taking your life, but not actually attempted to do so?”; “Have you ever made an attempt to take your life, by taking an overdose of tablets or in some other way?”.

Future Thinking (Positive Future Thinking and Negative Future Thinking). Positive and negative future thinking were recorded using an online adapted version of the Future Thinking Task (FTT; MacLeod *et al*., 1997). An Adapted online form of the Future Thinking Task (AFTT) was created by Kose, O’Connor and Evans (2020) on the Gorilla Experiment Builder for this study. In this adapted version, participants were presented with 13 different screens. The first screen included a general instruction about the task (Positive Future Thinking or Negative Future Thinking). The second and eighth screens involved detailed instructions for the time period of next week (T1 PFT or T1 NFT for Positive Future Thinking and Negative Future Thinking at Time 1, respectively), while the fourth and the tenth screens included detailed instructions for the time period of next year (T2 PFT or T2 NFT). The sixth and twelfth screens consisted of detailed instructions for the time period of next 5-10 years (T3 PFT or T3 NFT). Screens three, five, seven, nine, 11, and 13 included very brief instructions, a one-minute countdown timer on the right side of the screen just below the instructions, and then text fields just below the countdown timer where participants were asked to list the events they were generated according to instructions. In addition to this, half of the participants started the task with the positive version first and the remaining half started with the negative version of the task first.

This task asks participants to think of possible future experiences or events that they are looking forward to and things that they are not looking forward to throughout three different time frames (i.e., the next week, the next year, and the next 5 to 10 years). On each occasion, participants have one minute to think of possible future events for a given time frame and this is repeated until all three time periods are assessed. In line with previous research (MacLeod *et al*.,1997), the time frames are aggregated to yield total positive future thinking and negative future thinking scores (i.e., the total number of positive future thoughts per participant and the total number of negative future thoughts for each respondent).

The instructions given are generally, 'Try to think of as many positive future or negative future events, things that you are looking forward to or things that you are not looking forward to, that could happen within the next week/year/5-10 years'. The order of presentation of negative versus positive conditions is counterbalanced across participants, though in each

condition, the time periods are always presented in the same order (next week/year/5-10 years).

In this study, the contents of both positive future thinking and negative future thinking were also coded according to an adapted version of Godley *et al*.'s (2001) coding frame for future thinking to yield both the total number of positive future thoughts and negative future thoughts per category. There were seven different categories. The social/interpersonal category refers to positive or negative future thinking that includes family and/or friends and interpersonal events, including at least one other person, such as marriage, divorce, break-up, and having children. The achievement category refers to academic, job-related, or other test-related achievements, involving passing exams, getting into university or college, new job or promotion, and school-related items are also involved here. The intrapersonal category involves any thought that concerns only the individual and no one else, and so own health-related items are included in this category (e.g., getting better, not being depressed, being happy, being healthy, recovering, and being more confident). The leisure/pleasure category relates to any activities or events that are undertaken for leisure or pleasure, such as sports, birthdays, going on holidays, watching television, shopping, and dinner. These events can also be sociable but no one else is mentioned, as they can be undertaken alone. Items in the category of health of others concern the health of other family members or friends, and they can involve improvements or deteriorations in mental and/or physical health or general wellbeing. The financial and home items refer to any elements of finance/money and/or home (e.g., moving house, decorating the house, and debts being paid off). The final category, other, relates to thoughts that do not fit into the preceding categories or where any doubt exists as to the category for which an item is best fitted.

Inter-rater reliability check. One rater, who was not a member of the supervisory team, independently rated 20% of the responses. The agreement between the principal investigator and the second coder was good ($\kappa = .90$). We had an initial agreement of 90% and then reached a 100% consensus after discussion. Herein, all the responses were categorised by the principal investigator.

The Future-oriented Repetitive Thought (FoRT) Scale (Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017). This scale assesses to what extent individuals repeatedly think about the likelihood of positive and negative events occurring in the future. The 22-item includes

several components of future-oriented repetitive thinking: (1) the tendency to think about whether negative future events would happen or whether positive future events would not happen (e.g., "I think about the possibility of losing people or things that are important to me"); (2) the tendency to take pleasure in a positive future (e.g., "I daydream about the things that I want happening to me in the future"); and (3) the tendency to think about future goals (e.g., " I think about how to achieve my future goals''). Research participants are instructed to "Please read the following statements, and, for each one, consider how often, generally, you think about the future in these ways, and indicate whether you do so Almost Never (1), Sometimes (2), Often (3), or Almost Always (4)". Instructions stress "...that these questions are concerned with the frequency with which you think about the future in these ways rather than whether you tend to hold these as attitudes or beliefs about the future." This scale contains three subscales: Pessimistic repetitive future Thinking (PT), repetitive thinking about Future Goals (FG), and Positive Indulging about the future (PI). The measure indicated excellent internal consistency for the Pessimistic repetitive future Thinking (PT) (Cronbach's α=0.91), and good internal consistency both for the repetitive thinking about Future Goals (FG) (Cronbach's α=0.85), and Positive Indulging about the future (PI) (Cronbach's α=0.82) subscales.

The Consideration of Future Consequences Scale (CFC; Strathman, Gleicher, Boninger, & Edwards, 1994). The original scale consisting of 12 items evaluates how much individuals think about and are influenced by distant consequences about their current behaviour. It uses five-point ratings from 1 (Extremely Uncharacteristic) to 5 (Extremely Characteristic) (e.g., ''I consider how things might be in the future and try to influence those things with my day-to-day behaviour''). Higher numbers demonstrate a greater consideration of future consequences. While the internal reliability of the overall scale is quite high, recent research indicates the scale includes two subscales: The consideration of Immediate consequences (CFC-I) and the consideration of Future consequences (CFC-F) (Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008). More recently, the CFC scale has been expanded to a 14-item scale, with two new items added to improve the reliability of the CFC- Future subscale (Joireman, Shaffer, Balliet, & Strathman, 2012). In the present study, we used 14 items, and we also used the 7-point scale (from 1= Extremely Uncharacteristic to 7=Extremely Characteristic). The measure showed good internal consistency both for the CFC-Future (Cronbach's α=0.85), and the CFC-Immediate subscales (Cronbach's α=0.84) in the current study.

Stress. The Perceived Stress Scale-Short Form (PSS-short; Cohen & Williamson, 1988) is a 4-item (score range 4-20) scale that evaluates how often an individual felt or thought a certain way, such as 'Felt that things were going your way.' It is assessed on a 5-point Likert-type scale from (1) 'Never' to (5) 'Very Often'. High scores reflected greater levels of stress. The scale included two reverse code items (questions two and three). The PSS-short has been found to be a reliable and brief measure of stress (Lee, 2012) with good internal consistency within the current study (Cronbach's α=0.81).

Defeat. The Defeat Scale (Gilbert & Allan, 1998) is a 16-item measure of an individual's perceived struggle or loss of social rank (e.g., 'I feel that I have not made it in life'), which has been found to be associated with low psychological health. Participants respond using a 5-point Likert-type scale from (0) 'Never' to (4) 'Always' and scores range from zero to 64. Higher scores show greater levels of defeat. This measure has been found to have high internal consistency in the general population (i.e., 0.94 in the student population, Gilbert & Allan, 1998). In this study, we used three items from a short form of the original defeat scale using a 5-point Likert-type scale from (1) 'Never' to (5) 'Always' and scores range from three to 15. The measure indicated excellent internal consistency in the current study (Cronbach's α=0.91).

Entrapment. The Entrapment Scale (Gilbert & Allan, 1998) is a measure of internal entrapment, consisting of six items about one's own thoughts and feelings (e.g., 'I feel powerless to change myself') and external entrapment, involving 10 items assessing feeling trapped by external situations (e.g., 'I have a strong desire to escape from things in my life'). In this study, we used the 4-item Entrapment Scale Short-Form (E-SF) (De Beurs *et al*., 2020) which is an empirically derived short version of the Entrapment Scale (using items four, five, 14, and 16 of the original scale). Responses are recorded on a 5-point Likert-type scale from 'Not at All Like Me' to 'Extremely Like Me'. Higher scores demonstrate a greater sense of entrapment. Both internal and external entrapment sub-scales were found to have high levels of reliability in both student and clinical populations (>0.85; Gilbert & Allan, 1998). In this study, acceptable internal consistency for internal entrapment sub-scale (Cronbach's α=0.71), good internal consistencies for both external entrapment subscale (Cronbach's α= 0.89) and the total short scale (Cronbach's α= 0.88) were shown.

Anxiety. The General Anxiety Disorder-7 Scale (GAD-7) is a 7-item measure (e.g., 'Feeling nervous, anxious or on edge'; 'Feeling afraid as if something awful might happen, and

Trouble relaxing') developed to screen for generalized anxiety disorder (Spitzer, Kroenke, Williams, & Löwe, 2006). Each item is scored on a four-point Likert-type scale (1-4) with total scores ranging from seven to 28, and higher scores reflecting more symptoms of anxiety. The measure demonstrated excellent internal consistency in the current study (Cronbach's α=0.92).

Depression. The Patient Health Questionnaire Depression (PHQ-9) Scale (Cameron, Crawford, Lawton & Reid, 2008) is a screening tool for depressive symptoms. Items one to eight are for the assessment of depressive symptoms, while the last item (item nine) assesses suicide ideation. To minimise contamination with the Suicide Probability Scale (SPS; Cull & Gill, 1989), in this study, we used the first eight items as a measure of depressive symptoms. Based on the current study, good internal consistency was identified for this measure (Cronbach's α=0.86 for PHQ-8 without item nine and Cronbach's α=0.88 for PHQ-9).

Optimism/Pessimism. The Revised Life Orientation Test (LOTR) (Scheier, Carver, & Bridges, 1994) is a psychological measure that evaluates an individual's dispositional level of optimistic and pessimistic beliefs. It is a 10-item scale that assesses how optimistic or pessimistic individuals feel about the future. Participants responded on a 5-point rating scale (1 = Strongly Disagree; 5 = Strongly Agree) in this study. These statements contain 'In uncertain times, I usually expect the best' and 'If something can go wrong for me, it will.' Here, high ratings mean more optimism. The scale included three reverse code items assessing pessimism (items three, seven, and nine) and three items evaluating optimism (items one, four, and 10). Items two, five, six, and eight are filler items that are not scored as part of the revised scale. Therefore, the overall score is calculated by summing items one, three, four, seven, nine, and 10. The measure showed good internal consistency both for the pessimism (Cronbach's α=0.81) and optimism subscales (Cronbach's α=0.84).

3.3.3 Statistical Analysis

3.3.3.1 Power Calculation.

Assuming a priori multiple linear regression assessment with a moderate effect size (Cohen, 1992) of p= 0.15 and power (1-β) of 0.80 (p<0.05), G*Power recommends that a minimum of 114 participants is needed to detect an effect with a maximum of nine predictors. However, this number was doubled to allow for the calculation of subgroup analyses. Hence, the target

sample was a minimum of 300 participants. Statistical analyses were carried out using SPSS (version 29).

3.3.3.2 Data Screening and Missing Value Analysis.

The complete dataset was created by transferring each scale result from separate Excel files onto a single Excel datasheet. Second, the screening of the raw data on SPSS version 29 was completed, such as coding the Likert-type response values (e.g., 1 = Never, 2 = Rarely, and 3 = Often). Third, label names for each scale's items were added, and all scales were checked to see reverse-coded items. Then, the data were checked for minimum and maximum scores and outliers were also checked using the Mahalonobis Distance Analysis. Then, the probability of outliers was checked. Herein, we failed to reject the null hypothesis for Little's MCAR test which means our data are missing completely at random (p=.893). We completed an outlier check and an outlier analysis. Herein, the Mahalanobis Distance analysis detected only one outlier. When the probability of this outlier was checked by using the "1-CDFCHIQS(MAH_1-19(df)" formula, it suggested that one of the participants was an outlier with only p=.00099 possibility, which is very close to our threshold .001. Therefore, we kept the participant's data rather than removing it. Consistent with other studies conducted within the Suicidal Behaviour Research Lab, if an individual has not completed 75% or more items in a measure, then her/his data for that measure were not used.

Scale variables based on the total scores were created, and the data were checked for the regression assumptions. Test of reliability for each scale was calculated and Cronbach's alphas were reported under 3.3.2 Measures.

3.3.3.3 Regression Assumptions.

When we checked the assumptions of independence and constant variance, the scatter plots were rectangular, and no points were outside of minus three to plus three on either the x-axis or the y-axis. Tests of normality were applied utilising the explore function of the SPSS version 29. The normality assumption was violated for two of the variables. Herein, only anxiety (p=.012) and pessimistic repetitive future thinking (p<.001) were not normally distributed and all other variables were normally distributed (all p>.05). As for normality plots, generally points do seem to follow the line and so we would assume we have a normal distribution here that the observed standardised residuals are normally distributed.

3.3.3.4 Hypotheses Testing.

The main aim of this survey study was to advance our understanding of the relationship between future thinking and suicidal thoughts and/or suicidal behaviours within the context of the IMV model.

A series of univariate binary regression analyses were conducted to test hypotheses 1a, 1b, 2a, 2b, and 2c, with two-group suicide status as the response or outcome variable and future thinking (i.e., valence (positive and negative future thinking) and content (seven categories for each valence)) as the predictor variable. A hierarchical regression analysis was performed to test hypothesis 3a. Hypothesis 3b and question five were explored using moderation analyses and hypothesis 3c was investigated using a mediation analysis. There was no specific hypothesis for the 4th question of this study, and we explored question four using univariate and multivariate regression analyses.

3.4. Results

3.4.1 Descriptive Statistics

Overall, 409 individuals participated in the study. Our study compared two groups of individuals. About 76% of participants (n=312) reported a history of suicidal thoughts and/or suicidal behaviours and approximately 19% of participants reported having no history of suicidal thoughts and suicidal behaviours. Eighteen participants indicated that they 'would rather not say' so they are treated as missing data. Specifically, 153 (37.4%) reported a history of suicidal thoughts only and 34% (n=139) reported a history of suicidal behaviour, irrespective of their suicidal thoughts' status.

Approximately 82% of participants identified as White in our sample. Around 59% of participants were under 34 years or younger, meaning that our sample mostly consisted of individuals from "early adulthood" (Levinson, 1986). About 65% identified as a woman and 56% of participants were single/never married. Around 35% of participants were employed and 22% were students. Approximately 63% of participants had a bachelor's degree or higher and about 21% had a high-school degree. Additionally, 66% of participants reported a history of mental disorder diagnosis. Full demographic details are summarised in Table 3.1.

Table 3.1 *Baseline characteristics of the sample*

	n	%
Sex		
Man	88	21.5
Woman	265	64.8
Other	44	10.7
Missing	12	2.9
Gender		
Male	94	23.0
Female	299	73.1
Other	6	1.5
Missing	10	2.4
Sexual Orientation		
Heterosexual or Straight	194	47.4
Bisexual	112	27.4
Other	95	23.3
Missing	8	2.0
Marital Status		
Single, Never Married	229	56.0
Divorced	30	7.3
Married or Cohabiting	118	28.9
Other	20	5.0
Missing	12	2.9
Age		
18-24	108	26.4
25-34	133	32.5
35-44	62	15.2
45-54	36	8.8
55-64	48	11.7
Above 65	12	2.9
Missing	10	2.4
Ethnicity		
White	335	81.9
Black/African/Caribbean/Black British	18	4.4
Mixed/Multiple Ethnicities	26	6.4
Other	20	4.9
Missing	10	2.4
Level of Education		
Primary School	14	3.4
High School	84	20.5
Bachelor's Degree	147	35.9
Master's Degree	86	21
PhD or Higher	24	5.9
Other	38	9.3
Missing	16	3.9
Employment Status		
Full-time Employment	144.	35.2
Student	90.	22.0

Part-time Employment	48	11.7
Unable to Work	34	8.3
Unemployed (Looking for Work)	26	6.4
Retired	18	4.4
Other	35	8.5
Missing	14	3.4
History of Mental Disorder		
Yes	269	65.8
No	120	29.3
Other	4	1.0
Missing	16	3.9

3.4.2 Future Thinking and Suicide Risk

Hypothesis 1a proposed that participants with a history of suicidal ideation and/or suicidal behaviours would report fewer Positive Future Thoughts (PFT) than those without suicidal ideation or suicidal behaviours. This was tested using a binary logistic regression analysis with two-group suicide status (suicidal history: Yes versus No) as the outcome variable and the total number of positive future thoughts as the predictor variable. The logistic regression model was not statistically significant, $\chi 2(1) = .025$, $p = .875$. Positive future thinking did not predict two-group suicide status, *Exp(B)* =1.01, 95% *CI* [.947, 1.07], p=.875. The means and standard deviations of PFT as a function of two-group suicide status are also reported in Table 3.2.

As for hypothesis 1b stating that there would be no difference in the number of negative future thoughts between those with a history of suicidal behaviours and/or suicide ideation and those without a history of suicidal behaviours or suicide ideation, a binary logistic regression was also conducted to ascertain the effects of *negative future thinking* on two-group suicide status. The logistic regression model was statistically significant, $\chi 2(1) = 13.53$, $p<.001$. The model explained 5.4 % (Nagelkerke $R^2 = .054$) of the variance in two-group suicide status. As total negative future thinking increases the odds of not having a suicide history decreases by 13.2 % (*Exp(B)* =0.868, 95% *CI* [.802, .939], $p<.001$). The means and standard deviations of NFT as a function of two-group suicide status are also reported in Table 3.2.

Table 3.2 *The means and standard deviations of NFT and PFT as a function of two-group suicide status*

Variable	With SH *M(SD)*	Without SH *M(SD)*	All participants *M(SD)*
PFT	8.5(4.1)	8.6(4.5)	8.5(4.2)
NFT	7.5(3.6)	5.9(3.0)	7.2(3.5)

Note. PFT= Positive Future Thinking; NFT=Negative Future Thinking. SH=Suicidal History

3.4.2.1 The contents of positive future thoughts and suicide risk

The mean scores and standard deviations for the number of positive future thoughts' contents as a function of two-group suicide status (those with a history of suicidal thoughts and/or suicidal behaviours versus those without any history of suicidal thoughts or suicidal behaviours) are summarised in Table 3.3.

Table 3.3 *The means and standard deviations for PFT contents by two-group suicide status*

Variable	With SH *M(SD)*	Without SH *M(SD)*	All participants *M(SD)*
Interpersonal PFT	2.4(1.8)	2.2(1.7)	2.3(1.8)
Achievement PFT	1.8(1.6)	2.2(1.7)	1.9(1.6)
Intrapersonal PFT	0.6(0.9)	0.5(0.8)	.60(8.4)
Leisure/pleasure PFT	2.5(2.0)	2.4(1.7)	2.5(2.0)
Health of others PFT	0.1(0.4)	0.1(0.3)	.92(.34)
Financial/Home PFT	1.1(1.0)	1.0(1.0)	1.0(1.0)
Other PFT	0.1(0.3)	0.1(0.4)	.08(.31)

Note. PFT= Positive Future Thinking. *M*=Mean. *SD*=Standard Deviations. SH=Suicidal History.

Hypothesis 2a proposed that intrapersonal positive future thinking scores would be higher, whereas the other contents/types of positive future thinking scores would be lower for those with a history of suicidal thoughts and/or suicidal behaviours than those without suicidal ideation or suicidal behaviours. This was tested using a series of univariate binary logistic

regression analyses with two-group suicide status as the outcome variable and the total number of positive future thoughts for each type/content of future thinking (i.e., social/interpersonal, achievement, intrapersonal, leisure/pleasure, health of others, financial/home and other) as the predictor variable.

None of the regression models was significant (i.e., *interpersonal positive future thinking, Exp(B)* =.947, 95% CI [.82, 1.1], *p*=.45; *achievement positive future thinking Exp(B)* =1.13, 95% CI [.97, 1.3], *p*=.12; *intrapersonal positive future thinking, Exp(B)* =.886, 95% CI [.66, 1.2], *p*=.43; *leisure/pleasure positive future thinking, Exp(B)* =.983, 95% CI [.87, 1.1], *p*=.79; *health of others positive future thinking, Exp(B)* =.832, 95% CI [.38, 1.8], *p*=.64; *financial/home positive future thinking, Exp(B)* =.955, 95% CI [.75, 1.3], *p*=.71; and *other positive future thinking*, *Exp(B)* =1.80, 95% CI [.91, 3.6], *p*=.09.

3.4.2.2 The contents of negative future thoughts and suicide risk.

The mean scores and standard deviations for the number of negative future thoughts' contents as a function of two-group suicide status (those with a history of suicidal thoughts and/or suicidal behaviours versus those without any history of suicidal thoughts or suicidal behaviours) are summarised in Table 3.4.

Table 3.4 *The means and standard deviations for NFT contents by suicide status*

Variable	With SH *M(SD)*	Without SH *M(SD)*	All participants *M(SD)*
Interpersonal NFT	1.6(1.4)	1.2(1.2)	1.5(1.4)
Achievement NFT	1.7(1.5)	1.5(1.4)	1.7(1.5)
Intrapersonal NFT	1.5(1.4)	1.0(1.1)	1.4(1.3)
Leisure/Pleasure NFT	0.7(0.9)	0.6(0.9)	.67(.94)
Health of Others NFT	0.6(0.8)	0.5(0.6)	.61(.77)
Financial/Home NFT	1.1(1.3)	0.8(0.9)	1.0(1.2)
Other NFT	0.3(0.7)	0.4(0.7)	.28(.70)

Note. NFT=Negative Future Thinking. *M*=Mean. *SD*=Standard Deviations. SH=Suicidal History.

Hypothesis 2b suggesting that there would be no difference between groups in terms of different contents/types of negative future thinking scores was investigated using a series of binary logistic regression analyses with two-group suicide status as the outcome variable and the total number of each negative future thoughts in terms of content (i.e., social/interpersonal achievement, intrapersonal, leisure/pleasure, health of others, financial/home and other) as the predictor variable.

The results of each binary logistic regression analysis are reported as follows.

The binary logistic regression analysis conducted to ascertain the effects of *interpersonal negative future thinking* on two-group suicide status was significant, $\chi 2(1) = 5.636$, $p=.018$, and explained 2.3 % (Nagelkerke $R^2 = .023$) of the variance in two-group suicide status. For each unit increase in interpersonal negative future thinking the odds of not being in the suicide history decreases by 21.1%, *Exp(B)* =0.789, 95% *CI* [.642, .969], $p=.018$.

Table 3.5 *Binary logistic regression analysis results for interpersonal negative future thinking as a function of suicidal status (history vs no history)*

				95% *CI*			
Variable	Beta	*SE*	Wald X^2	LL	UL	OR	*p*
Interpersonal NFT	-.237	.105	5.13	.642	.969	.789	.024

Note. NFT=Negative Future Thinking. *CI*: Confidence Interval; OR: Odds Ratio; *SE*: Standard Error.

Secondly, according to the results of the binary logistic regression performed to ascertain the effects of *intrapersonal negative future thinking* on two-group suicide status, the logistic regression model was also statistically significant, $\chi 2(1) = 11.704$, $p<.001$, with 4.6 % (Nagelkerke $R^2 = .046$) of the variance in two-group suicide status explained. For each unit increase in total intrapersonal negative future thinking the odds of not being in the suicide history group decreases by 31%, Exp*(B)* =0.692, 95% *CI* [.551, .868], $p<.001$.

Table 3.6 *Binary logistic regression analysis results for intrapersonal negative future thinking as a function of suicidal status (history vs no history)*

				95% *CI*			
Variable	Beta	*SE*	Wald X^2	LL	UL	OR	*p*
Intrapersonal NFT	-.368	.116	10.1	.551	.868	.692	.001

Note. NFT=Negative Future Thinking. *CI*: Confidence Interval; OR: Odds Ratio; *SE*: Standard Error.

The third binary logistic regression analysis ascertained the effects of *financial/home negative future thinking* on two-group suicide status, $\chi 2(1) = 4.390$, p=.036, with 1.8 % (Nagelkerke R^2 = .018) of the variance in two-group suicide status explained. For each unit increase in total financial/home negative future thinking the odds of not being in the suicide history group decreases by 21%, *Exp(B)* =0.791, 95% *CI* [.628, .996], p=.036.

Table 3.7 *Binary logistic regression analysis results for financial/home negative future thinking as a function of suicidal status (history vs no history)*

				95% *CI*			
Variable	Beta	*SE*	Wald X^2	LL	UL	OR	*p*
Financial/Home NFT	-.235	.118	3.97	.628	.996	.791	.046

Note. NFT=Negative Future Thinking. *CI*: Confidence Interval; OR: Odds Ratio; *SE*: Standard Error.

None of the binary logistic regression analyses to ascertain the effects of *achievement* or *leisure/pleasure* or *health of others* or *other* contents of *negative future thinking* on two-group suicide status, were statistically significant ($\chi 2(1) = 1.171$, p =.279, $\chi 2(1) = 3.097$, p =.078, $\chi 2(1) = 1.897$, p =.168, $\chi 2(1) = 1.897$, p =.168, respectively). In other words, none of these negative future thinking contents predict two-group suicide status (*Exp(B)* =0.935, 95% *CI* [.79, 1.11], p=.44, *Exp(B)* =0.859, 95% *CI* [.648, 1.141], p=.279, *Exp(B)* =0.733, 95% *CI* [.512, 1.049], p=.078, *Exp(B)* =1.25, 95% *CI* [.919, 1.700], p=.036, respectively).

3.4.2.3 Future Thinking Across Different Time Periods and Suicide Risk.

Hypothesis 2c, which predicted that different time frames of future thoughts would not be differentially associated with suicide status, was explored using a series of univariate binary logistic regression analyses with two-group suicide status as the outcome variable and the total number of positive future thinking and negative future thinking scores across different time frames (next week, next year, and next 5-10 years) as the predictor variables. The results of each binary logistic regression analysis are reported as follows.

Three separate binary logistic regression analyses were conducted to investigate the relationship between *positive future thinking time periods of next week (T1) or next year (T2) or next 5-10 years (T3)* and two-group suicide status. None of the logistic regression models was statistically significant ($\chi 2(1) = .137$, $p = .711$, $\chi 2(1) = 0.85$, $p = .771$, $\chi 2(1) = 0.299$, $p = .584$, respectively). In other words, none of the positive future thinking time periods (i.e., next week -T1, next year - T2, next 5-10 years - T3) predicted two-group suicide status (*Exp(B)* =0.711, 95% *CI* [.859, 1.110], *p*=.711, *Exp(B)* =1.02, 95% *CI* [.884, 1.182], *p*=.771, *Exp(B)* =1.04, 95% *CI* [.896, 1.216], *p*=.584, respectively).

Another three separate binary logistic regression analyses examined the relationship between *negative future thinking time periods of next week (T1) or next year (T2) or next 5-10 years (T3)* and two-group suicide status.

The first binary logistic regression analysis was conducted to ascertain the effects of *negative future thinking (next week, T1)* on two-group suicide status. The logistic regression model was statistically significant, $\chi 2(1) = 6.939$, *p*=008. The model explained 2.8 % (Nagelkerke $R^2 = .028$) of the variance in two-group suicide status. As total T1 (next week) negative future thinking increases the odds of not having a suicide history decreases by 20%. As total T1 (next week) negative future thinking increases by a unit the odds of having a history of suicide are 1.25 times higher (*Exp(B)* =.797, 95% *CI* [.670, .949], *p*=.008).

Table 3.8 *Binary logistic regression analysis results for next week NFT as a function of suicidal status (history vs no history)*

				95% *CI*			
Variable	Beta	SE	Wald X^2	LL	UL	OR	*p*
T1 NFT (next week)	-.226	.089	6.53	.670	.949	.797	.011

Note. CI: Confidence Interval; OR: Odds Ratio; SE: Standard Error.

The second binary logistic regression analysis was performed to investigate the effects of *negative future thinking (next year, T2)* on two-group suicide status. The model was statistically significant, $\chi 2(1) = 10.432$, p=001 and explained 4.1 % (Nagelkerke $R^2 = .041$) of the variance in two-group suicide status. When total T2 (next year) negative future thinking increases the odds of not having a suicide history decreases by 26%. As total T2 (next year) negative future thinking increases by a unit the odds of having a history of suicide are 1.35 times higher (*Exp(B)* =.741, 95% *CI* [.612, .897], p=.001).

Table 3.9 *Binary logistic regression analysis results for next year NFT as a function of suicidal status (history vs no history)*

				95% *CI*			
Variable	Beta	SE	Wald X^2	LL	UL	OR	*p*
T2 NFT (next year)	-.300	.098	9.41	.612	.897	.741	.002

Note. CI: Confidence Interval; OR: Odds Ratio; SE: Standard Error.

The third and last binary logistic regression analysis was carried out to explore the effects of *negative future thinking (next 5-10 years)* on two-group suicide status. The model was statistically significant $\chi 2(1) = 6.708$, p=010, and explained 2.7 % (Nagelkerke $R^2 = .027$) of the variance in two-group suicide status. As total T3 (next 5-10 years) negative future thinking increases the odds of not having a suicide history decreases by 20%. When total T3 (next 5-10 years) negative future thinking increases by a unit the odds of having a history of suicide are 1.25 times higher (*Exp(B)* =.803, 95% *CI* [.676, .953], p=.01).

Table 3.10 *Binary logistic regression analysis results for next 5-10 years NFT as a function of suicidal status (history vs no history)*

				95% *CI*			
Variable	Beta	SE	Wald X^2	LL	UL	OR	*p*
T3 NFT (next 5-10 years)	-.220	.088	6.29	.676	.953	.803	.012

Note. CI: Confidence Interval; OR: Odds Ratio; SE: Standard Error.

As each of the three negative time periods is significant, a multivariate regression analysis entering all three-time frames in a single model to see which time period is the most important was carried out.

The multivariate regression analysis conducted to examine whether suicide ideation can be predicted by *T1, T2, and T3 negative future thinking* showed that only T3 negative future thinking (*B*=.49*, t*=2.01, *p* =.045) contributed significantly to the model. This means that the most important time period is T3 (next 5-10 years; please see Table 3.11).

Table 3.11 *Multivariate regression analysis of some future thinking measures for association with suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
T1_Total_NFT	-.047	.254	-.546	.453	-.010	.854
T2_Total_NFT	-.034	.260	-.546	.478	-.007	.896
T3_Total_NFT*	.488	.243	.010	.966	.110	.045

Note. NFT=Negative Future Thinking. *p<.05.

3.4.3 The Effect of Future Thinking on Suicide Risk above and beyond Depression

Hypothesis 3a positing that low levels of positive future thinking (i.e., few positive future thoughts) would be associated with suicide risk independent of depression was tested using a standard hierarchical regression analysis, with two blocks of variables. To control for its effect, depression was included in the first block as the predictor variable, with suicide ideation as the dependent variable. In block two, positive future thinking (PFT), the predictor variable of interest, was added to the model. The results showed that the overall model was significant, specifically that 30% of the variance in suicide ideation was explained by depression and PFT (F (2, 406) =86.81, p< .001, R^2=.300). Herein, depression was uniquely significantly associated with suicide ideation (b=.547, t=13.148, p<.001), however, positive future thinking was not significantly associated with suicide ideation (β = .026, p =.709) (F (1, 407) = .525, p=.469, R^2=.001). This suggests that positive future thinking did not have an effect beyond the variance explained by depression.

3.4.4 Moderation Effect of Positive Future Thinking on Entrapment (Entrapment Total, External Entrapment, and Internal Entrapment) and Suicidal Ideation Relationship

Hypothesis 3b, assuming that positive future thinking would operate as a motivational moderator by moderating the relationship between entrapment (entrapment total, external entrapment, and internal entrapment) and suicidal ideation, was tested using moderation analyses.

First, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with total entrapment as the predictor, suicide ideation as the outcome, and positive future thinking as a moderator. Altogether, 22.6 % of the variability was predicted by all of the variables (F (3, 405) = 39.40, p<.001, R^2=.226). There was a significant main effect of total entrapment on suicidal ideation, (b =.64, SE = .059, p < .001). However, the interaction effect was not statistically significant (p =.40), indicating that positive future thinking did not moderate the effect of entrapment on suicide ideation. The main effect of positive future thinking was also not significant (p =.23) (Please see Table 3.12).

Table 3.12 *Positive Future Thinking as a Moderator of the Entrapment and Suicide Ideation Relationship*

Predictor	β	p	95% CI	
			LL	UL
Entrapment*	.637	. 000	.521	.752
PFT	.089	.231	-.057	.234
Entrapment x PFT	-.012	.403	-.039	.016

Note. *p <.001. PFT= Positive Future Thinking

Second, two separate moderation analyses using the PROCESS macro for SPSS were also performed (Hayes, 2022), with external entrapment or internal entrapment (entrapment subscales) as the predictor, suicide ideation as the outcome, and positive future thinking as a moderator.

In the model in which external entrapment was the predictor variable, 19.48% of the variability was predicted by all of the variables (F (3, 405) = 32.6575, p<.001, R^2=.1948). Table 3.13 depicts the unstandardised regression coefficients. Here, there was a significant main effect found between external entrapment and suicidal ideation, (b =1.2139, SE = .1234, p < .001). However, the interaction effect was not statistically significant (p =.36), indicating that positive future thinking did not moderate the effect of external entrapment on suicide ideation. The main effect of positive future thinking was also not significant (p =.19).

Table 3.13 *Positive Future Thinking as a Moderator of the External Entrapment and Suicide Ideation Relationship*

Predictor	β	p	95% *CI*	
			LL	UL
External Entrapment*	1.21	.000	.971	1.46
PFT	. 099	.195	-.051	.248
External Entrapment x PFT	-.027	.359	-.084	.031

Note. *p <.001. PFT= Positive Future Thinking

When it comes to the model in which internal entrapment was the predictor, 20.6% of the variability was predicted by all of the variables (F (3, 405) = 35.0340, p<.001, R^2=.2060).

Table 3.14 demonstrates the unstandardised regression coefficients. Herein, there was a significant main effect found between internal entrapment and suicidal ideation (b =1.0571, SE = .1036, p < .001). However, the interaction effect was not statistically significant (p =.39), indicating that positive future thinking did not moderate the effect of internal entrapment on suicidal ideation. The main effect of positive future thinking was also not significant (p =.34).

Table 3.14 *Positive Future Thinking as a Moderator of the Internal Entrapment and Suicide Ideation Relationship*

Predictor	β	p	95% *CI*	
			LL	UL
Internal Entrapment*	1.06	.000	.853	1.26
PFT	.072	.336	-.075	.218
Internal Entrapment x PFT	-.022	. 386	-.071	. 028

Note. *p <.001. PFT= Positive Future Thinking

3.4.5 Moderation Effect of Positive Future Thinking on Defeat and Suicidal Ideation Relationship

An additional moderation analysis using the PROCESS macro for SPSS was carried out (Hayes, 2022), with defeat as the predictor, suicide ideation as the outcome, and positive future thinking as a moderator. Altogether, 11.9 % of the variability was predicted by all of the variables (F (3, 405) =18.2861, p<.001, R^2=.1193). Table 3.15 indicates the unstandardised regression coefficients. There was a significant main effect found between defeat and suicidal ideation (b =.5940, SE = .0807, p < .001). However, the interaction effect was also not statistically significant (p =.68), indicating that positive future thinking did not moderate the effect of defeat on suicide ideation. The main effect of positive future thinking was also not significant (p =.15).

Table 3.15 *Positive Future Thinking as a Moderator of the Defeat and Suicide Ideation Relationship*

Predictor	*β*	*p*	95% *CI*	
			LL	UL
Defeat*	.594	.000	.435	.753
PFT	.115	.146	-.040	.269
Defeat x PFT	.008	.684	-.030	.046

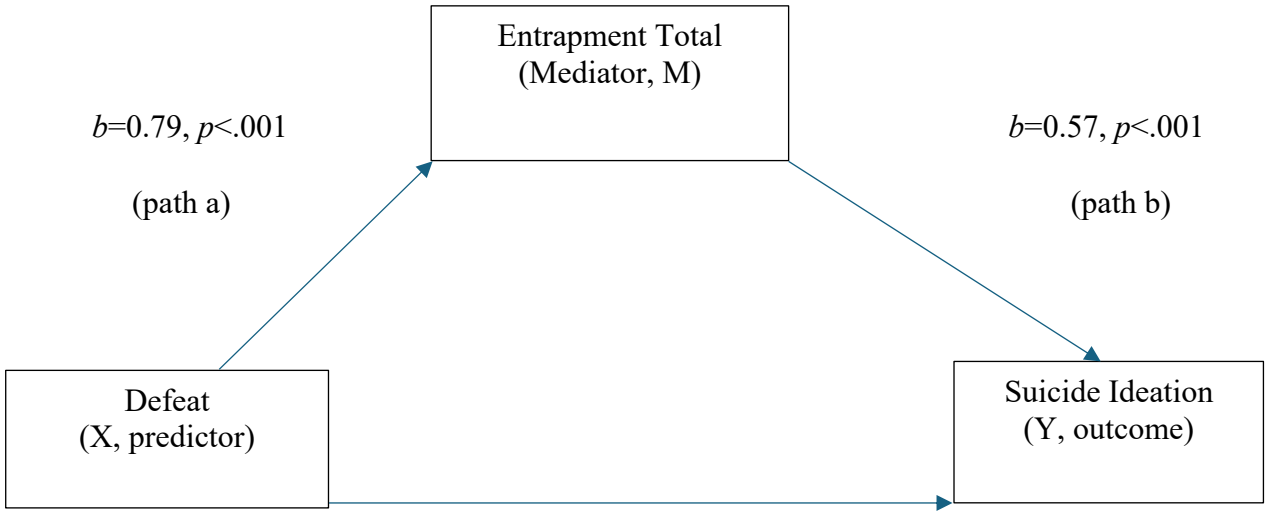
Note. *p <.001. PFT= Positive Future Thinking

3.4.6 The Mediating Role of Entrapment on the Relationship between Defeat and Suicide Ideation

Following Hayes' (2022) Process Macro via the bootstrapping method, a simple mediation analysis (model 4) was performed with defeat as the predictor variable, entrapment as the mediator and suicide ideation as the outcome variable to test hypothesis 3c. We hypothesised that defeat would affect suicide ideation indirectly via entrapment. There are two regression analyses here: One in which defeat is proposed to predict entrapment (path 'a' from the predictor to the mediator). In the second regression analysis, both entrapment and defeat are assumed to predict suicide ideation together. Here path 'b' is from mediator (i.e., entrapment) to outcome variable (i.e., suicide ideation), and path 'c' is the direct effect from the predictor variable (i.e., defeat) to the outcome variable (i.e., suicide ideation).

For path 'a', the effect from defeat (predictor variable, X) to entrapment total (mediator, M-dependent/outcome variable), b is .787, p<.001. Higher defeat scores are associated with more entrapment, and this is highly statistically significant. Path 'b' is highly significant, as expected from our mediation hypothesis (b=.567, t=7.612, p<.001). Path c' (the direct effect) is not significant, but our mediation model does not require this (b=.136, t=1,424, p=.155). Path 'c' is also significant (b=.583, t=7.254, p<.001, please see Figure 3.1).

Figure 3.1 *Mediation Analysis Summary*



Direct effect, b=0.14, p=.16 (path c')

Total effect, b=0.58, p<.001 (path c)

As hypothesized, paths 'a' and 'b' were both significant. Also note that the direct effect was closer to zero than the total effect. This makes sense because the direct effect is the total effect minus the indirect effect. The indirect effect is calculated as the product a*b. For our example, ab is the change in Y (suicide ideation) associated with a 1-unit increase in X (defeat) through M (entrapment total) (b=.447, 95% bootstrapped CI [.325, .524] (the standardized b-coefficient for ab =Index of mediation, β=.259 ,95% bootstrapped CI [.191, .329]). Importantly, the 95% CI [.325, .524] does not contain zero and is therefore a significant effect. Hence, entrapment is considered as a mediator between defeat and suicide ideation (p<.05).

3.5 The Association between Future Thinking Measures and Suicide Ideation

There was no specific hypothesis regarding the fourth research question as to which measure of future thinking would be the stronger predictor of suicide risk. The future thinking measures used in this study were an online version of the Future Thinking Task (the Adapted Future Thinking Task - AFTT by Kose, O'Connor, and Evans for this study), which was adapted from the original Future Thinking Task (FTT; MacLeod *et al*., 1997), the *Future-oriented Repetitive Thought (FoRT) scale* (Miranda, Wheeler, Polanco-Roman, & Marroquin,

2017), and the *Consideration of Future Consequences Scale* (CFC; Stratman, Gleicher, Boninger, & Edwards, 1994).

3.5.1. Future Thinking Measures and Suicide Ideation

First, a series of univariate regression analyses were conducted with suicide ideation as the outcome variable and the different future thinking measures (total scores) as the predictor variables (i.e., PFT and NFT, repetitive future thinking, and considerations of future consequences). The results of each univariate regression analysis are reported as follows.

First, a univariate regression analysis was carried out with suicide ideation as the outcome variable and *positive future thinking* total score as the predictor variable. The model only explained 0.1% of the variance in suicide ideation, F (1,407) = 104.38, R^2 = .001, p=.469. Positive future thinking was not a significant predictor of suicide ideation (β=.060, t= .725, p=.469).

Table 3.16 *Univariate regression analysis of the association between positive future thinking and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Positive future thinking	.060	.083	-.103	.223	.036	.469

Second, another univariate regression analysis with suicide ideation as the outcome variable *and negative future thinking* total score as the predictor variable suggested that the model only explained 0.2% of the variance in suicide ideation, F (1,407) = 2.017, R^2 = .002, p=.156. The results showed that negative future thinking was not a significant predictor of suicide ideation (β=.139, t= 1.420, p=.156).

Table 3.17 *Univariate regression analysis of the association between negative future thinking and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Negative Future thinking	.139	.098	-.054	.332	.070	.156

Third, the results of univariate regression analysis with suicide ideation as the outcome variable and *future-oriented repetitive thinking* total score as the predictor variable suggested that future-oriented repetitive thinking explained 6.2% of the variance, R^2=.062, F (1, 407) = 26.757, p <.001. Future-oriented repetitive thinking significantly predicted suicidal ideation, B=.194, t= 5.173, p <.001.

Table 3.18 *Univariate regression analysis of the association between future-oriented repetitive future thinking and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Future-oriented repetitive thinking	.194	.037	.120	.267	.248	<.001

The fourth univariate regression analysis was performed with suicide ideation as the outcome variable and *considerations of future consequences* total score as the predictor variable. The model was non-significant, only explaining 0.1% of the variance in suicide ideation, F (1,407) =.239, R^2 = .001, p=.625.

Table 3.19 *Univariate regression analyses of the association between future thinking measures and suicide ideation*

Variable	Beta	*SE*	95% CI		*β*	*p*
			LL	*UL*		
Considerations of future consequences	-.023	.046	-.114	.068	-.024	.625

As only future-oriented repetitive thinking was associated with suicide ideation, multivariate regression was not undertaken.

Then, another series of univariate regression analyses were carried out with suicide ideation as the outcome variable and scores from *the future thinking measures' subscales* as the predictor variable (i.e., seven different contents of the future thinking task and time frames regarding both positive and negative future thinking, pessimistic repetitive future thinking, repetitive thinking about future goals, positive indulging about the future, considerations of future consequences- future, and considerations of future consequences- immediate). Then, two separate multivariate regression analyses were performed with suicide ideation as the outcome variable and significant future thinking measures from the univariate regression analyses as the predictor variables. Here, we did not include the total score and subscales of the same scale in the same multivariate analyses. The results of each univariate regression analysis are reported as follows.

3.5.1.1 The Contents of Positive Future Thinking and Suicide Ideation.

Separate univariate regression analyses were performed with suicide ideation as the outcome variable and each content of positive future thinking as the predictor variable, and none of them was significant (i.e., *interpersonal positive future thinking p*=.695, *achievement positive future thinking p*=.098, *intrapersonal positive future thinking p*=.474, *leisure/pleasure positive future thinking p*=.875, *health of others positive future thinking p*=.990, *financial/home positive future thinking p*=.764, *other positive future thinking p*=.966).

3.5.1.2 The Contents of Negative Future Thinking and Suicide Ideation.

Separate univariate regression analyses were conducted with suicide ideation as the outcome variable and each content of negative future thinking as the predictor variable, and none of them was significant (i.e., *interpersonal negative future thinking p*=.067, *achievement negative future thinking p*=.362, *intrapersonal negative future thinking p*=.550, *leisure/pleasure negative future thinking p*=.102, *health of others negative future thinking p*=.950, *financial/home negative future thinking p*=. 477, *other negative future thinking p*=. 489).

3.5.1.3 Future Thinking Across Different Time Periods and Suicide Ideation.

Three separate univariate regression analyses with suicide ideation as the outcome variable and *T1 positive future thinking total (next week)* or *T2 positive future thinking total (next year)* or *T3 positive future thinking total (next 5-10 years*) as the predictor variable were performed. Results showed that none of them significantly predicts suicide ideation (*T1 positive future thinking total (next week)*, *B*=.056, *t*=.318, *p*=751; *T2 positive future thinking total (next year) B*=.230, *t*=1.117, *p*=.264; *T3 positive future thinking total (next 5-10 years), B*=.071, *t*=.327, *p*=744).

Another three separate univariate regression analyses with suicide ideation as the outcome variable and *T1 negative future thinking total (next week)* or *T2 negative future thinking total (next year)* or *T3 negative future thinking total (next 5-10 years)* were carried out. The results demonstrated that both *T1 NFT* and T*2 NFT* were not significant predictors of suicide ideation (*B*=.118, *t*=.523, *p*=.601; *B*=.136, *t*=.591, *p*=.555, respectively).

On the other hand, the model in which suicide ideation is the outcome variable and *T3 negative future thinking total (next 5-10 years)* is the predictor variable was significant and explained 1.1% of the variance in suicide ideation (R^2= .011, *F* (1, 407) = 4.331, *p*<.05). T3 NFT significantly predicted suicide ideation, *B*=.460, *t*=2.105, *p*=.036 (see Table 3.20).

Table 3.20 *Univariate regression analysis of the association between NFT over next 5-10 years and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
T3 NFT (next 5-10 years)*	.460	.219	.030	.889	.104	.036

Note. *p<.05.

3.5.1.4 The Components of Future-oriented Repetitive Thinking and Suicide Ideation.

Separate univariate regression analyses with suicide ideation as the outcome variable and the components of the Future-Oriented Repetitive Thought scale as the predictor variable were conducted (Please see Table 3.21). Herein, the results of univariate regression analysis with suicide ideation as the outcome variable and *pessimistic repetitive future thinking* as the predictor variable suggested that pessimistic repetitive future thinking explained 15.8% of the variance, R^2= .158, F (1, 407) = 76.442, p<.001. Pessimistic repetitive future thinking significantly predicted suicide ideation, B=.430, t= 8.743, p <.001.

Table 3.21 *Univariate regression analysis of the association between pessimistic repetitive future thinking and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Pessimistic repetitive future thinking**	.430	.049	.333	.526	.398	<.001

Note. *p<.05, **p<.001.

In addition to this, the results of univariate regression analysis with suicide ideation as the outcome variable and *repetitive thinking about future goals* as the predictor variable

suggested that repetitive thinking about future goals explained 1.5% of the variance, R^2= .015, F (1, 407) = 5.997, p=.015. Repetitive thinking about future goals was also a significant predictor of suicide ideation, B=-.267, t= -2.449, p <.015.

Table 3.22 *Univariate regression analyses of the association between repetitive thinking about future goals and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Repetitive thinking about future goals*	-.267	.109	-.481	-.053	-.121	.015

Note. *p<.05, **p<.001.

On the other hand, the model where suicide ideation is the outcome variable and *positive indulging about the future* is the predictor variable was not significant, therefore, positive indulging about the future did not predict suicide ideation, B=.022, t=.205, p=.84.

3.5.1.5 The Components of the Considerations of Future Consequences and Suicide Ideation.

A univariate regression analysis with suicide ideation as the outcome variable and *Considerations of Future Consequences-Future* sub-scale scores as the predictor variable was performed. The model explained only 0.2% of the variance in suicide ideation (R^2= .002, F (1, 407) = .945, p=.332). Considerations of Future Consequences-Future did not significantly predict suicide ideation, B=-.040, t=-.972, p=.332. Another univariate regression analysis with suicide ideation as the outcome variable and the *Considerations of Future Consequences-Immediate* sub-scale scores as the predictor variable was performed. The model explained only 0.1% of the variance in suicide ideation (R^2= .001, F (1, 407) = .285, p=.594. Considerations of Future Consequences-Immediate sub-scale scores did not significantly predict suicide ideation, B=.021, t=.534, p=.594.

3.5.1.6 Multivariate Analyses with Significant Future Thinking Measures and Suicide Ideation.

Univariate regression analyses reported in the sections above showed that T3 negative future thinking (5-10 years) that is a type of future thinking measured via the adapted version of the standard Future Thinking Task (MacLeod *et al*., 1997) and the future-oriented repetitive thinking (total score), pessimistic repetitive future thinking (sub-scale), and repetitive thinking about future goals (sub-scale) that were assessed through the Future-oriented Repetitive Thought (FoRT) scale (Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017) were significant predictors of suicide ideation.

Therefore, first, a multivariate regression analysis was conducted to examine whether suicide ideation can be predicted by *T3 negative future thinking* (5-10 years) and *future-oriented repetitive thinking* (Please see Table 3.23). The model was significant, F (2, 406) = 15.98, p<.001, explaining 7.3% (R^2 =.073) of the variance in suicide ideation. Future-oriented repetitive thinking (B= .19*, t*= 5.22*, p<.001*) and T3 negative future thinking (*B*=.47*, t*=2.22, p =.027) both contributed significantly to the model.

Table 3.23 *Multivariate regression analysis of some future thinking measures for association with suicide ideation*

	Beta	*SE*	95% *CI*		*β*	*p*
Variable			*LL*	*UL*		
Future-oriented repetitive thinking**	.194	.037	.121	.268	.249	<.001
T3 NFT (5-10 years) *	.471	.212	.054	.887	.106	.027

Note. **p<.001, *p<.05. NFT: Negative Future Thinking.

Second, another multivariate regression analysis was conducted to examine whether suicide ideation can be predicted by *T3 negative future thinking* (5-10 years), which was assessed via the AFTT (Appendix H) that was created by Kose, O'Connor, and Evans (2020) on Gorilla Experiment Builder for this study, an online adapted version of the standard Future Thinking

Task (MacLeod *et al*., 1997), *pessimistic repetitive future thinking*, and *repetitive thinking about future goals*, which are scores on the sub-scales of the Future-Oriented Repetitive Thought Scale (Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017). The model was significant, F (3, 405) = 29.66, $p<.001$, explaining 18% (R^2 =.18) of the variance in suicide ideation. T3 negative future thinking (B= .44, t= 2.19, p=.029), pessimistic repetitive future thinking (B=.43, t= 8.75, p <.001), and repetitive thinking about future goals (B=-.24, t= -2.45, p=.015) contributed significantly to the model (Please see Table 3.24).

Table 3.24 *Multivariate regression analysis of some future thinking measures for association with suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
T3 NFT (5-10 years) *	.436	.199	.044	.828	.098	.029
Pessimistic repetitive future thinking**	.425	.049	.330	.521	.394	<.001
Repetitive thinking about future goals*	-.244	.100	-.440	-.048	-.110	.015

Note. *p<.05. **p<.001

3.5.2 Other Study Variables and Suicide Ideation

A series of univariate regression analyses were also carried out with other possible predictors of suicide ideation (i.e., defeat, entrapment, anxiety, depression, optimism/pessimism, and stress) that were assessed in this study. Then, two separate multivariate analyses were performed with all significant predictors, including future thinking measures that were found significant in predicting suicide ideation within the univariate regression analyses. The results of each univariate regression analysis are reported as follows.

First, we investigated the association between suicide ideation and defeat and entrapment (total entrapment, internal entrapment, and external entrapment); both have been emphasised

in the emergence of suicidal ideation within the Integrated Motivational–Volitional model of suicidal behaviour.

The model in which *defeat* is the predictor variable was significant and explained 11.4% of the variance in suicide ideation (R^2= .114, F (1, 407) = 52.620, p<.001), and significantly predicted suicide ideation, B=.583, t=7.254, p<.001.

Table 3.25 *Univariate regression analysis of the association between defeat and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Defeat*	.583	.080	.425	.740	.338	<.001

Note. *p<.001.

The model where *entrapment* is the predictor variable was significant and explained 22.1% of the variance in suicide ideation (R^2= .221, F (1, 407) = 115.612, p<.001). Entrapment significantly predicted suicide ideation, B=.633, t=10.752, p<.001.

Table 3.26 *Univariate regression analysis of the association between entrapment and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Entrapment*	.633	.059	.517	.748	.470	<.001

Note. *p<.001.

It is also important to explore the relationship between the subscales of entrapment and suicidal ideation. Therefore, we examined the relationship between suicide ideation and external entrapment and internal entrapment.

The model, including *external entrapment* as the predictor variable, was significant and explained 18.9% of the variance in suicide ideation (R^2= .189, F (1, 407) = 94.739, p<.001). External entrapment significantly predicted suicide ideation, B=1.200, t=9.733, p<.001.

Table 3.27 *Univariate regression analysis of the association between external entrapment and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
External entrapment*	1.20	.123	.958	1.44	.435	<.001

Note. *p<.001.

The model, involving *internal entrapment* as the predictor variable was also significant and explained 20.2% of the variance in suicide ideation (R^2= .202, F (1, 407) = 103.278, p<.001). Internal entrapment significantly predicted suicide ideation, B=1.052, t=10.163, p<.001.

Table 3.28 *Univariate regression analysis of the association between internal entrapment and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Internal entrapment*	1.052	.104	.849	1.26	.450	<.001

Note. *p<.001.

In addition to examining the univariate associations of defeat, entrapment, and entrapment subscales with suicidal ideation, we also explored the univariate associations between suicidal ideation and other study variables (i.e., anxiety, depression, optimism, pessimism, and stress) which have been frequently associated with suicide risk in the literature.

The model with *anxiety* as the predictor variable was significant and explained 19.2% of the variance in suicide ideation (R^2= .192, F (1, 407) = 96.768, p<.001). Anxiety significantly predicted suicide ideation, B=.473, t=9.837, p<.001.

Table 3.29 *Univariate regression analysis of the association between anxiety and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Anxiety*	.473	.048	.378	.567	.438	<.001

Note. *p<.001.

The model in which *depression* is the predictor variable explained 29.9% of the variance in suicide ideation (R^2= .299, F (1, 407) = 173.85, p<.001). Depression significantly predicted suicide ideation, B=.691, t=13.19, p<.001.

Table 3.30 *Univariate regression analysis of the association between depression and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Depression*	.691	.052	-.051	.588	.794	<.001

Note. *p<.001.

The model, including the *optimism/pessimism total score* as the predictor variable, was significant and explained 17% of the variance in suicide ideation (R^2= .170, F (1, 407) = 83.285, p<.001). Optimism/pessimism significantly predicted suicide ideation, B=-.493, t=-9.126, p<.001.

Table 3.31 *Univariate regression analysis of the association between optimism/pessimism and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Optimism/pessimism*	-.493	.054	-.599	-.387	-.412	<.001

Note. *p<.001.

The model, involving *pessimism* as the predictor variable, was significant and explained 14% of the variance in suicide ideation (R^2= .140, F (1, 407) = 66.519, p<.001). Pessimism significantly predicted suicide ideation, B=-.817, t=-8.156, p<.001.

Table 3.32 *Univariate regression analysis of the association between pessimism and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Pessimism*	-.817	.100	-.1.01	-.620	-.375	<.001

Note. *p<.001.

The model, including *optimism* as the predictor variable, was also significant and explained 14.3% of the variance in suicide ideation (R^2= .143, F (1, 407) = 67.986, p<.001). Optimism significantly predicted suicide ideation, B=-.829, t=-8.245, p<.001.

Table 3.33 *Univariate regression analysis of the association between optimism and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Optimism*	-.829	.101	-.1.03	-.632	-.378	<.001

Note. *p<.001.

The model with *stress* as the predictor variable was also significant and explained 4.2% of the variance in suicide ideation (R^2= .042, F (1, 407) = 17.723, p<.001). Stress significantly predicted suicide ideation, B=.355, t=4.210, p<.001.

Table 3.34 *Univariate regression analyses of the association between stress and suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Stress*	.355	.084	.189	.521	.204	<.001

Note. **p*<.001.

3.5.2.1 Multivariate Analyses with Significant Predictors from the Univariate Analyses and Suicide Ideation.

A multivariate regression analysis was conducted to examine whether suicide ideation can be predicted by T3 negative future thinking (5-10 years), future-oriented repetitive thinking, defeat, entrapment, depression, anxiety, optimism/pessimism, and stress. The model was significant, F (8, 400) = 36.85, $p<.001$, explaining 42.4% (R^2 =.424) of the variance in suicide ideation. Future-oriented repetitive thinking (B= .09, t= 2.89, $p=.004$), entrapment (B= .224, t= 2.64, $p=.009$), depression (B= .524, t= 9.75, $p<.001$), anxiety (B= .125, t= 2.12, $p=.035$), optimism/pessimism (B= -.136, t=-.2.15, $p=.032$), and stress ($B=.287$, $t=3.53$, p<.001) contributed significantly to the model, but T3 negative future thinking (B= .243, t= 1.42, $p=.16$) and defeat ($B=.105$, t= 1.51, p=.25) did not significantly contributed to the model (Please see Table 3.35).

Table 3.35 *Multivariate regression analysis of variables with total scores for association with suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
Repetitive future thinking total**	.091	.031	.029	.153	.116	.001
T3 total NFT	.243	.171	-.093	.578	.072	.156
Defeat total score	.105	.091	-.074	.284	.061	.250
Entrapment total*	.224	.085	.057	.392	.167	.009
Anxiety total score*	.125	.059	.009	.240	.115	.035
Optimism/pessimism total*	-.136	.063	-.261	-.012	-.114	.032
Depression total score**	.524	.054	.418	.629	.415	<.001
Stress total**	.287	.081	.448	.127	.165	<.001

Note. *p<.05, **p ≤001. NFT: Negative Future Thinking.

Another multivariate regression analysis was conducted to examine whether suicide ideation can be predicted by T3 negative future thinking (5-10 years), repetitive thinking about future goals, pessimistic repetitive future thinking, defeat, external entrapment, internal entrapment, anxiety, optimism, pessimism, depression, and stress. The model was significant, F (11, 397) = 28.42, $p<.001$, explaining about 44.1 % (R^2=.441) of the variance in suicidal ideation. Pessimistic repetitive future thinking (B= .20, t=4.32, $p<.001$), anxiety (B= .13, t= 2.22, p=.027), stress (B= .25, t=3.02, p=003), and depression (B= .51, t=9.44, $p<.001$) contributed significantly to the model, but T3 negative future thinking (B=.24, t=1.4, p =.16), repetitive thinking about future goals (B= -.09, t=-.965, p=.34), defeat (B=.11, t= 1.19, p=.23), internal entrapment (B=.01, t=.59, p=.56), external entrapment (B=.31, t= 1.79, p=.07), pessimism (B=.05, t=.41, p=.68), optimism (B= -.11, t=-.85, p=.40) did not (Please see Table 3.36).

Table 3.36 *Multivariate regression analysis of study variables with sub-scale scores for association with suicide ideation*

	Beta	*SE*	95% CI		*β*	*p*
Variable			*LL*	*UL*		
T3 NFT (5-10 years)	.236	.169	-.096	.568	.053	.164
repetitive thinking about future goals	-.085	.088	-.257	.088	-.038	.335
pessimistic repetitive future thinking**	.199	.046	.109	.290	.185	<.001
Defeat	.108	.091	-.070	.293	.063	.234
external entrapment	.306	.171	-.030	.643	.111	.074
internal entrapment	.095	.163	-.225	.416	.041	.559
Anxiety*	.130	.059	.041	.294	.121	.027
Optimism	.103	.122	.375	.154	.047	.397
Pessimism	-.049	.121	-.318	.206	-.022	.684
Depression**	.506	.054	.400	.611	.400	<.001
Stress*	.246	.081	.406	.086	.142	.003

Note. *p<.05, **p<.001. NFT: Negative Future Thinking.

3.5.2.2 The Moderation Effect of Other Future Thinking Measures on the Relationship between Entrapment and Suicide Ideation.

Question five as to whether other measures of future thinking (i.e., future-oriented repetitive thinking and the considerations of future consequences) would moderate the relationship between entrapment (total entrapment, internal entrapment, and external entrapment) and suicide ideation was explored using moderation analyses. Herein, we performed separate moderation analyses with future-oriented repetitive thinking or the considerations of future consequences as a moderator, entrapment total or internal entrapment or external entrapment as a predictor variable, and suicide ideation as a dependent variable.

The moderation effect of future-oriented repetitive thinking on the relationship between entrapment and suicide ideation:

First, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with entrapment as the predictor, suicide ideation as the outcome, and future-oriented repetitive thinking as a moderator. Altogether, 50.3 % of the variability was predicted by all of the variables (F (3, 405) = 45.74, p<.001, R^2=.5031). There was a significant main effect found between entrapment and suicide ideation, (b =.58, SE = .059, p < .001). However, the interaction effect was not statistically significant (p =.08), indicating that future-oriented repetitive thinking did not moderate the effect of entrapment on suicide ideation. However, the main effect of future-oriented repetitive thinking was significant (b =.12, SE = .035, p=.0007, please see Table 3.37).

Table 3.37 *The moderation effect of future-oriented repetitive thinking on the entrapment and suicide ideation relation*

Predictor	β	p	95% *CI*	
			LL	*UL*
Entrapment*	.583	.000	.467	.699
frt*	.118	.001	.050	.186
Entrapment x frt	-.011	.080	-.024	.001

Note. *p <.001. frt: Future-oriented repetitive thinking.

Second, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with external entrapment as the predictor, suicide ideation as the outcome, and future-oriented repetitive thinking as a moderator. Altogether, 47.4 % of the variability was predicted by all of the variables (F (3, 405) = 39.11, p<.001, R^2=.4740). There was a significant main effect found between external entrapment and suicide ideation (b =1.1, SE = .123, p < .001). However, the interaction effect was not statistically significant (p =.09), indicating that future-oriented repetitive thinking did not moderate the effect of external entrapment on suicide ideation. However, the main effect of future-oriented repetitive thinking was significant (b =.13, SE = .035, p=.0004, please see Table 3.38).

Table 3. 38 *The moderation effect of future-oriented repetitive thinking on the external entrapment and suicide ideation relation*

Predictor	*β*	*p*	95% *CI*	
			LL	*UL*
External entrapment*	1.09	.000	.857	1.34
Frt*	.127	.001	.057	.196
External entrapment x Frt	-.022	.093	-.048	.004

Note. *p <.001. frt: Future-oriented repetitive thinking.

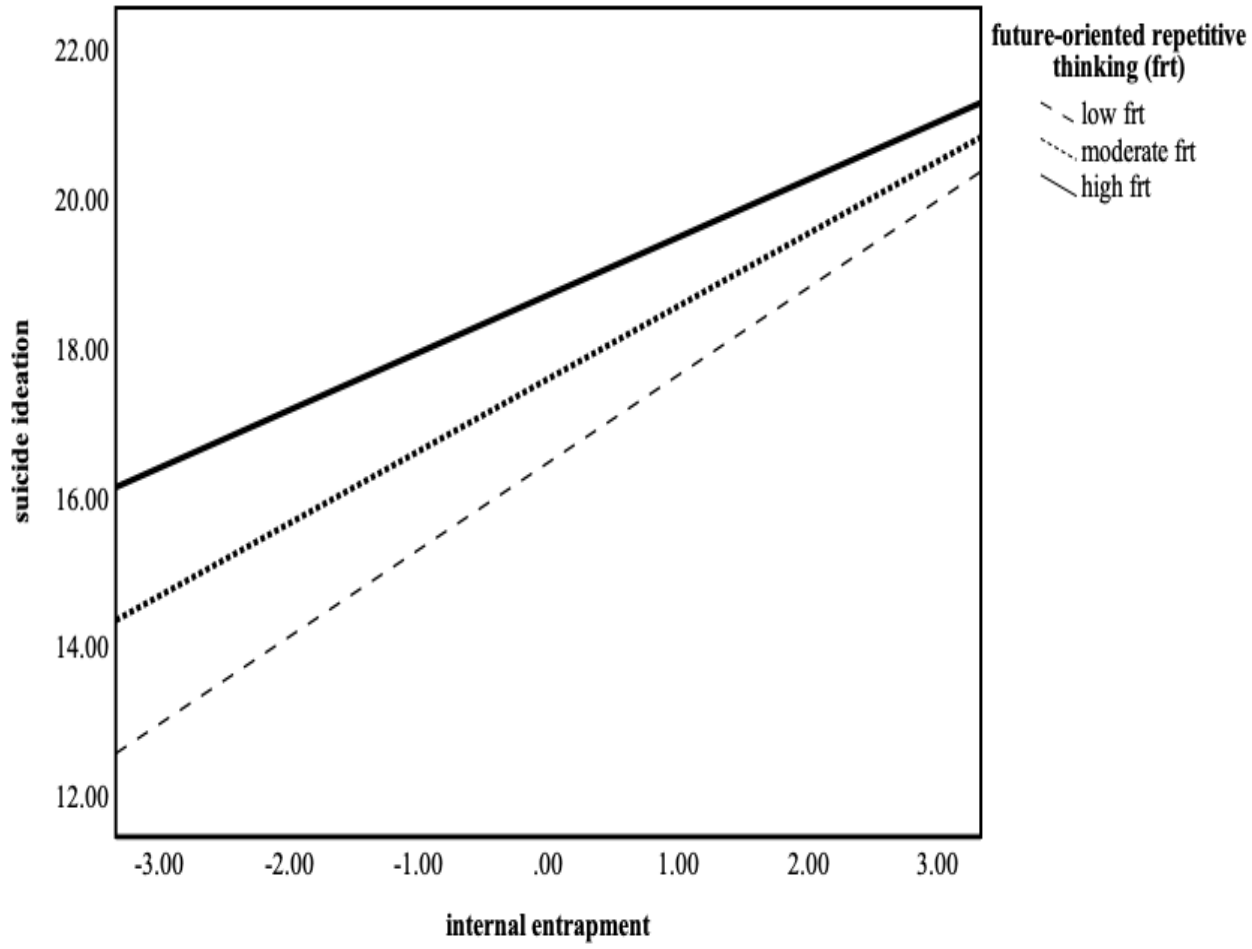
Third, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with internal entrapment as the predictor, suicide ideation as the outcome, and future-oriented repetitive thinking as a moderator. Altogether, 48.8 % of the variability was predicted by all of the variables (F (3, 405) = 42.27, p<.001, R^2=.4883). There was a significant main effect found between internal entrapment and suicide ideation (b =.971, SE = .103, p < .001). The interaction effect was also statistically significant (b =-.022, SE = .011, p<.05), indicating that future-oriented repetitive thinking moderates the effect of internal entrapment on suicide ideation. Additionally, the main effect of future-oriented repetitive thinking was significant (b =.125, SE = .035, p=.0004, please see Table 3.39 and Figure 3.2 for more details).

Table 3.39 *The moderation effect of future-oriented repetitive thinking on the internal entrapment and suicide ideation relation*

Predictor	*β*	*p*	*95% CI*	
			LL	*UL*
Internal entrapment**	.971	.0000	.768	1.17
frt**	.125	.0004	.057	.193
Internal entrapment x frt*	-.022	.0499	-.044	.000

Note. *$p \leq .05$, **p<.001. frt: Future-oriented repetitive thinking.

Figure 3.2 *Future-oriented repetitive thinking and internal entrapment interaction*



The moderation effect of considerations of future consequences on the relationship between entrapment and suicide ideation:

As for the considerations of future consequences, first, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with entrapment as the predictor, suicide ideation as the outcome, and the considerations of future consequences as a moderator. Altogether, 47.6 % of the variability was predicted by all of the variables (F (3, 405) = 39.53, p<.001, R^2=.476). There was a significant main effect found between entrapment and suicide ideation (b =1.35, SE = .443, p= .002). However, the interaction effect was not statistically significant (p =.10), indicating that the considerations of future consequences did not moderate the effect of entrapment on suicide ideation. In addition to this, the main effect of the considerations of future consequences was also not significant (b =.16, SE = .112, p=.15, please see Table 3.40).

Table 3.40 *The moderation effect of the considerations of future consequences on the entrapment and suicide ideation relation*

Predictor	*β*	*p*	95% *CI*	
			LL	*UL*
Entrapment*	1.35	.002	.484	2.22
CFC	.161	.151	-.059	.381
Entrapment x CFC	-.013	.101	-.027	.002

Note. *p <.05. CFC: Considerations of Future Consequences.

Second, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with external entrapment as the predictor, suicide ideation as the outcome, and the considerations of future consequences as a moderator. Altogether, 44.1% of the variability was predicted by all of the variables (F (3, 405) = 32.68, p<.001, R^2=.441). There was a significant main effect found between external entrapment and suicide ideation (b =2.78, SE = .915, p =.003). However, the interaction effect was not statistically significant (p =.08), indicating that the considerations of future consequences did not moderate the effect of external entrapment on suicide ideation. Additionally, the main effect of the considerations of future consequences was also not significant (b =.19, SE = .118, p=.102, please see Table 3.41).

Table 3.41 *The moderation effect of the considerations of future consequences on the external entrapment and suicide ideation relation*

Predictor	*β*	*p*	95% *CI*	
			LL	*UL*
External entrapment*	2.78	.003	.985	4.58
CFC	.194	.102	.038	.427
External entrapment x CFC	-.027	.081	-.058	.003

Note. *p <.05. CFC: Considerations of Future Consequences.

Third, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with internal entrapment as the predictor, suicide ideation as the outcome, and the considerations of future consequences as a moderator. Altogether, 45.5 % of the variability

was predicted by all of the variables (F (3, 405) = 35.34 p<.001, R^2=.455). There was a significant main effect found between internal entrapment and suicide ideation (b =2.27, SE = .809, p= .005). However, the interaction effect was not statistically significant (b =-.021, SE = .014, p=.13), indicating that the considerations of future consequences did not moderate the effect of internal entrapment on suicide ideation. Additionally, the main effect of the considerations of future consequences was also not significant (b =.118, SE = .101, p=.25, please see Table 3.42).

Table 3.42 *The moderation effect of the considerations of future consequences on the internal entrapment and suicide ideation relation*

Predictor	β	p	95% *CI*	
			LL	*UL*
Internal entrapment*	2.27	.005	.679	3.86
CFC	.118	.246	-.081	.317
Internal entrapment x CFC	-.021	.130	-.048	.006

Note. *$p \leq$.01. CFC: Considerations of Future Consequences.

The moderation effect of the sub-scales of the future-oriented repetitive thought scale on the relationship between entrapment sub-scales and suicide ideation:

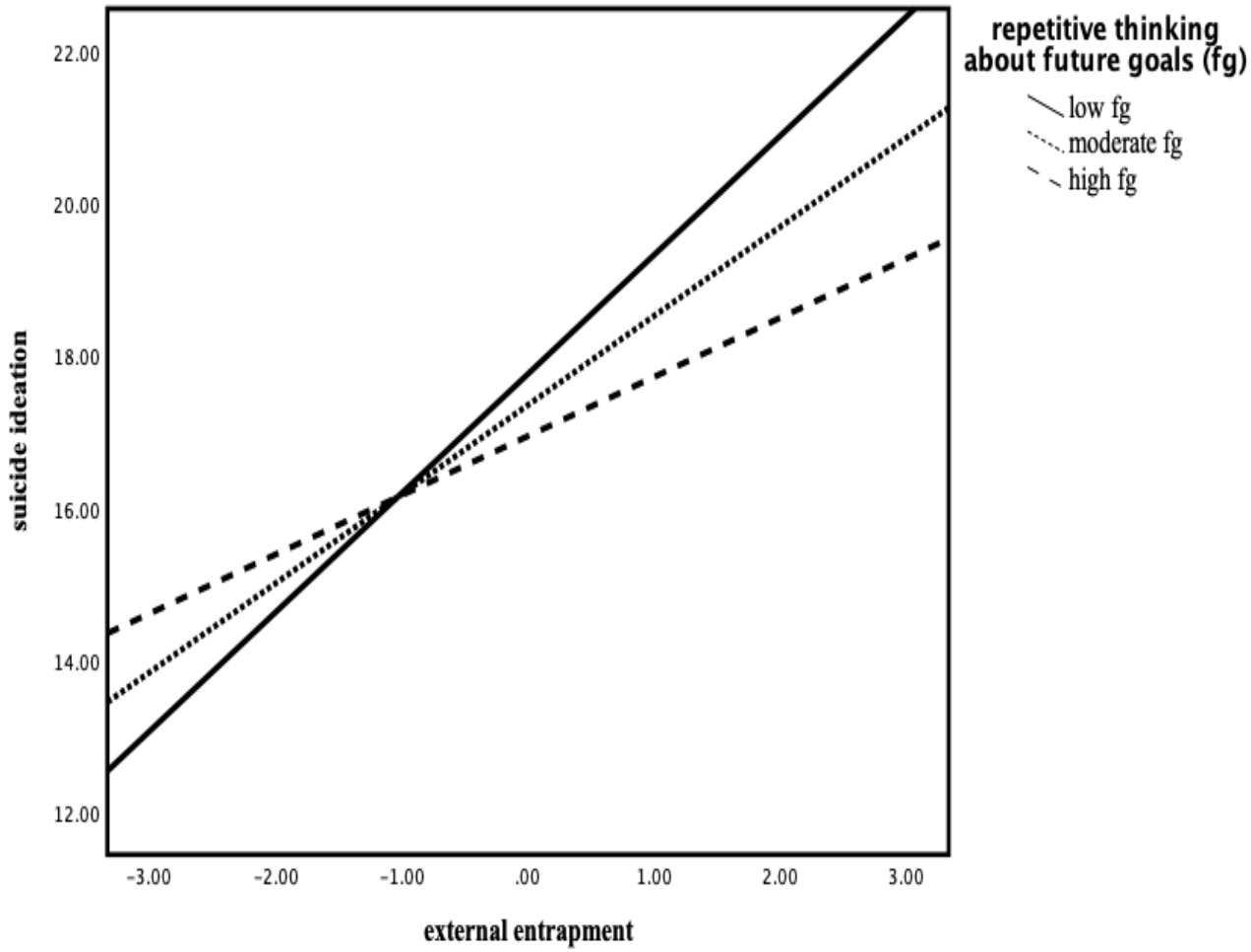
Then, first, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with external entrapment as the predictor, suicide ideation as the outcome, and repetitive thinking about Future Goals (FG) as a moderator. Altogether, 21.5 % of the variability was predicted by all of the variables (F (3, 405) = 36.96, p<.001, R^2=.215). There were significant main effects of external entrapment (b =2.48, SE = .405, $p \leq$.001), and FG (b =.72, SE = .275, p<.05). Their interaction was also a significant predictor of suicide ideation (b =-.125, SE = .037, $p \leq$.001), suggesting that repetitive thinking about future goals moderated the association between external entrapment and suicidal ideation (Please see Table 3.43).

Table 3.43 *The moderation effect of repetitive thinking about future goals on the external entrapment and suicide ideation relationship*

Predictor	β	p	95% *CI*	
			LL	*UL*
External entrapment**	2.472	.000	1.675	3.269
FG*	.715	.010	.173	1.257
External entrapment x FG**	-.125	.001	-.198	-.052

Note. $p \leq 01$*, $p \leq .001$**. FG: repetitive thinking about Future Goals (FG).

Figure 3.3 *Repetitive thinking about future goals and external entrapment interaction*



Second, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with external entrapment as the predictor, suicide ideation as the outcome, and

pessimistic repetitive future thinking (PT) as a moderator. Altogether, 26.4% of the variability was predicted by all of the variables (F (3, 405) = 48.38, p<.001, R^2=.264). However, the main effect of external entrapment, pessimistic repetitive future thinking and their interaction were not statistically significant predictors of suicide ideation (Please see Table 3.44).

Table 3.44 *The moderation effect of pessimistic repetitive future thinking on the external entrapment and suicide ideation relationship*

Predictor	β	p	95% *CI*	
			LL	*UL*
External entrapment	.522	.242	.353	1.397
PT	.199	.105	-0.41	.439
External entrapment x PT	.018	.326	-.018	.054

Note. PT: Pessimistic repetitive future Thinking.

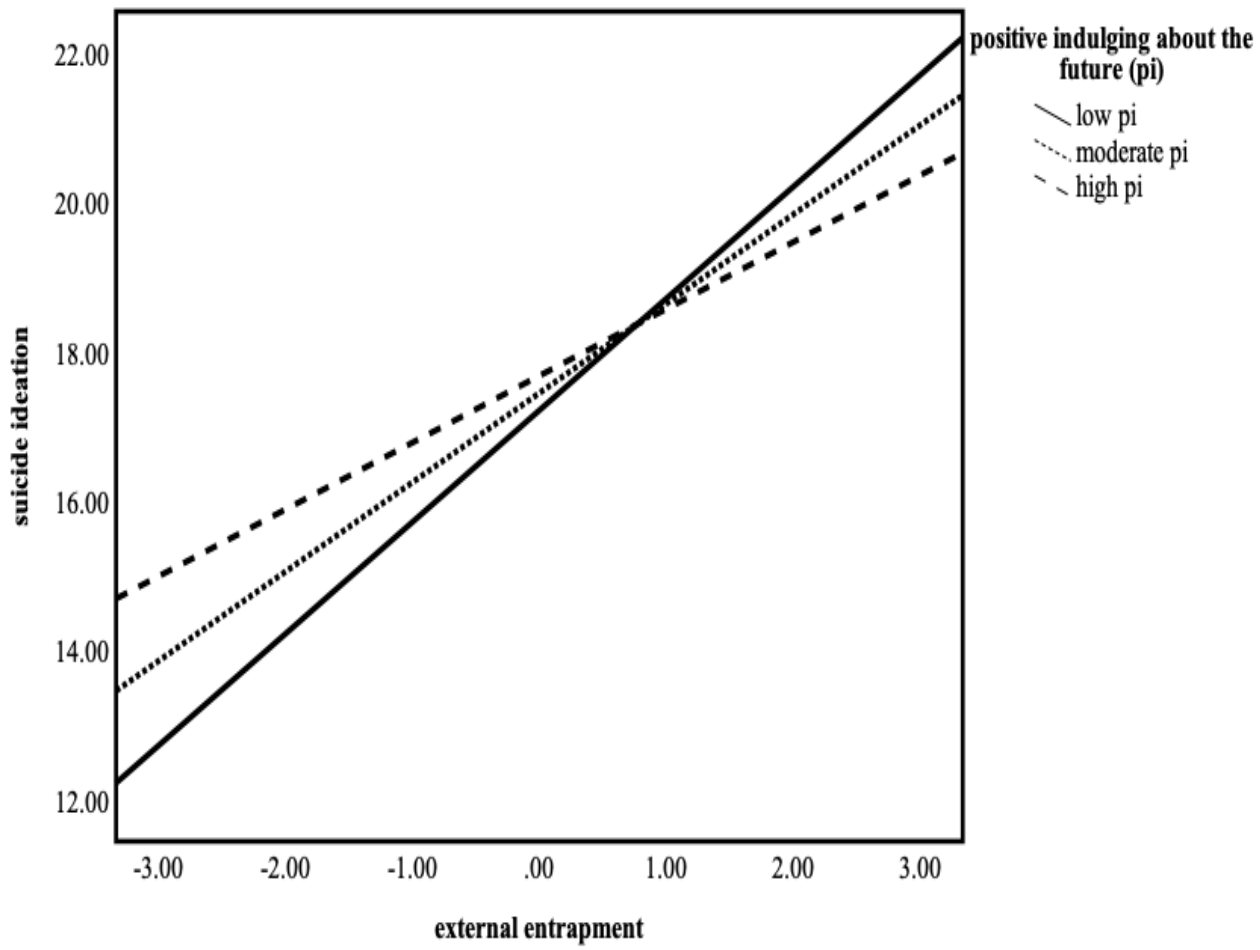
Third, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with external entrapment as the predictor, suicide ideation as the outcome, and positive indulging about the future (PI) as a moderator. Altogether, 20.2% of the variability was predicted by all of the variables (F (3, 405) = 34.13, p<.001, R^2=.202). There were significant main effects of external entrapment (b =2.06, SE = .365, p < .001), and PI (b =.69, SE = .27, p<.05). Their interaction was also a significant predictor of suicide ideation (b =-.091, SE = .037, p<.05), suggesting that positive indulging about the future moderated the association between external entrapment and suicidal ideation (Please see Table 3.45).

Table 3.45 *The moderation effect of positive indulging about the future on the external entrapment and suicide ideation relationship*

Predictor	β	p	95% *CI*	
			LL	*UL*
External entrapment**	2.059	.000	1.341	2.776
PI*	.688	.011	.157	1.219
External entrapment x PI*	-.091	.013	-.163	-.019

Note. p<.05*, p<.001**. PI: Positive Indulging about the future

Figure 3.4 *Positive indulging about the future and external entrapment interaction*



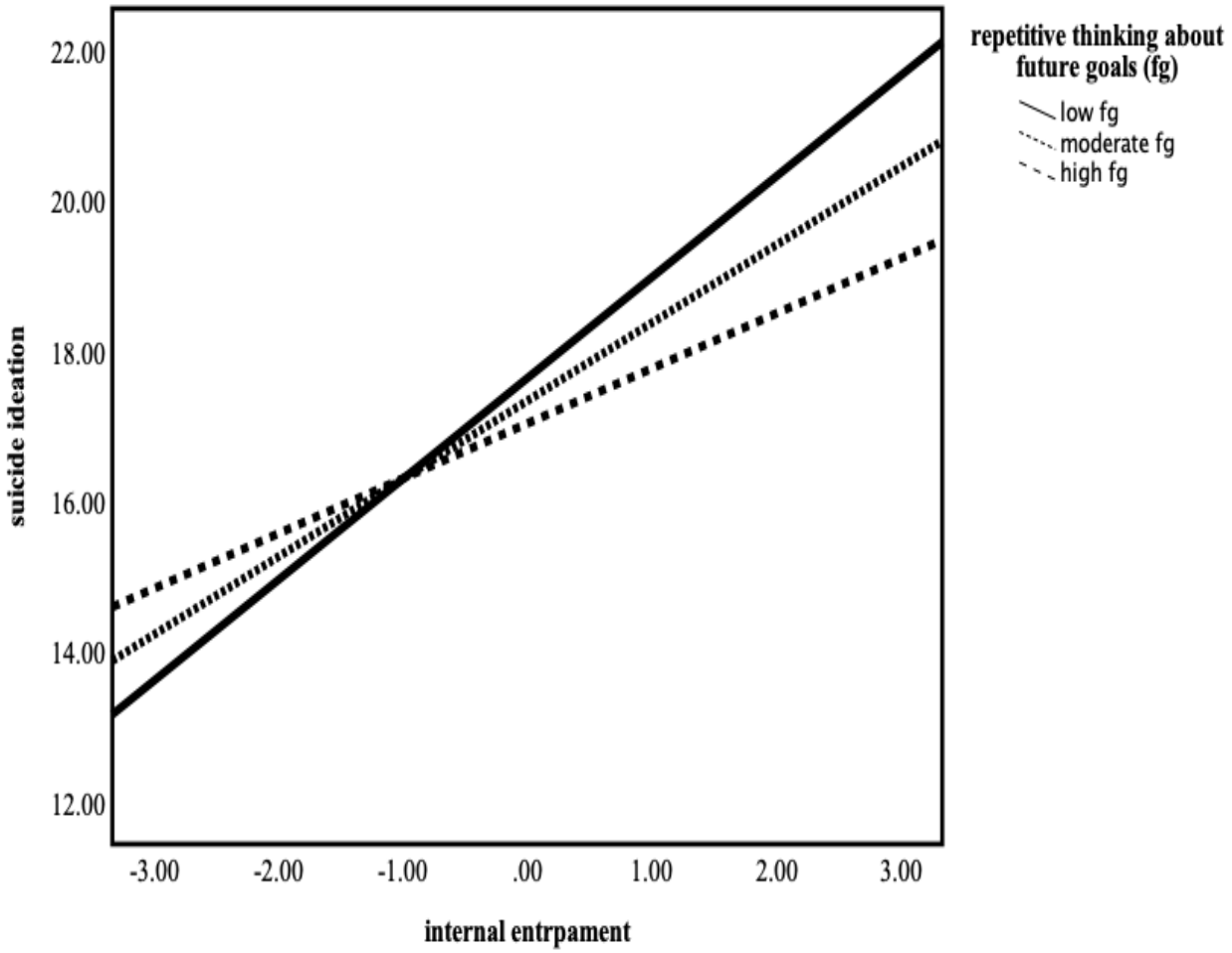
Then, first, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with internal entrapment as the predictor, suicide ideation as the outcome, and repetitive thinking about future goals (FG) as a moderator. Altogether, 22.3% of the variability was predicted by all of the variables (F (3, 405) = 38.64, p<.001, R^2=.223). There were significant main effects of internal entrapment (b =2.04, SE = .352, p <.001), and FG (b =.541, SE = .241, p<.05). Their interaction was also a significant predictor of suicide ideation (b =-.097, SE = .032, p=.003), suggesting that repetitive thinking about future goals moderated the association between internal entrapment and suicidal ideation (Please see Table 3.46).

Table 3.46 *The moderation effect of repetitive thinking about future goals on the internal entrapment and suicide ideation relationship*

Predictor	*β*	*p*	95% *CI*	
			LL	*UL*
Internal entrapment**	2.043	.000	1.351	2.736
FG*	.541	.025	.067	1.014
Internal entrapment x FG*	-.097	.003	-.160	-.033

Note. $p<.05$*, $p<.001$**. FG: repetitive thinking about Future Goals.

Figure 3.5 *Repetitive thinking about future goals and internal entrapment interaction*



Second, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with internal entrapment as the predictor, suicide ideation as the outcome, and

pessimistic repetitive future thinking (PT) as a moderator. Altogether, 27.3 % of the variability was predicted by all of the variables (F (3, 405) = 50.66, p<.001, R^2=.273). The main effect of internal entrapment (p=.077) and the interaction between PT and internal entrapment (p=.67) were not significant. However, the main effect of PT was significant (b =.26, SE = .107, p<.05, please see Table 3.47).

Table 3.47 *The moderation effect of pessimistic repetitive future thinking on the internal entrapment and suicide ideation relationship*

Predictor	β	p	95% *CI*	
			LL	*UL*
Internal entrapment	.680	.077	.353	1.397
PT*	.262	.014	-0.41	.439
Internal entrapment x PT	.007	.670	-.018	.054

Note. p<.05*. PT: Pessimistic repetitive future Thinking.

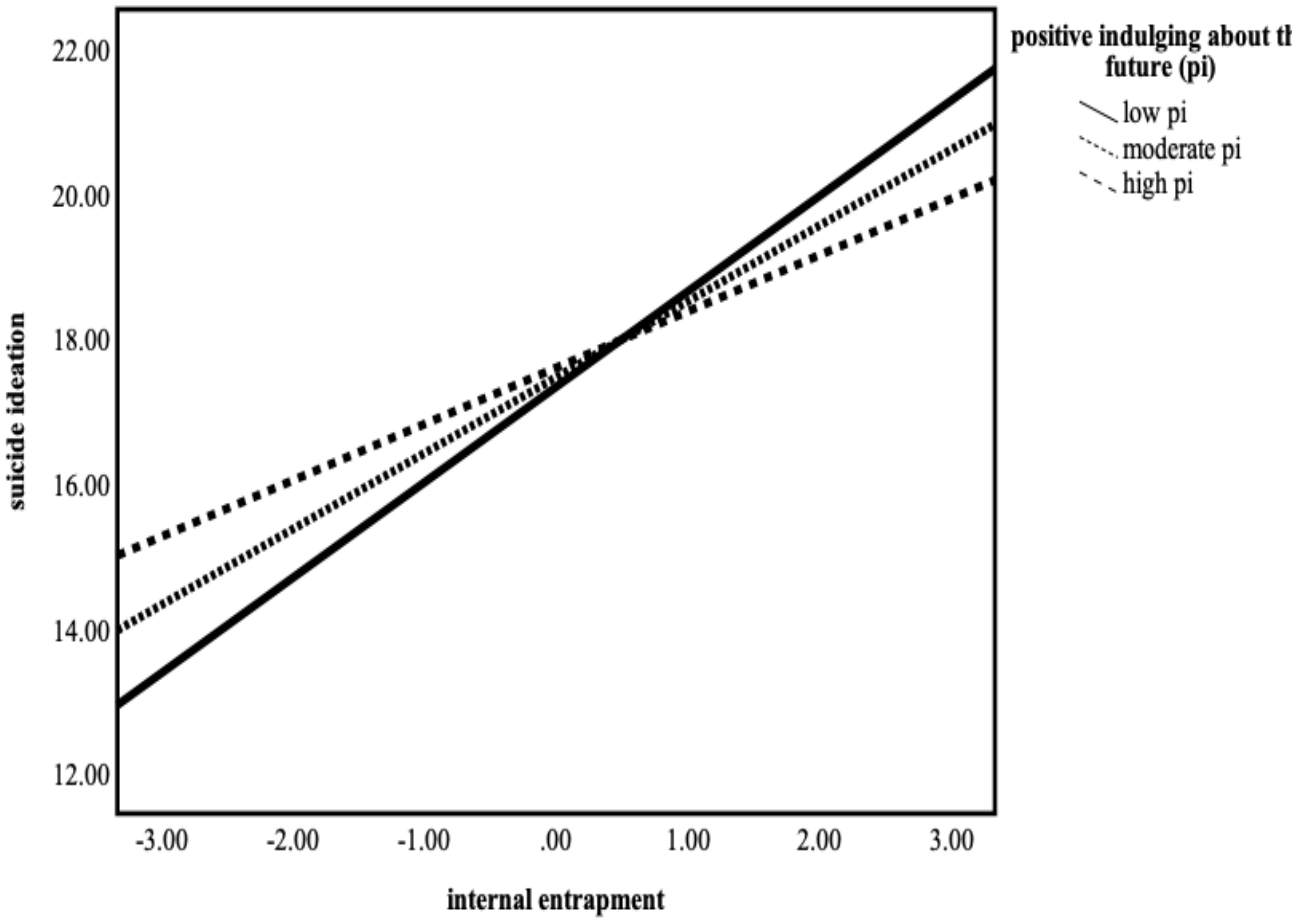
Third, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with internal entrapment as the predictor, suicide ideation as the outcome, and positive indulging about the future (PI) as a moderator. Altogether, 21.6 % of the variability was predicted by all of the variables (F (3, 405) = 37.18, p<.001, R^2=.216). There were significant main effects of internal entrapment (b =1.82, SE = .31, p < .001), and PI (b =.58, SE = .23, p<.05). Their interaction was also significant (b =-.082, SE = .03, p<.05), suggesting that positive indulging about the future moderated the association between internal entrapment and suicidal ideation (Please see Table 3.48).

Table 3.48 *The moderation effect of positive indulging about the future on the internal entrapment and suicide ideation relationship*

Predictor	β	p	95% *CI*	
			LL	*UL*
Internal entrapment**	1.823	.000	1.213	2.433
PI*	.580	.012	.128	1.032
Internal entrapment x PI*	-.082	.009	-.143	-.021

Note. p<.05*, p<.001**. PI: Positive Indulging about the future.

Figure 3.6 *Positive indulging about the future and internal entrapment interaction*



The moderation effect of the sub-scales of the considerations of future consequences *scale on the relationship between entrapment sub-scales and suicide ideation:*

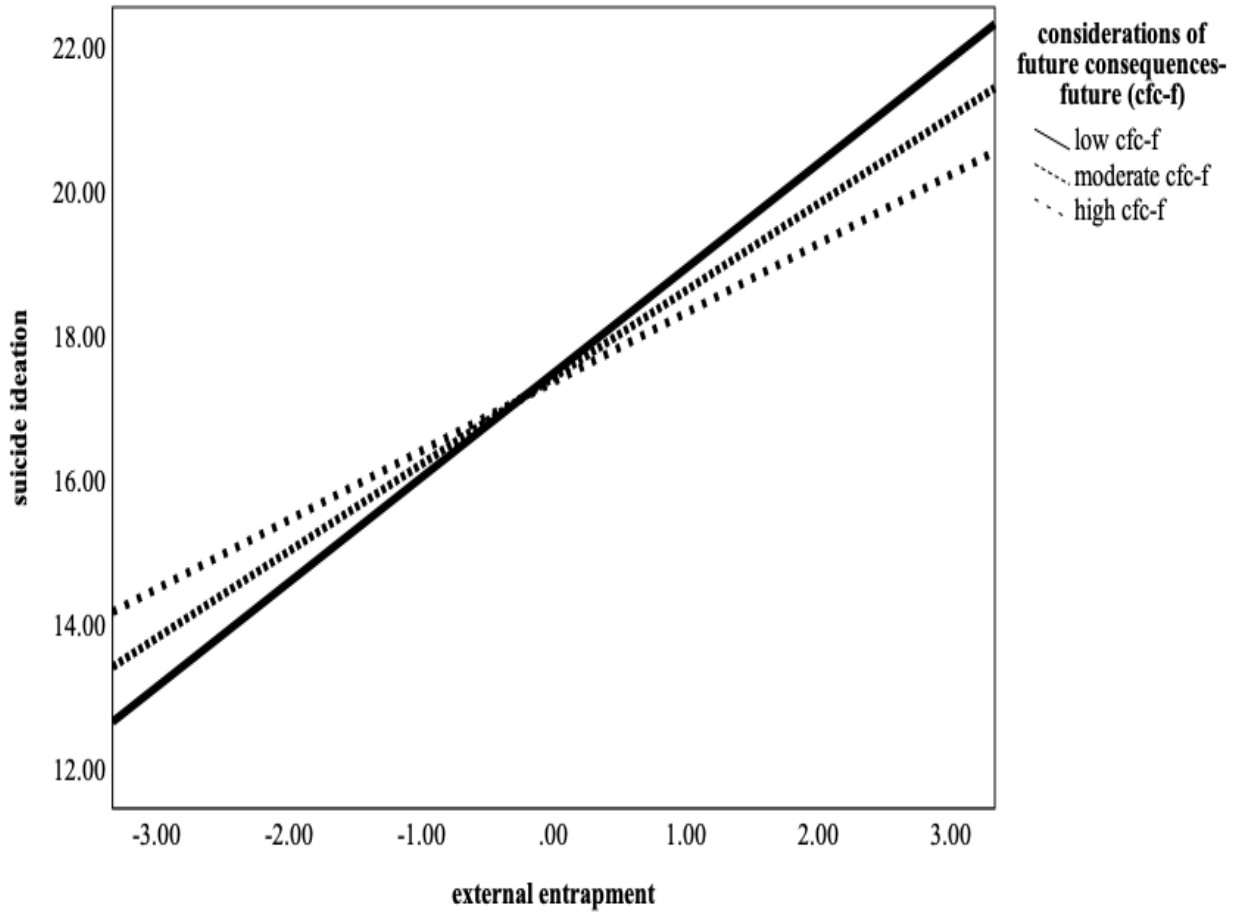
First, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with external entrapment as the predictor, suicide ideation as the outcome, and the Considerations of Future Consequences- Future (CFC-F) as a moderator. Altogether, 19.7 % of the variability was predicted by all of the variables (F (3, 405) = 33.19, p<.001, R^2=.197). There was a significant main effect of external entrapment (b =1.35, SE = .468, p<.001) and a significant interaction effect (b =-.029, SE = .014, p<.05), suggesting that the Considerations of Future Consequences- Future moderated the association between external entrapment and suicidal ideation. However, the main effect of the Considerations of Future Consequences- Future was not significant (p= .066, please see Table 3.49).

Table 3.49 *The moderation effect of the considerations of future consequences-future on the external entrapment and suicide ideation relation*

Predictor	*β*	*p*	95% *CI*	
			LL	*UL*
External entrapment**	2.127	.000	.484	2.22
CFC-F	.189	.066	-.059	.381
External entrapment x CFC-F*	-.029	.040	-.027	.002

Note. *p <.05, **p<.001. CFC-F: Considerations of Future Consequences- Future.

Figure 3.7 *Considerations of future consequences and external entrapment interaction*



Second, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with external entrapment as the predictor, suicide ideation as the outcome, and the Considerations of Future Consequences- Immediate (CFC-I) as a moderator. Altogether, 18.9% of the variability was predicted by all of the variables (F (3, 405) = 31.54, p<.001,

R^2=.189). There was a significant main effect of external entrapment (*b* =1.03, *SE* = .386, *p*=.008). However, the main effect of the Considerations of Future Consequences- Immediate (CFC-I) (*p*=.72) and interaction effect (*p*=.63) were not significant (Please see Table 3.50).

Table 3.50 *The moderation effect of the considerations of future consequences-immediate on the external entrapment and suicide ideation relation*

Predictor	*β*	*p*	95% *CI*	
			LL	*UL*
External entrapment*	1.025	.008	.267	1.78
CFC-I	-.038	.717	-.243	.167
External entrapment x CFC-I	.007	.634	-.021	.035

Note. *p <.05. CFC-I: Considerations of Future Consequences- Immediate.

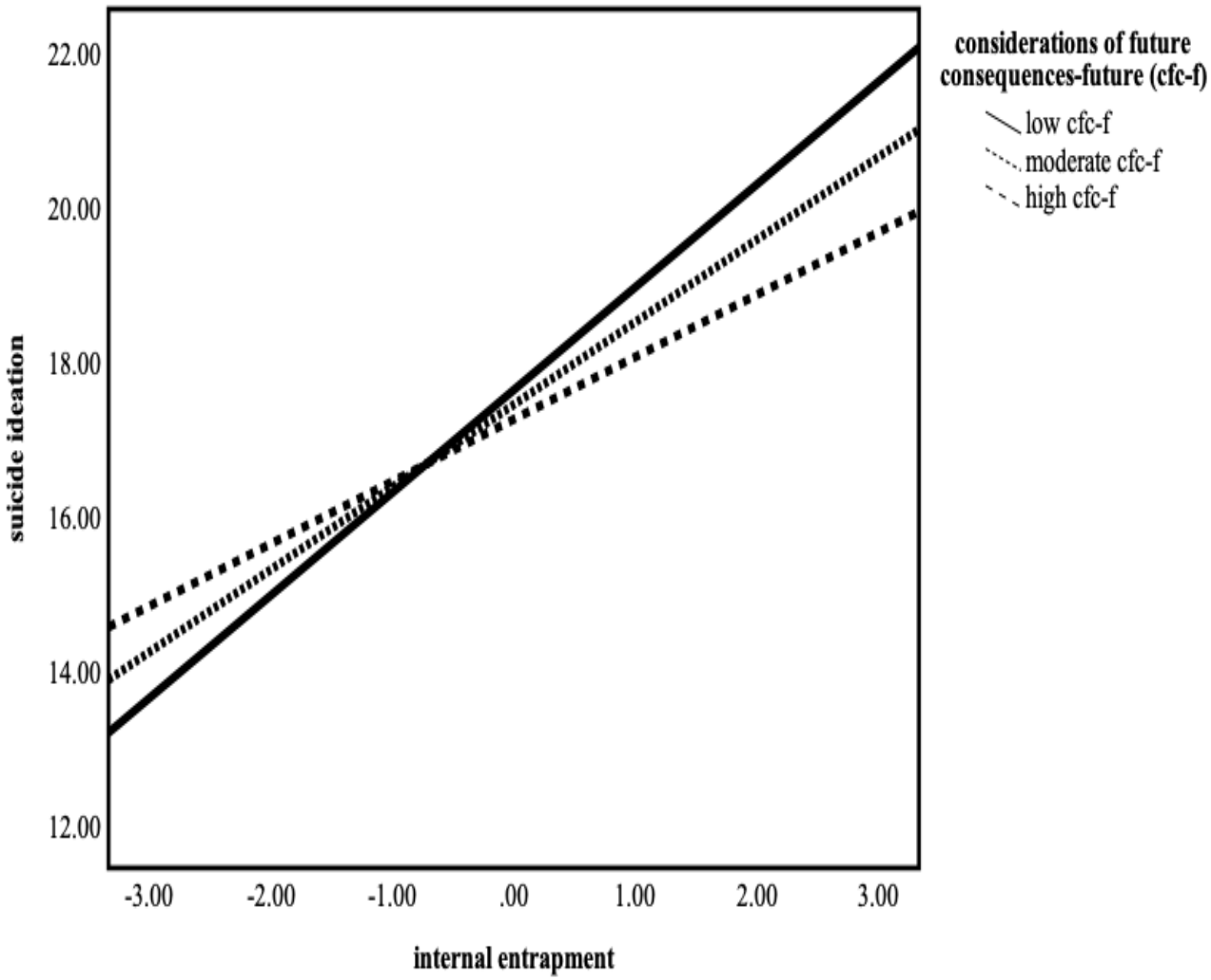
Then, first, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with internal entrapment as the predictor, suicide ideation as the outcome, and Considerations of Future Consequences- Future (CFC-F) as a moderator. Altogether, 21.5% of the variability was predicted by all of the variables (*F* (3, 405) = 37.03, *p*<.001, R^2=.215). There were significant main effects of external entrapment (*b* =1.35, *SE* = .411, *p*<.001) and the Considerations of Future Consequences- Future (*b* =-.029, *SE* = .088, *p*<.05) and also a significant interaction effect (*b* =-.029, *SE* = .012, *p*<.05), suggesting that Considerations of Future Consequences- Future moderated the association between internal entrapment and suicidal ideation (Please see Table 3.51).

Table 3.51 *The moderation effect of the considerations of future consequences-future on the internal entrapment and suicide ideation relation*

Predictor	*β*	*p*	95% *CI*	
			LL	*UL*
Internal entrapment**	2.046	.000	1.24	2.85
CFC-F*	.180	.042	.007	.354
Internal entrapment x CFC-F*	-.031	.013	-.055	-.007

Note. *p <.05, **p<.001. CFC-F: Considerations of Future Consequences- Future.

Figure 3.8 *Considerations of future consequences-future and internal entrapment interaction*



Second, a moderation analysis using the PROCESS macro for SPSS was conducted (Hayes, 2022), with internal entrapment as the predictor, suicide ideation as the outcome, and the Considerations of Future Consequences- Immediate (CFC-I) as a moderator. Altogether, 20.5% of the variability was predicted by all of the variables (F (3, 405) = 34.76, p<.001, R^2=.205). There was a significant main effect of internal entrapment (b =.722, SE = .319, p<.05). However, both the interaction effect (p=.28) and the main effect of the Considerations of Future Consequences- Immediate were not significant (p= .34, please see Table 3.52).

Table 3.52 *The moderation effect of the considerations of future consequences-immediate on the internal entrapment and suicide ideation relation*

Predictor	β	p	95% *CI*	
			LL	*UL*
Internal entrapment*	.722	.024	.095	1.35
CFC-I	-.083	.343	-.254	.089
Internal entrapment x CFC-I	-.013	.276	-.010	.036

Note. *p <.05. CFC-I: Considerations of Future Consequences- Immediate.

3.6 Discussion

Previous cross-sectional studies investigating the relationship between future thinking and suicide risk have generally indicated that suicidal individuals have a lack of positive future thinking in the absence of any increased negative future thinking. For example, suicidal participants have been shown to demonstrate deficits in thinking of future positive events both for the near and distant future, however, they did not differ from controls (hospital and non-hospital controls) in terms of the generation of future negative events (Macleod, Rose, & Williams, 1993). This reduced ability to think of future positive experiences and no overall increased ability to think of future negative experiences occurred in depressed suicidal individuals, independent of depression compared to non-depressed and matched controls (MacLeod, Pankhania, Lee, & Mitchell, 1997; Hunter & O'Connor, 2003). Additionally, suicidal participants with personality disorder were lower in positive future thinking, but not in negative future thoughts, than suicidal participants with personality difficulty and those without any personality disorders or difficulties (MacLeod, Tata, Tyrer, Schmidt, Davidson, & Thompson, 2005). Furthermore, being 'as certain as one may be while anticipating an absence of positive future outcomes (Certainty-AP), but not certainty about negative outcomes (Certainty-N), statistically predicted concurrent suicide ideation, beyond the effects of simple pessimism about positive and negative outcomes, and hopelessness partially mediated this relationship, and certainty-AP statistically predicted suicidal ideation even after adjusting for hopelessness and symptoms of depression (Sargalska, Miranda, & Marroquin, 2011).

Consistent with these findings in the literature, hypothesis 1a proposed that participants with a history of suicidal ideation and/or suicidal behaviours would report fewer positive future thoughts (PFT) than those without suicidal ideation or suicidal behaviours. Surprisingly, positive future thinking did not predict two-group suicide status in our sample. Although participants with suicidal thoughts and/or suicidal behaviours generated fewer things to look forward to (i.e., positive future thoughts) than participants without a history of suicidal thoughts or suicidal behaviours, this difference was non-significant (*M*=8.5, *SD*=4.1 and *M*=8.6, *SD*=4.5, respectively). This finding was consistent with a study conducted by O'Connor, Connery, and Cheyne (2000) in which there was no significant difference between the suicidal individuals and the matched controls in terms of positive future thoughts, although the predicted trend was evident, and positive future-directed thinking contributed to suicidal individuals' hopelessness independently of depression and negative cognitive style.

This finding contradicts the general consensus in the literature that positive future thoughts are reduced in individuals with a history of suicide compared to those without any history of suicide. However, previous research has often been based on data from those recruited from hospital settings following suicidal behaviours. Whereas, we have recruited individuals with and without a history of suicidal thoughts and/or suicidal behaviours from the community.

Hypothesis 1b stated that there would be no difference in the number of negative future thoughts between those with a history of suicidal behaviours and/or suicide ideation and those without a history of suicidal behaviours or suicide ideation. Nevertheless, NFT distinguished participants with a history of suicide ideation and/or suicide behaviour from participants without any history of suicide ideation or suicide behaviour. Participants with suicidal thoughts and/or suicidal behaviours (M = 7.5, SD = 3.6) produced significantly more negative future thoughts than participants without any history of suicidal thoughts or suicidal behaviours (M = 5.9, SD = 3.0), consistent with the findings from Macleod and Tarbuck's study (1994). In Macleod and Tarbuck's (1994) study, suicidal individuals reported negative events as being more likely to happen to themselves compared to controls without suicidal experiences. Additionally, depressed suicidal individuals had increased negative future thinking for the immediate future compared to non-depressed suicidal individuals and matched controls in a study conducted by MacLeod, Pankhania, Lee, and Mitchell (1997). In line with our findings, another study also showed that the number of negative events demonstrated a relationship to suicidal individuals' hopelessness but only after controlling for

the value, likelihood, and number of future positive events (MacLeod, Tata, Tyrer, Schmidt, Davidson, & Thompson, 2005).

As for the contents of future thoughts, there were no cross-sectional studies looking at the relationship between contents of future thoughts and suicide risk in the literature. However, it has been shown that increased intrapersonal positive future thinking predicts future suicide attempts (e.g., O'Connor, Williams, & Smyth, 2015). As a result, we were keen to explore the intrapersonal positive future thoughts and suicide risk relationship cross-sectionally.

Therefore, hypothesis 2a posited that intrapersonal positive future thinking scores would be higher, whereas the other contents/types of positive future thinking scores would be lower for those with a history of suicidal thoughts and/or suicidal behaviours than those without suicidal ideation or suicidal behaviours. However, none of the binary logistic regression models was significant (all $p \geq .10$). Participants with a history of suicide ideation and/or suicidal behaviours generated slightly more intrapersonal (M=0.6, SD=0.9) PFT compared to those without suicide history (M=0.5, SD=0.8), although this difference was not significant. They only produced fewer achievement PFT (M=1.8, SD=1.6) in comparison to participants without any history of suicidal thoughts or suicidal behaviours (M=2.2, SD=1.7) even though this group difference was also not statistically significant. They even had slightly higher (but not significantly different) scores on social/interpersonal, leisure/pleasure, and financial/home positive future thoughts than those without a suicide history, while the two groups' scores on health of others and other PFT contents/types were equal.

We had no specific hypothesis in terms of the relationship between the contents of negative future thoughts and suicide across two-groups of participants since there were no previous studies in this regard. However, based on previous research on the relationship between negative future thinking and suicide, hypothesis 2b suggested that there would be no difference between groups in terms of different contents/types of negative future thinking scores as well. Results showed that hypothesis 2b was partially supported in that there were no significant group differences in terms of achievement, leisure/pleasure, and health of others NFT contents/types (all p>.05). Nevertheless, participants with suicidal thoughts and/or suicidal behaviours generated significantly more social/interpersonal (M=1.6, SD=1.4), intrapersonal (M=1.5, SD=1.4), and financial/home (M=1.1, SD=1.3) NFTs when compared to those without any history of suicidal thoughts or suicidal behaviours (M=1.2, SD=1.2; M=1.0,

SD=1.1; *M*=0.8, *SD*=0.9, respectively). In addition to these, participants without any history of suicidal thoughts or suicidal behaviours had significantly higher scores on other NFT (*M*=0.4, *SD*=0.7) in comparison to those with suicidal thoughts and/or suicidal behaviours (*M*=0.3, *SD*=0.7).

In simple terms, in relation to the content of future negative thoughts, participants with past suicidal thoughts and/or suicidal behaviours reported more negative interpersonal/social future events, including at least one other person (e.g., family and friends), such as divorce and break-up than participants without any history of suicidal thoughts or suicidal behaviours. We collected no information about why our participants have had suicidal thoughts and/or suicidal behaviours. Therefore, it might be beneficial to gather information about the reasons behind suicidal attempts or suicidal thoughts in future research. Herein, qualitative studies are needed to investigate the reasons behind concerns related to divorce and break-up in people with a history of suicidal thoughts and/or suicidal behaviours. Additionally, in the treatment of individuals with past suicidal thoughts and/or suicidal behaviours, improving interpersonal skills and coping strategies for future possible negative social/interpersonal events should be targeted.

Those with a suicidal history also generated more intrapersonal negative events that concern only themselves, such as items related to their own health (e.g., getting worse and being depressed). In addition to these, they produced more negative future thoughts about the health of others concerning deteriorations in the mental/physical health or well-being of family or friends and finance/money and/or home related negative future thoughts (e.g., debts being not paid off). Since the data for this study were collected during the pandemic period, individuals' concerns about their own and other people's health in addition to financial concerns may have increased compared to before and after the Covid-19 periods. Therefore, it may be useful to replicate this study in the post-Covid period. However, in our sample it seems that people with a history of suicidal thoughts and/or suicidal behaviours were more concerned about health and financial issues throughout the pandemic in comparison to those without a history of suicidal thoughts or suicidal behaviours.

Conversely, those with a suicidal history generated less ‘other’ type/content of negative future thoughts than those without any history of suicidal thoughts or suicidal behaviours. We had categorised responses related to thoughts that do not fit into the preceding categories or where

any doubt existed as to the category for which an item is best fitted. Specifically, we mostly put responses about environmental (e.g., climate change and global warming), epidemic diseases, politics (e.g., concerns of administration of public by the government), and concerns about issues with major global impacts into the 'other' category of negative future thinking. Throughout the pandemic, participants with past suicidal thoughts and/or suicidal behaviours appear to have focused more on future concerns about the individual or their immediate environment, such as family and friends rather than general concerns.

Our study sample included a well-educated group of individuals with roughly 63% of participants having a bachelor's degree or higher and about 21% having a high-school degree. Therefore, we should be cautious while generalising our findings to general population. Future research should replicate this study in more educational diverse samples. Then, in such samples we may see differences across the two groups (i.e., suicidal history versus non-suicidal history), especially in terms of achievement type of future thoughts mostly referring to school-related failures or successes. Additionally, as more than two thirds (66%) of our sample reported having a history of mental disorder diagnosis (mostly of anxiety and/or depression), generalisations to wider public may be difficult.

According to the results of our systematic review study (Chapter 2), another issue that needed to be further investigated was the effect of different time periods on the relationship between thinking about the future and the risk of suicide. Therefore, we examined the role of different time frames in the relationship between both positive and negative future thinking and suicide risk.

Herein, hypothesis 2c predicted that different time frames of future thoughts would not be differentially associated with suicide status (suicide risk, having or not having a history of suicide ideation and/or suicidal behaviours). This hypothesis was also partially supported. No significant group differences were observed in terms of next week, next year, and next 5-10 years PFTs. Nonetheless, next week, next year, and next 5-10 years NFT were significant predictors of suicide risk. Therefore, a multivariate regression analysis entering all three NFT time frames in a single model was performed so as to explore which time period is the most important. Results indicated that only next 5-10 years negative future thinking contributed significantly to the model, meaning that the most important time period is next 5-10 years NFT.

Hypothesis 3a assumed that low levels of positive future thinking would be associated with suicide risk independent of depression in line with the literature. The results demonstrated that the overall model, including both depression and PFT, explained 30% of the variance in suicide ideation. However, hypothesis 3a was not supported. Herein, depression was uniquely significantly associated with suicide ideation; however, positive future thinking was not significantly associated with suicide ideation.

In addition to all of the above, we wanted to test the moderation effect of positive future thinking on the relationship between entrapment and suicide ideation, and the mediating role of entrapment on the relationship between defeat and suicide ideation, as suggested in the IMV model, in our sample. Therefore, hypothesis 3b assumed that positive future thinking would operate as a motivational moderator by moderating the relationship between entrapment and suicidal ideation. However, results showed that positive future thinking did not moderate the effect of entrapment on suicide ideation. And hypothesis 3c suggested that entrapment would mediate the relationship between defeat and suicide ideation. This hypothesis was supported in our sample as entrapment mediated the association between defeat and suicide ideation. In other words, defeat affects entrapment, which in turn influences suicide ideation.

It was also important to investigate which measure of future thinking would be the strongest predictor of suicide risk. Here, there was no specific hypothesis regarding the fourth research question as to which measure of future thinking would be the stronger predictor of suicide risk. For future thinking variables, univariate regression analyses showed that next 5-10 years negative future thinking measured via an online adapted version of the standard Future Thinking Task (MacLeod *et al*., 1997) developed by authors of this study (i.e., adapted future thinking task); future-oriented repetitive thinking, pessimistic repetitive future thinking, and repetitive thinking about future goals assessed through the Future-oriented Repetitive Thought (FoRT) scale (Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017) were significant predictors of suicide ideation. For other background factors, univariate regression analyses indicated that defeat, entrapment total, external entrapment, internal entrapment, depression, anxiety, optimism/pessimism total, optimism, pessimism, and stress were also significant predictors of suicide ideation.

A multivariate regression model indicated that both future-oriented repetitive thinking and T3 negative future thinking were significant predictors of suicide ideation. When defeat, entrapment, depression, anxiety, optimism/pessimism, and stress were added to the model, however, T3 negative future thinking was no longer a significant predictor of suicide ideation, but future-oriented repetitive thinking continued to significantly predict suicide ideation. Herein, entrapment, anxiety, optimism/pessimism, and stress and depression also contributed to the model significantly.

Another multivariate regression model investigated whether suicide ideation can be predicted by T3 negative future thinking (5-10 years), pessimistic repetitive future thinking and repetitive thinking about future goals (which are sub-scores of the future-oriented repetitive thinking). The overall model was significant, and all three predictors significantly contributed to the model. When defeat, external entrapment, internal entrapment, depression, anxiety, optimism/pessimism, and stress were added to the model, however, only pessimistic repetitive future thinking continued to significantly predict suicide ideation, but T3 negative future thinking, repetitive thinking about future goals were no longer significant predictors of suicide ideation. Herein, anxiety, stress, and depression also significantly contributed to the model. Therefore, it can be concluded that the strongest measure related to future thinking in predicting suicide ideation in our sample was the Future-oriented Repetitive Thought Scale (FoRT; Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017).

In relation to research question five about whether other measures of future thinking (i.e., future-oriented repetitive thinking and the considerations of future consequences) would moderate the relationship between entrapment and suicide ideation, there has been very little relevant previous research, and so no hypotheses have been specified. Herein, results showed that future-oriented repetitive thinking, repetitive thinking about future goals, positive indulging about the future, and CFC-Future each moderated the effect of internal entrapment on suicide ideation. Additionally, repetitive thinking about future goals, positive indulging about the future, and CFC-Future each moderated the association between external entrapment and suicide ideation.

This study cross-sectionally investigated to what extent future thinking was associated with suicide risk. The main limitation of this study is the cross-sectional design which did not allow us to make any inferences about cause and effect. In addition to this, participants were

recruited using opportunity sampling and this led to an over-representation of females and the most of participants were younger adults and from white backgrounds. Herein, there was no evidence as to gender effect on the relationship between future thinking and suicide risk. Another limitation of the study was that no assessment of verbal fluency or cognitive performance was included in this study. However, as there was no significant difference in terms of cognitive performance or verbal fluency across the two groups (suicidal history versus non-suicidal history) in previous studies, we assume that any results found in this study cannot be simply accounted for by individuals in the suicidal history group being less cognitively fluent. In addition to these, it was difficult to clearly explain why negative future thinking was a significant predictor of suicide risk, but positive future thinking was not. As discussed in the first paragraphs of this section, there were only a few studies consistent with this finding in the literature. However, we will further address this issue in the general discussion (Chapter 5).

On the other hand, this study has also some strengths as well as its limitations. For instance, this is the first study to comprehensively investigate the association between future thinking and suicidal ideation and/or suicidal behaviour using an online adapted version of the standard future thinking task (MacLeod *et al*., 1997) with the inclusion of the contents of both positive and negative future thinking.

This study may also have some implications for theories and future research, and interventions or treatments in suicide patients. This study yielded results that should be further explored and considered in the interventions in individuals with a history of suicidal thoughts and/or suicidal behaviours, especially regarding the association between NFT and suicide risk, variations in the relationship between future thinking and suicide risk as a function of the future thoughts' content, and time period.

It was also shown that the strongest measure, concerning future thinking was the FoRT (Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017) which evaluates the extent to which individuals repeatedly think about the likelihood of positive and negative events happening in the future. Future research is needed to further explore this finding. In one study, future-oriented repetitive thinking was found to be uniquely associated with depression and anxiety symptoms and future-oriented negative thinking was unrelated to suicidal ideation and attempts after taking into account the four worry features (i.e., frequency, duration,

controllability, and content) and negative affect (Gorday, Rogers & Joiner, 2018). Therefore, it would be beneficial for future research to replicate this finding with an inclusion of the investigation of worry and negative affect.

In addition to these, it would also be beneficial to include the FAS task, a measure of cognitive performance or verbal fluency which is used as a control task (Lezak, 1995), immediately before the administration of the standard Future Thinking Task (MacLeod *et al*., 1997) in individuals with past suicidal experiences.

Another contribution of this study to the literature is that this study showed that the standard future thinking task can be implemented online. By adapting the future thinking task to be applicable online, we had the opportunity to collect data during the pandemic on a large community sample. Further research should compare individuals who are admitted to hospitals with past suicidal experiences and people with suicidal history from the community in terms of future thinking using the online adapted version of the future thinking task.

The findings of this study may also support early identification of high-risk individuals and promote implementation of suicide prevention strategies in the community. It showed the importance of considering the contents of negative future thoughts in individuals with past suicidal thoughts and/or suicidal behaviours, especially throughout stressful life events (i.e., Covid-19).

In summary, it seems that the relationship between future thinking and suicide risk is complex that it changes as a function of thoughts' content. However, future orientation shows promise as a cognitive variable associated with suicide risk. Its role in suicidality needs to be better understood. Treatments designed to improve future orientation (reducing negative future thoughts and increasing positive future thoughts) may reduce the risk of suicide. In other words, understanding better why individuals think about suicide or attempt suicide may help researchers in the evaluation and treatment of suicide. Future research could attempt to replicate the existing findings. In the following chapter, we will present an experimental study on the relationship between positive future thinking and suicide using the standard future thinking task (MacLeod *et al*., 1997) administered through face-to-face interviews rather than using the online adapted version of the task.

Chapter 4: An Experimental Study of the Relationship between Positive Future Thinking, Entrapment, Defeat, Depression, and Death-Related Mental Imagery in Individuals with and without a History of Suicide Risk

4.1 Abstract

Background: Although there is growing evidence that impaired positive future thinking is associated with suicide risk, the relationship between positive future thinking and suicidal thoughts or suicidal behaviours has yet to be completely understood. Therefore, this current experimental study explored the relationship between positive future thinking and suicide risk.

Methods: Anonymous data were collected between the 16th of June 2022 and the 30th of April 2023 from 53 adults aged 18 years or older through an experimental study, which included completing a screening call via Zoom, a range of self-reported measures (suicidal history, suicide ideation, defeat, entrapment, depression, and death-related mental imagery) through an online survey, and a battery of tasks (verbal fluency or cognitive performance task, positive future thinking task and positive- and negative-mood induction) during an experimental session. The study compared two groups of individuals with and without a history of suicidal thoughts and/or suicidal behaviours in terms of positive future thinking abilities (i.e., generating things to look forward to) across different time periods and established psychological markers of suicide risk (e.g., depression, defeat, entrapment, and death-related mental imagery). A series of binary logistic regression analyses, two repeated measures ANOVA, two repeated measures ANCOVA, and an independent samples t-test were performed to test the hypotheses.

Results: Within this study (n=53, mean age=28.42), there were 20 female and 10 male participants in the suicidal thoughts and/or suicidal behaviours history group, compared to 14 female and nine male participants in the control group (i.e., those with no suicidal thoughts or suicidal attempts history). Participants without any history of suicidal thoughts or suicidal behaviours reported significantly more positive future thoughts (PFT) than participants with past suicidal thoughts and/or suicidal behaviours. Mean scores for PFT from pre- to post-negative mood induction declined significantly in both groups; however, this decrease was more marked in the participants with a history of suicidal thoughts and/or suicidal behaviours

but only significant when depression and/or suicidal ideation were controlled for. Individuals with a history of suicidal thoughts and/or suicidal behaviours reported significantly higher levels of death-related mental imagery, depression, entrapment, and defeat compared to those without past suicidal thoughts or suicidal behaviours.

Conclusions: Positive future thinking is affected by a negative mood induction in individuals with and without a suicidal history, but it is most marked in those with a suicidal history when depression and suicide ideation are controlled.

4.2 Introduction

Suicide is a major public health concern, with more than 703,000 individuals dying by suicide every year worldwide, meaning that there is approximately one death each 40 seconds, and there are also many more individuals who attempt suicide (World Health Organisation, 2021). As noted in Chapter 1, it is well known that the factors involved in the emergence of suicidal thoughts and suicidal behaviours are quite diverse, including psychological, demographic, clinical, environmental, biological, social, cultural aspects, and their interactions (Williams, 2001). However, suicides are preventable with timely, evidence-based, and often low-cost interventions and/or effective and comprehensive multisectoral suicide prevention strategies (WHO, 2021). In this study, we have focused on a selection of psychological factors (i.e., positive future thinking, entrapment, defeat, depression, and death-related mental imagery) that are implicated in the pathways to suicidal thoughts and suicidal behaviours. More specifically, we focused on examining in detail the relationship between how people think about their own future and other factors derived from the Integrated Motivational–Volitional model of suicidal behaviour (IMV model; O'Connor & Kirtley, 2018).

As noted throughout this thesis, a small number of studies have investigated the extent to which future thinking is associated with suicidal thoughts and suicidal behaviours even though positive future thinking, which is defined as specific expectancies about the future (O'Connor & Williams, 2014), can be a more sensitive predictor of suicide ideation than global hopelessness (O'Connor *et al*., 2008). According to these studies, the absence of positive thoughts about the future (i.e., positive future thinking, PFT) rather than the over-representation of negative thoughts about the future (i.e., negative future thinking, NFT) is associated with suicide risk (i.e., suicidal thoughts and suicidal behaviours) independent of depression and verbal fluency or cognitive performance (MacLeod, Pankhania, Lee, & Mitchell, 1997; O'Connor, Connery, & Cheyne, 2000; Sargalska, Miranda, & Marroqúin, 2011). However, little is yet known about the factors associated with PFT and the characteristics of individuals who may be more vulnerable to such deficits when mood is low. In other words, it remains unclear the extent to which positive future thinking is associated with established correlates of suicide risk, including clinical or psychiatric history, death-related mental imagery, defeat, entrapment, and depression when mood is low in individuals with and without past suicidal thoughts and/or suicidal behaviours.

Moreover, there is also evidence indicating that not all types of PFT may be protective against suicide risk over time as high levels of intrapersonal PFT (i.e., future thoughts about the self and no one else, such as being happier, healthier, and more confident) was found to be a significant predictor of future suicide attempts in a 15-month follow-up study (O'Connor, Smyth, & Williams, 2015). There are very few experimental studies investigating the relationship between different aspects of future thinking and suicide risk (e.g., Walsh, 1993; Williams *et al*., 1996, Williams *et al*., 2007; Hales, Deeprose, Goodwin, & Holmes, 2011). In addition, very few published studies have experimentally manipulated mood to see changes in PFT (e.g., O'Connor & Williams, 2014). Therefore, the relationship between positive future thinking and the risk of suicide seems to be more complex than previously envisaged and it needs to be further investigated via experimental research designs.

Defeat and entrapment are predictors of suicidal behaviour (O'Connor *et al*., 2013) and suicidal thoughts (Rasmussen *et al*., 2010), and they are correlated with positive future thoughts (Rasmussen *et al*., 2010). Death-related mental imagery can also play a role in the transition from suicidal thoughts to suicide attempts, indeed imagining the act of suicide was associated with 'worst ever' suicide ideation in a clinical sample of depressed participants (Holmes, Crane, Fennell, & Williams, 2007). Being less distressed by such mental images of suicide is also associated with higher levels of suicidality (Crane, Shah, Barnhofer, & Holmes, 2012). Depression is also associated with positive future thinking in individuals with suicidal experiences (MacLeod *et al*., 2005). In this study, therefore, we also assessed defeat, entrapment, death-related mental imagery, and depression.

The overall aim of this study was to investigate the relationship between positive future thinking and suicide risk via an experimental research design. This study aims to address a dearth of experimental research into the relationship between positive future thinking and suicide risk (i.e., having or not having a history of suicidal thoughts and/or suicidal behaviours). Therefore, this study aimed to experimentally manipulate mood to elucidate its effect on prospective positive cognitions of individuals with a lifetime history of suicidal thoughts and/or suicidal behaviours and healthy controls. Herein, another aim of this experimental study was to compare individuals with a lifetime history of suicidal behaviours and/or suicidal thoughts with those with no suicidal history (i.e., a control group) on several psychological measures and explore the differences in these measures across these two groups. We wanted to explore whether PFT would decrease following a negative mood

induction and whether such changes would vary as a function of suicide status (i.e., having or not having a history of suicidal thoughts and/or suicidal behaviours). In other words, we experimentally induced negative mood (i.e., by asking participants to read a list of negative statements and listening to sad music simultaneously) in those with and without a lifetime history of suicidal behaviour and/or suicidal ideation and examined whether changes in PFT pre- versus post-induction are associated with self-reported baseline entrapment, defeat, depression, and death-related mental imagery.

We have also listed a summary of the aims and hypotheses of this study in the following section:

4.2.1 Current Study Aims and Hypotheses

The overarching aim of this experimental study was to enhance our understanding of the relationship between positive future thinking and suicidal thoughts and suicidal behaviours within the context of the IMV model (O'Connor & Kirtley, 2018). The current study addressed the following specific aims and associated hypotheses.

Aim 1. To see if there are any differences across groups (i.e., suicidal history versus not suicidal history) in terms of verbal fluency.

Hypothesis:

1a. There will be no differences between groups in terms of verbal fluency or cognitive performance. Therefore, any results will not simply be accounted for by the individuals who have had suicidal thoughts and/or suicidal behaviours being less cognitively fluent.

Aim 2. To explore the extent to which PFT (positive future thinking) distinguishes between adults who have had suicidal thoughts and/or suicidal behaviours and adults without any history of suicide attempts or suicidal thoughts before and after a negative mood induction.

Hypothesis:

2a. Individuals with a history of suicidal thoughts and/or suicidal behaviours will show a deficit in being able to think of future positive events compared to those without a history of suicidal thoughts or suicidal behaviours

Aim 3. To investigate whether positive future thinking is affected by a negative mood induction in those with and without a suicidal history and whether any differences hold after controlling for depression and suicidal ideation.

Hypotheses:

3a. After a negative mood induction, it is expected that the level of PFT will decrease more in the group with a lifetime history of suicidal thoughts and/or suicidal behaviours compared to a control group (without suicidal history), and 3b, that this effect will be independent of depression and 3c suicidal ideation.

Aim 4. To explore the characteristics of individuals with a lifetime history of suicidal thoughts and/or suicidal behaviours.

Hypothesis:

4a. Individuals with a history of suicidal thoughts and/or suicidal behaviours will score significantly more highly than controls on the measures of death-related mental imagery, depression, entrapment, and defeat.

4.3. Methods

4.3.1 Participants

Individuals with a lifetime history of suicidal behaviours and/or suicidal thoughts (n=30) and individuals without a suicidal history (n=23) aged 18 years or older and living in Scotland comprised the study sample.

4.3.2 Measures

All measures used in this experimental study are listed below.

Demographics. Information about age, sex, gender, ethnicity, marital status, level of education, employment, sexual orientation, medication use, and history of psychiatric illness were obtained.

Suicidal ideation. Suicidal ideation was evaluated through the Suicide Ideation subscale of the Suicide Probability Scale (SPS; Cull & Gill, 1989) which is a valid and reliable measure of suicide risk in adults and adolescents over the age of 13 years (Tatman, Greene, & Karr, 1993; Go, Kim, & Lee, 2000). In this study, we used the Suicide Ideation subscale that includes eight items from the main instrument. Its score ranges from zero to 24 and it assesses various thoughts of suicide, such as 'I feel the world is not worth continuing to live in' and participants show how often each statement applies to them on a 4-point scale from 'None of the Time' (1), to 'Most or All of the Time' (4). Its score ranges from eight to 32. Higher scores demonstrate higher levels of suicidal ideation. The measure showed excellent internal consistency in the current study (Cronbach's α=0.90).

Suicidal History. This was measured through the items from the Adult Psychiatric Morbidity Survey (McManus, Bebbington, Jenkins, & Brugha, 2016) which assess death-related thoughts, suicide ideation, and suicidal behaviours throughout the lifetime and within the last year. The items involve two groups of questions to investigate whether the participant has (i) ever thought of ending their life or (ii) attempted to end their own life. These are: (i) "Have you ever seriously thought of taking your life, but not actually attempted to do so?"; (ii) "Have you ever made an attempt to take your life, by taking an overdose of tablets or in some other way?"

Depression. The Patient Health Questionnaire (PHQ-9) (Cameron, Crawford, Lawton, & Reid, 2008) is a screening tool for depressive symptoms. Items one to eight are for the assessment of depressive symptoms, and the last item (item nine) measures suicide ideation. To minimise contamination with the Suicide Probability Scale, we used the first eight items as a measure of depressive symptoms in this study. Participants respond via a 4-point Likert-type scale from (1) 'Not at All' to (4) 'Nearly Every Day' and scores range from eight to 32 when item nine was excluded or from eight to 36 for the scale, including nine items. Based on the current study, excellent internal consistency was detected for this measure (Cronbach's α=0.91 for PHQ-8 without item-9 and Cronbach's α=0.92 for PHQ-9).

Entrapment. The Entrapment Scale (Gilbert & Allan, 1998) is a measure of internal entrapment, involving six items about one's own thoughts and feelings (e.g., 'I feel powerless to change myself') and external entrapment, including 10 items assessing feeling trapped by external situations (e.g., 'I have a strong desire to escape from things in my life'). In this study, we used the 4-item brief Entrapment Scale (De Beurs *et al*., 2020) which is an

empirically derived short version of the entrapment scale (using items four, five, 14, and 16 of the original scale). Responses are collected on a 5-point Likert-type scale from 'Not at all like me' (1) to 'Extremely like me' (5). Higher scores indicate a greater sense of entrapment, and scores for the 4-item Entrapment Scale Short-Form (E-SF) (De Beurs *et al*., 2020) used in this study range from four to 20, for both internal and external entrapment subscales scores range from two to 10. Both internal and external entrapment sub-scales were found to have high levels of reliability in both student and clinical populations (>0.85; Gilbert & Allan, 1998). In this study, excellent internal consistencies for internal entrapment subscale (Cronbach's α=0.93), external entrapment subscale (Cronbach's α= 0.89) and the total short scale (Cronbach's α= 0.92) were found.

Defeat. The Defeat Scale (Gilbert & Allan, 1998) is a 16-item measure of an individual's perceived struggle or loss of social rank (e.g., 'I feel that I have not made it in life'), which has been found to be related to low psychological health. Participants respond via a 5-point Likert-type scale from (0) 'Never' to (4) 'Always' and scores range from zero to 64. Higher scores show greater levels of defeat, and this measure has been found to have high internal consistency in the general population (i.e., 0.94 in the student population, Gilbert & Allan, 1998). In this study, we used four items from a short form of the original Defeat Scale (Griffiths *et al*., 2015) using a 5-point Likert-type scale from (1) 'Never' to (5) 'Always' and scores range from four to 20. The measure showed excellent internal consistency in the current study (Cronbach's α=0.93).

Death-related Mental Imagery. This measure includes asking eight questions to establish the frequency with which participants imagine death-related imagery when they are feeling down or distressed, involving engaging in suicidal behaviours (e.g., images of yourself planning or preparing to harm yourself or make a suicide attempt, and images of what might happen to other people if you died). Participants respond via a 6-point Likert-type scale from (1) 'None of the Time' to (6) 'Would Rather not Say' and scores range from eight to 48. The measure showed good internal consistency in this study (Cronbach's α=0.83).

Tasks used in the experimental component of the study

Verbal Fluency. The Verbal Fluency Task (FAS) is a standard measure of cognitive performance or verbal fluency which is used as a control task in this study (Lezak, 1995). It includes asking study participants to write as many words as they can think of beginning with

each of the three letters: F, A, S. Participants are asked to exclude proper nouns, numbers, the same words with different suffixes, and repetitions. Participants are given one minute for each letter, and the three letters are presented in a fixed order, F, A, S. The mean number of acceptable words generated for each letter is calculated. This task was administered just before the positive future thinking task (see 4.3.4 Design, Recruitment and Procedures).

Positive Future Thinking Task. Positive Future Thinking (PFT) was assessed following MacLeod *et al*.'s (1997) procedure before and after a negative mood induction. Participants were presented with four different time frames (next week/T1, next month/T2, next year/T3, and next 5 to 10 years/T4) and asked to think of as many events as possible that they were looking forward to or they would enjoy. Participants were randomly allocated to receive two time periods before a negative mood induction (e.g., next week, next month) and two time periods after a negative mood induction (e.g., next year, next 5-10 years) such that all four-time frames were completed by each participant. The presentation of time periods order was counterbalanced across participants (e.g., T1-T2-T3-T4; T2-T1-T4-T3; T3-T4-T1-T2; T4-T3-T2-T1, T1-T2-T3-T4…, the first two time periods before the negative mood induction and the second two time periods after the negative mood induction, please see Table 4.1). For each time period, participants were allowed one minute to produce as many positive events as they could think of. The pre- and post-negative mood induction responses were aggregated separately to yield a total pre- and post-negative mood induction positive future thinking score, respectively.

Table 4.1 *The presentations of time periods before and after negative mood induction*

Order of presentations of time periods	**1**	**2**	**3**	**4**
Before negative	T1	T2	T3	T4
mood induction	T2	T1	T4	T3
After negative	T3	T4	T1	T2
mood induction	T4	T3	T2	T1

Negative and Positive Mood Induction. Moore and Oaksford's (2002) procedure for the negative mood induction was used. This is an adaptation of the Velten mood induction procedure (Velten, 1968) which combines music, reading statements and a specific request to participants to try to change their mood. Negative statements, such as "There have been days when I felt confused, and everything went miserably wrong, and I was powerless to stop it" were accompanied by sad music (i.e., Alexander Nevsky Suite, Prokofiev's Russia under the Mongolian Yoke) that played at half speed over a period of 10 minutes. The negative mood induction procedure took about 10 minutes to complete. The mood was measured pre- and post-negative mood induction using a 100 mm Visual Analogue Scale recording how sad or happy a participant is feeling at that time. After the completion of the second positive future thinking task, all participants also completed a positive mood induction procedure which comprised of reading a list of positive statements such as "I feel that many of my friendships will stick with me in the future" and listening to happy music (i.e., Mozart) simultaneously. The positive mood induction procedure lasted approximately 10 minutes.

The administration of a combined negative mood induction, which includes listening to sad music (Prokofiev's "Russia under the Mongolian Yoke; Alexander Nevsky Suite) and reading negative statements (Moore & Oaksford, 2002) simultaneously, was used to experimentally manipulate the affective state of all study participants. The aim of conducting a negative mood induction procedure was to examine the extent to which low mood affects one's ability to generate things to look forward to (i.e., positive future thinking) across different time frames. Specifically, a negative mood induction procedure was carried out to investigate the differences in positive future thinking ability from pre-to-post sad mood induction procedures between and within two groups of participants (suicidal history versus non-suicidal history groups). In summary, we wanted to explore whether PFT would decrease following a negative mood induction and whether such changes would vary as a function of suicide status (i.e., having or not having a history of suicidal thoughts and/or suicidal behaviours). After completion of the second positive future thinking task, all participants underwent a positive mood induction procedure, which involved reading positive statements and listening to happy music (i.e., Mozart) simultaneously, to elevate the participants' mood and to eliminate any effect of the negative mood induction procedure on the study participants before leaving the laboratory.

Visual Analogue Scale (VAS) Mood Rating. Participants were asked to assess their mood in terms of sadness or happiness on a 100 mm VAS just before the first positive future thinking task and again immediately after the negative mood induction. They were asked to rate as follows: ‘‘At this moment I feel. . .’’ and sadness or happiness were printed above the 100 mm line which was anchored on a scale of ‘Not at All’ to ‘Extremely’.

4.3.4 Design, Recruitment and Procedures

This study adopted a quantitative experimental research design. Before data collection, ethical approval was received from the Medical, Veterinary, and Life Sciences (MVLS) ethics committee (Approval number: 200210061). All study participants were informed that participation was voluntary, and they were free to withdraw from the study at any stage. Participants’ eligibility to take part in the study was assessed through screening calls on Zoom (Appendix J, Screening Tool). For the experimental component of the study, eligible participants were invited to the SBRL (Suicidal Behaviour Research Laboratory) Health Laboratory at Gartnavel Royal Hospital which was part of the University of Glasgow.

Prospective participants were screened by using the inclusion and exclusion criteria below:

Inclusion for the Control Group:
1. Aged 18 years and older.
2. Can attend an appointment at the SBRL Health Lab.
3. Without suicidal history (i.e., suicide attempts or suicidal thoughts).

Inclusion for the Suicidal History Group:
1. Aged 18 years and older.
2. Have a lifetime history of suicide attempts and/or suicidal thoughts.
3. Can attend an appointment at the SBRL Health Lab.

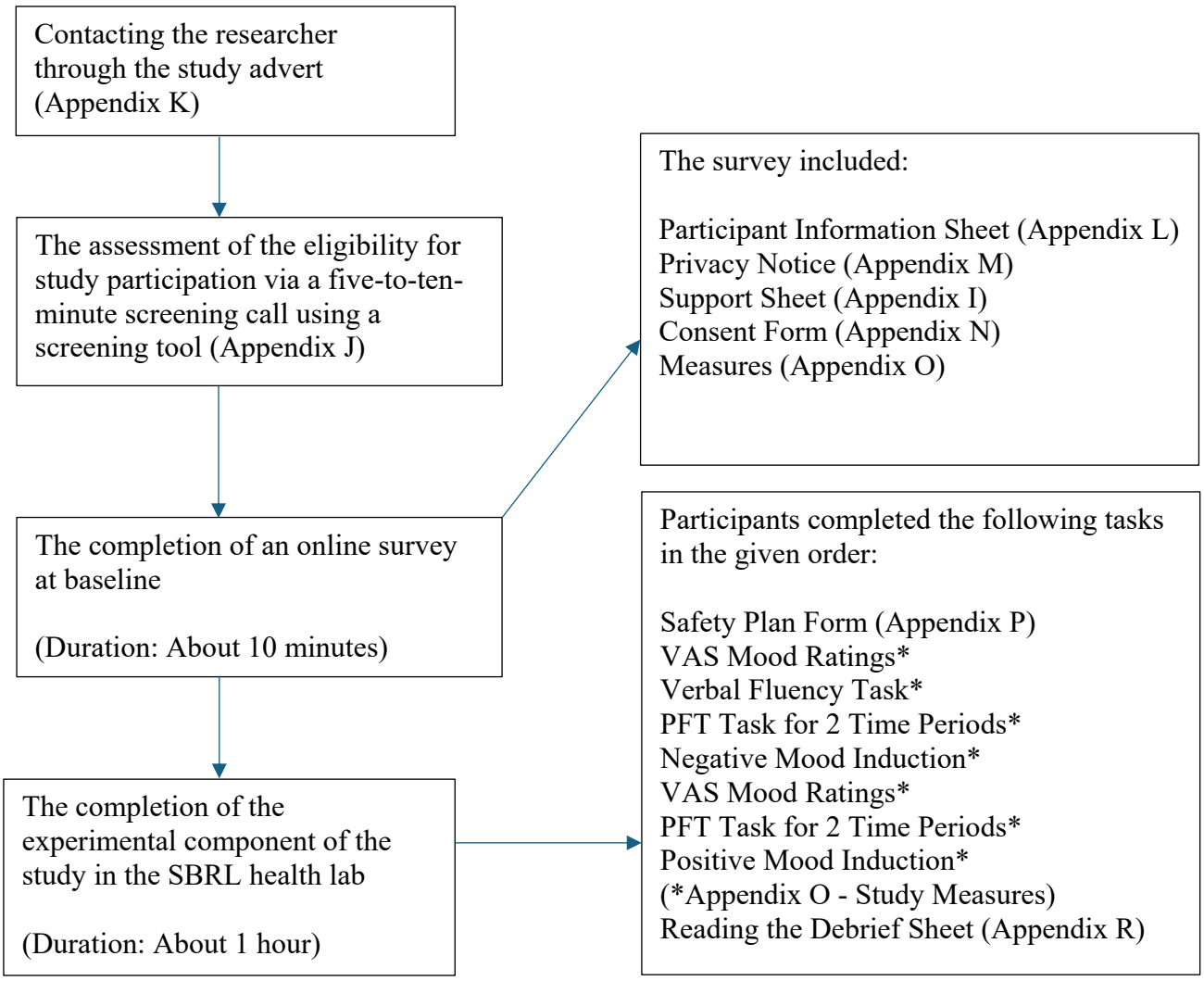
Exclusion Criteria for both Groups of Participants:
1. Not fluent in English.
2. Be imminently suicidal at the time of recruitment.
3. Be actively psychotic at the time of recruitment.
4. Have a learning disability or cognitive impairment.

After seeing the study advertisement (Appendix K), prospective participants emailed the PhD researcher with their contact details, then the researcher got in touch for a screening call on Zoom. Participants who met the eligibility criteria after screening calls were provided with a survey link, including an Information Sheet (Appendix L), Privacy Notice (Appendix M), Consent Form (Appendix N), and Support Sheet (Appendix I) via email. This survey link also included a set of online questionnaires (e.g., clinical history, death-related mental imagery, the levels of defeat, entrapment, and depression) and a demographics form to be completed by participants at baseline, a few days before the experimental session. Questionnaires were in self-report format and presented using the University of Glasgow Online Survey Tool. For the experimental component of the study, appointments were arranged by the PhD researcher according to the participant's availability. Then, participants were sent an email confirming this time and date and provided with directions to the SBRL Health Lab. Participants who did not meet the inclusion criteria were also thanked for their interest in taking part in the study and sent a support sheet (Appendix I).

All participants attended separate individual appointments at the SBRL Health Lab at Gartnavel Royal Hospital. During the appointment, all participants took part in the experimental component of the study which included the completion of verbal fluency assessment, positive future thinking tasks (pre- and post-negative mood induction), a negative- and a positive- mood induction (Please see Appendix O). The experimental part of the study took approximately one hour to complete and was conducted by the PhD Researcher.

All participants received a £30 Amazon Voucher as compensation for their study completion and to contribute to their travel costs to the lab. Additional compensation was offered for participants who resided more than 25 miles away from the Gartnavel Royal Hospital, up to a maximum of £10 Amazon Voucher.

Figure 4.1 *The different steps of the procedures*



4.3.5 Statistical Analysis

A G*Power analysis recommended that a minimum of 40 participants was needed. The proposed sample size has a power of .8 to detect an effect size of at least d=0.4 (with alpha at 0.05). Considering the sample sizes in previous studies of similar designs in which the relationship between PFT and suicide risk was examined, the sample size of this proposed study also seems sufficient.

Descriptive statistics and bivariate correlations were computed to examine the normality and interrelatedness of all variables. Mean scores and standard deviations across the two groups were also reported.

Groups were first compared on the number of words generated in the standard verbal fluency task to explore hypothesis 1a. Herein, a t-test was performed to see group differences in general cognitive fluency and to see whether any results could simply be accounted for by those in the suicidal history group being less cognitively fluent.

Before testing hypothesis 1b, we recoded the time frames to have only two different time periods due to the small sample size we have: *(1)* Shorter Time Period, including next week (T1) and next month (T2) and *(2)* Longer Time Period, involving next year (T3) and next 5-10 years (T4). Then, hypothesis 1b was investigated using repeated measures ANOVA with two groups (i.e., participants with suicide history versus participants without suicide history) as a between-subject factor and two conditions (i.e., Total pre-mood induction PFT versus total post-mood induction PFT irrespective of time period or content) as a within-participants factor.

Then, a binary logistic regression analysis with two-group suicide status (i.e., suicidal history versus not suicidal history) as the outcome variable and a total number of positive future thoughts as the predictor variable was performed to test hypothesis 2a, suggesting that individuals with a history of suicidal thoughts and/or suicidal behaviours would show a deficit in being able to think of future positive events compared to ones without a history of suicidal thoughts or suicidal behaviours.

Hypothesis 3a proposes that the level of PFT would decline more in the group with a history of suicidal thoughts and/or suicidal behaviours in comparison to those without any history of suicidal thoughts or suicidal behaviours. This was explored through repeated measures ANCOVA with positive future thinking pre- and post-negative mood induction as the within subject factor and two-group suicide status as the between-participants factor and depression as the covariate.

Hypothesis 3b proposes that the effects described in hypothesis 3a would be independent of depression and hypothesis 3c proposes that they would also be independent of suicide ideation. These were explored using repeated measures ANCOVA, controlling for depression and suicide ideation.

A series of binary logistic regression analyses were conducted to examine hypothesis 4a, anticipating that individuals with a history of suicidal thoughts and/or suicidal behaviours

would score significantly more highly than controls on the measures of death-related mental imagery, depression, entrapment, and defeat.

In addition to these, we assessed the effectiveness of the mood induction procedure. Herein, we checked if there would be a significant change in sadness scores before and after negative mood induction. VAS scores for sadness were subjected to repeated measures ANOVA with time (before a mood induction versus after a mood induction sadness scores) as the within-subjects factor and two-group suicide status (suicidal history versus non-suicidal history) as the between-participants factor.

4.3.6 Data Screening and Missing Value Analysis

We failed to reject the null hypothesis for Little's MCAR test which means our data are missing completely at random (p=.104). Outliers were also checked using the Mahalonobis Distance Analysis. Herein, the Mahalanobis Distance analysis detected no outlier.

Missing data. There were no missing cases for our continuous variables. When we checked the accuracy of the data overall by looking at the minimum and maximum values, they all fell within the expected ranges.

Normality. When we looked at tests of normality our dependent variable, positive future thinking, was normally distributed.

Linearity. To check for linearity, we graphed the data to individually assess whether there are linear relationships. Under chart builder's scatter plot matrix, we included all the variables that we used in the analyses. When we looked at the scatter plots, there was no evidence for curvilinear relationships, therefore, we assumed that whatever relationships we have they were linear in nature.

Univariate outliers. To screen for outliers in the data we looked at the minimum and maximum z-scores for each variable. There was no evidence for outliers.

4.4. Results

4.4.1 Sample Characteristics

Fifty-three participants completed all components of the study, and the mean age (*SD*) was 28.42 years (*SD*=10.96). Their ages ranged from 18 to 65. Thirty-four of these participants were women and 19 were men (n=53). In the suicidal thoughts and/or suicidal attempts history group, there were 20 female and 10 male (*n*=30) participants while the control group (i.e., those with no suicidal thoughts or suicidal attempts history) consisted of 14 female and nine male participants (*n*=23). The two groups did not differ in terms of gender (20 and 14 females for the suicidal history and non-suicidal history groups, respectively, *Chi* (1) = .66, *ns*) and age distributions (*M*= 30.4, *SD*= 13.5 and *M*= 26, *SD*= 5.5 in the suicidal history and non-suicidal history groups, respectively, *t* (51) = 1.47, *ns*). Ninety-five individuals completed screening calls with the researcher via Zoom, 61 of them completed the survey but eight of 61 did not attend the lab sessions to complete the whole study. The recruitment process took place between the 16th of June 2022 and the 30th of April 2023.

There were significant positive correlations between pre- and post-negative mood induction positive future thinking (p<.001). There were significant bivariate positive correlations among all study variables, except positive future thinking *(*p<.001) (Please see Table 4.2).

Table 4.2 *Correlations for study variables*

	1	2	3	4	5	6	7	8	9
1		.682**	.048	-.064	-.272	-.189	-.052	-.187	-.178
2	.734**		.291	.226	.050	.149	.243	-.080	-.062
3	-.057	.069		.737**	.787**	.840**	.722**	.696**	.649**
4	.043	.009	.731**		.652**	.903**	.863**	.869**	.660**
5	-.019	.141	.700**	.723**		.915**	.759**	.676**	.622**
6	.015	.075	.772**	.938**	.918**		.890**	.846**	.704**
7	-.095	-.034	.776**	.830**	.865**	.911**		.822**	.646**
8	.109.	.079	.645**	.628**	.569**	.647**	.551**		.786**
9	-.031	.063.	.816**	.877**	.766**	.889**	.834**	.654**	

Note. ***p*<.001, **1** Pre-Positive Future Thinking (PFT), **2** Post PFT, **3** Suicide ideation, **4** Internal entrapment, **5** External entrapment, **6** Entrapment, **7** Defeat, **8** Death-related mental imagery, **9** Depression. Values below the diagonal for participants with a history of suicidal thoughts/behaviours and values above the diagonal for participants without any history of suicidal thoughts/behaviours

4.4.2 Hypotheses Testing

Aim 1. To explore whether there are any differences across groups in terms of verbal fluency. To test hypothesis 1a, groups were first compared on the number of words generated in the standard verbal fluency task. Herein, an independent samples t-test was performed to explore group differences on general cognitive fluency.

There were no statistically significant group differences in terms of verbal fluency (M=35.2, SD=14.2 for the suicidal history group and M=36.4, SD=9.4 for the non-suicidal history group), t (51) = - .34, *ns.*

Aim 2. To explore the extent to which PFT (Positive Future Thinking) distinguishes between adults who have had suicidal thoughts and/or suicidal behaviours and adults without any history of suicide attempts or suicidal thoughts before and after a negative mood induction.

As we have one continuous outcome variable (Positive Future Thinking, PFT 1 or PFT 2) and a dichotomous predictor variable, two-group suicide status, with two levels (i.e., suicidal history versus non-suicidal history), we used the binary logistic regression analysis to test hypothesis 2a.

Here, two separate binary logistic regression analyses with two-group suicide status as the outcome variable and total number of positive future thoughts pre the negative mood induction (PFT 1) or total number of positive future thoughts post the negative mood induction (PFT 2) as the predictor variable was performed to test hypothesis 2a.

Table 4.3 *The means and standard deviations of predictors as a function of suicide status*

Variable	With suicide history M(SD)	Without suicide history M(SD)	Total M(SD)
PFT 1	5.8 (1.5)	8.3 (1.5)	6.9(2.0)
PFT 2	4.2 (1.8)	7.3 (1.6)	5.5 (2.3)
Depression	16.1(6.8)	11.8(4.1)	15.4(6.6)
Death-related mental imagery	19.0(6.8)	12.2(4.5)	16.1(6.8)
Entrapment	11.5(5.2)	6.1(3.2)	9.2(5.2)
Internal Entrapment	5.5(3.0)	3.3(1.8)	4.8(2.6)
External Entrapment	6.0(2.6)	4.2(1.8)	4.2(1.8)
Defeat	10.1(4.9)	5.6(2.7)	8.1(4.6)

Note. M: Mean. SD: Standard Deviation. PFT 1: Positive Future Thinking pre-negative mood induction. PFT 2: Positive Future Thinking post-negative mood induction.

The overall logistic regression model was found to be statistically significant, $\chi 2(1) = 26.34$, $p<.001$, with Nagelkerke R^2 value of .526, meaning that approximately 53% of the variance in two-group suicide status (i.e., outcome variable) is explained by *pre-negative mood induction positive future thinking* (i.e., PFT 1, predictor variable). PFT 1 was found to be statistically significant in predicting one's odds of two-group suicide status ($\chi 2(1) = 12.81$, $p<.001$). In particular, the odds of one not having a suicidal history (the probability of being in the group without a history of suicidal thoughts or suicidal behaviours) will increase by about 13% for every additional increase in PFT 1 (*Exp(B)* =3.09, 95% CI [1.67, 5.74], $p<.001$).

Table 4.4 *Binary logistic regression analysis results for the pre-negative mood induction Positive Future Thinking (PFT) as a function of suicidal status (history vs no history)*

				95% CI			
Variable	Beta	SE	Wald X^2	LL	UL	OR	*p*
PFT 1	1.051	.281	14.036	1.65	4.96	2.86	<.001

Note. PFT 1: Pre-negative mood induction Positive Future Thinking. CI: Confidence Interval; OR: Odds Ratio; SE: Standard Error.

Another binary logistic regression was performed to see whether *post-negative mood induction positive future thinking* predicts the odds of an individual's *two-group suicide status*. The overall logistic regression model was found to be statistically significant, $\chi 2(1) = 30.94$, $p<.001$, with Nagelkerke R^2 value of .593, meaning that approximately 59% of the variance in two-group suicide status (i.e., outcome variable) is explained by post-negative mood induction positive future thinking (i.e., PFT 2, predictor variable). PFT 2 was found to be statistically significant in predicting one's odds of two-group suicide status ($\chi 2(1) = 14.04$, $p<.001$). In particular, the odds of one not having a suicidal history (the probability of being in the group without a history of suicidal thoughts or suicidal behaviours) will increase by about 14% for every additional increase in PFT 2 (*Exp(B)* =2.86, 95% CI [1.65, 4.96], $p<.001$).

Table 4.5 *Binary logistic regression analysis results for the post-negative mood induction Positive Future Thinking (PFT) as a function of suicidal status (history vs no history)*

				95% CI			
Variable	Beta	SE	Wald X^2	LL	UL	OR	*p*
PFT 2	1.129	.315	12.809	1.67	5.74	3.09	<.001

Note. PFT 2: Post-negative mood induction Positive Future Thinking. CI: Confidence Interval; OR: Odds Ratio; SE: Standard Error.

Aim 3. To investigate whether positive future thinking is affected by a negative mood induction in those with and without a suicidal history and whether any differences hold after controlling for depression and suicidal ideation.

As for hypothesis 3a, repeated measures ANOVA determined that mean positive future thinking scores differed significantly from the pre- to post-negative mood induction (i.e., the effect of time or factor 1, pre-negative mood induction PFT versus post-negative mood induction PFT) (F (2, 51) = 60.02, p<.001). However, the effect of time * two-group suicide status was not statistically significant (F (2, 51) = 3.75, p=.058). The effect of two-group suicide status (i.e., suicidal history versus non-suicidal history) was statistically significant (F (2, 51) = 44,03, p<.001).

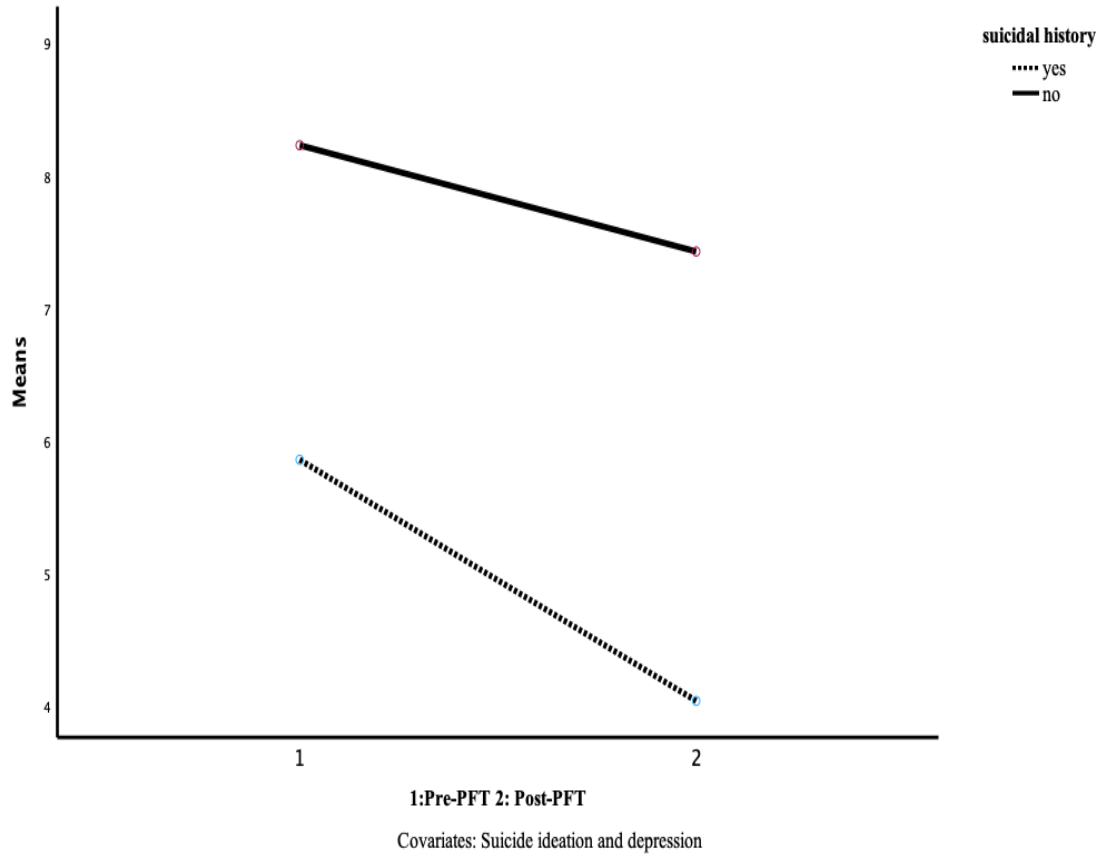
The mean scores of PFT between the pre- and post-negative mood induction decreased significantly in both groups; however, this decrease seems to be more marked in the participants with suicidal history, although the interaction is not significant.

For hypothesis 3b, we undertook similar analyses to those for hypothesis 3a, but on this occasion, we added depression as a covariate in repeated measures ANCOVA. The ANCOVA indicated that mean positive future thinking scores reduced significantly from the pre- to post-negative mood induction (Mean PFT Pre = 6.9 versus Mean PFT Post = 5.5) (F (1, 50) = 13.26, p <.001). The effect of two-group suicide status in the average positive future thinking was statistically significant (F (1, 50) = 32.26, p <.001). The test of pairwise comparison showed that there is a significant difference in terms of positive future thinking between-

participants with a history of suicidal thoughts and/or suicidal behaviours (M=5.0) and participants without a history of suicidal thoughts or suicidal behaviours (M=7.7; p<.001). However, the effects of the interaction between the time and depression covariate, (F (1, 50) = .867, p =.356) was not significant. The interaction between the time and two-group suicide status (F (1, 50) = 4.60, p =.037) was significant. Depression as the covariate did not explain a significant amount of variance (F (1, 50) = .026, p =.872) in positive future thinking.

As for hypothesis 3c, we performed the same analysis to those for hypothesis 3b, but on this occasion, we added suicide ideation and depression as covariates in repeated measures ANCOVA. The ANCOVA demonstrated that mean positive future thinking scores decreased significantly from the pre- to post-negative mood induction (Mean PFT Pre = 6.9 versus Mean PFT Post = 5.5) (F (1, 49) = 10.08, p <.001). In addition, the difference in PFT between the two times has a significant interaction effect with two-group suicide status (i.e., suicidal history versus non-suicidal history) (F (1, 49) = 5.08, p=.029). Tests of between-subjects effects showed that depression (p=.58) and suicide ideation (p=.56) both as covariates did not explain a significant amount of variance in the average value of PFT measured at pre-and post-negative mood induction. For participants in two different groups (i.e., suicidal history versus non-suicidal history), the test of pairwise comparison showed that they have significant differences in the average PFT, F (1, 49) = 27.27, p <.001, (M=4.95 for the suicidal history group and M=7.83 for the non-suicidal history group). The mean Pre PFT is 7.04 and mean Post PFT is 5.73 for all participants (p<.001).

Figure 4.2 *Pre- versus post- negative mood induction positive future thinking as a function of suicide status when controlling for depression and suicide ideation*



Aim 4. To explore the characteristics of individuals with a lifetime history of suicidal thoughts and/or suicidal behaviours.

A series of separate binary logistic regression analyses were conducted to examine hypothesis 4a, which predicts that individuals with a history of suicidal thoughts and/or suicidal behaviours would score significantly more highly than controls in terms of depression, death-related mental imagery, entrapment, and defeat (Please see Table 4.3 for means and standard deviations by groups).

First, a binary logistic regression analysis with depression as the predictor variable and two-group suicide status (suicidal history versus non-suicidal history) as the outcome variable was performed. The overall logistic regression model was found to be statistically significant, $\chi 2(1) = 14.25$, $p<.001$, with Nagelkerke R^2 value of .316 meaning that approximately 32% of

the variance in two-group suicide status (i.e., outcome variable) is explained by depression (i.e., predictor variable). Depression was found to be statistically significant in predicting one's odds of two-group suicide status ($\chi 2(1) = 9.78$, p=.002). In particular, the odds of being in the suicidal history group is increased by about 10% for every additional unit increase in depression (*Exp(B)* =.818, 95% CI [.722, .928], p<.05).

Table 4.6 *Binary logistic regression analysis result for depression as a function of suicidal status (suicidal history vs no history)*

				95% CI			
Variable	Beta	SE	Wald X^2	LL	UL	OR	*p*
Depression	-.200	.064	9.78	.722	.928	.818	.002

Note. CI: Confidence Interval; OR: Odds Ratio; SE: Standard Error.

Second, a binary logistic regression analysis with death-related mental imagery as the predictor variable and two-group suicide status (suicidal history versus non-suicidal history) as the outcome variable was conducted. The overall logistic regression model was found to be statistically significant, $\chi 2(1) = 15.79$, p<.001, with Nagelkerke R^2 value of .345 meaning that roughly 35% of the variance in two-group suicide status (i.e., outcome variable) is explained by death-related mental imagery (i.e., predictor variable). Death-related mental imagery was found to be statistically significant in predicting one's odds of two-group suicide status ($\chi 2(1) = 10.13$, p=.001). In particular, the odds of being in the suicidal history group is increased by about 10% for every additional unit increase in death-related mental imagery (*Exp(B)* =.809, 95% CI [.709, .922], p<.05).

Table 4.7 *Binary logistic regression analysis result for death-related mental imagery as a function of suicidal status (suicidal history vs no history)*

				95% CI			
Variable	Beta	SE	Wald X^2	LL	UL	OR	*p*
Death-related mental imagery	-.212	.067	10.1	.709	.922	.809	.001

Note. CI: Confidence Interval; OR: Odds Ratio; SE: Standard Error.

Third, a binary logistic regression analysis with entrapment as the predictor variable and two-group suicide status (suicidal history versus non-suicidal history) as the outcome variable was carried out. The overall logistic regression model was found to be statistically significant, $\chi 2(1) = 17.72$, $p<.001$, with Nagelkerke R^2 value of .381 meaning that nearly 38% of the variance in two-group suicide status (i.e., outcome variable) is explained by entrapment (i.e., predictor variable). Entrapment was found to be statistically significant in predicting one's odds of two-group suicide status ($\chi 2(1) = 10.13$, $p=.001$). In particular, the odds of being in the suicidal history group is increased by about 10% for every additional unit increase in entrapment (*Exp(B)* =.731, 95% CI [.603, .887], $p<.05$).

Table 4.8 *Binary logistic regression analysis results for entrapment as a function of suicidal status (suicidal history vs no history)*

				95% CI			
Variable	Beta	SE	Wald X^2	LL	UL	OR	*p*
Entrapment	-.313	.098	10.1	.603	.887	.731	.001

Note. CI: Confidence Interval; OR: Odds Ratio; SE: Standard Error.

Additionally, two separate binary logistic regression analyses with internal or external entrapment as the predictor variable and two-group suicide status (suicidal history versus non-suicidal history) as the outcome variable were carried out. The overall logistic regression models were found to be statistically significant (for internal entrapment $\chi 2(1) = 14.76$,

p<.001, with Nagelkerke R^2 value of .326 and for external entrapment $\chi 2(1) = 15.86$, p<.001, with Nagelkerke R^2 value of .350). About 33% of the variance by internal entrapment (i.e., predictor variable) and 35% of the variance by external entrapment (i.e., predictor variable) are explained in two-group suicide status (i.e., outcome variable). Both internal and external entrapment were found to be statistically significant in predicting an individual's odds of being in the suicidal history group, for internal entrapment ($\chi 2(1) = 8.75$, p=.003) and for external entrapment ($\chi 2(1) = 10.04$, p=.002). In particular, the odds of being in the suicidal history group is increased by 8.8% for every additional unit increase in internal entrapment (*Exp(B)* =.606, 95% CI [.435, .845], p<.05) and by 8.8% for every additional unit increase in external entrapment (*Exp(B)* =.581, 95% CI [.415, .813], p<.05).

The results of separate binary logistic regression analyses for internal entrapment or external entrapment as a function of two-group suicide status are depicted in Table 4.9 and Table 4.10.

Table 4.9 *Binary logistic regression analysis result for internal entrapment as a function of suicidal status (suicidal history vs no history)*

				95% CI			
Variable	Beta	SE	Wald X^2	LL	UL	OR	*p*
Internal Entrapment	-.500	.169	8.75	.435	.845	.606	.003

Note. CI: Confidence Interval; OR: Odds Ratio; SE: Standard Error.

Table 4.10 *Binary logistic regression analysis result for external entrapment as a function of suicidal status (suicidal history vs no history)*

				95% CI			
Variable	Beta	SE	Wald X^2	LL	UL	OR	*p*
External Entrapment	-.543	.171	10.0	.415	.813	.581	.002

Note. CI: Confidence Interval; OR: Odds Ratio; SE: Standard Error.

Fourth, a binary logistic regression analysis with defeat as the predictor variable and two-group suicide status (suicidal history versus non-suicidal history) as the outcome variable was conducted. The overall logistic regression model was found to be statistically significant, $\chi 2(1) = 14.89$, $p<.001$, with Nagelkerke R^2 value of .328 meaning that 32.8% of the variance in two-group suicide status (i.e., outcome variable) is explained by defeat (i.e., predictor variable). Defeat was found to be statistically significant in predicting one's odds of two-group suicide status (being in the group with a history of suicidal thoughts and/or suicidal behaviours versus being in the group without a history of suicidal thoughts or suicidal behaviours) ($\chi 2(1) = 9.46$, $p=.002$). In particular, the odds of an individual being in the suicidal history group is increased by about 9.5% for every additional unit increase in defeat (*Exp(B)* =.739, 95% CI [.610, .896], $p<.05$).

Table 4.11 *Binary logistic regression analysis result for defeat as a function of suicidal status (suicidal history vs no history)*

				95% CI			
Variable	Beta	SE	Wald X^2	LL	UL	OR	*p*
Defeat	-.302	.098	9.46	.610	.896	.739	.002

Note. CI: Confidence Interval; OR: Odds Ratio; SE: Standard Error.

We also evaluated the effectiveness of the mood induction procedure.

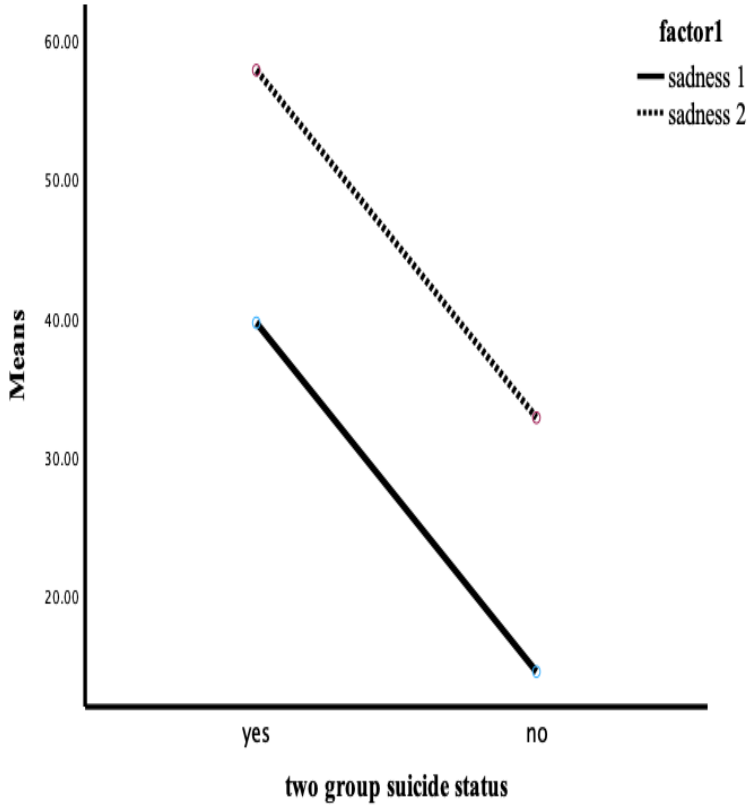
Table 4.12 *The means and standard deviations of pre- and post-negative mood induction sadness as a function of suicide status*

Variable	With suicide history M(SD)	Without suicide history M(SD)	Total M(SD)
Sadness 1	39.6(28.8)	14.6(15.7)	28.8(26.9)
Sadness 2	57.8(25.0)	32.8(21.9)	47.0(26.6)

Note. M: Mean. SD: Standard Deviation.

Repeated measures ANOVA confirmed that mean sadness did differ significantly from the pre- to post-negative mood induction (i.e., the effect of time or factor 1, pre-negative mood induction sadness versus post-negative mood induction sadness) (F (1, 51) = 33.32, p<.001). The effect of time * two-group suicide status was not statistically significant (F (1, 51) = .000, p=.987). The effect of two-group suicide status (i.e., suicidal history versus non-suicidal history) was statistically significant (F (1, 51) = 18.49, p<.001). The mean scores of sadness between the pre- and post-negative mood induction increased significantly in both groups (Please see Figure 4.3 and Table 4.12), however, this increase was stronger in the participants with suicidal history.

Figure 4.3 *Pre- versus post-negative mood induction sadness scores as a function of suicide status*



Note. Yes: Participants with a suicidal history. No: Participants without any history of suicide. Factor 1: Pre-negative mood induction sadness (sadness 1) and post-negative mood induction sadness (sadness 2).

4.5 Discussion

There were no significant differences between groups in terms of verbal fluency or cognitive performance. This showed that any results found in this study could not simply be accounted for by individuals who have had suicidal thoughts and/or suicidal behaviours being less cognitively fluent, therefore hypothesis 1a was supported.

Hypothesis 2a, which suggested that individuals with a history of suicidal thoughts and/or suicidal behaviours would show a deficit in being able to think of future positive events in comparison to those without a history of suicidal thoughts or suicidal behaviours, was also supported. Positive future thinking distinguished between adults who have had suicidal thoughts and/or suicidal behaviours and adults without a history of suicide attempts or suicidal thoughts pre- and post-negative mood induction. Binary logistic regression analyses showed that both pre- and post-negative mood induction positive future thinking predicted two-group suicide status (suicidal history versus non-suicidal history). Participants without a history of suicidal thoughts or suicidal behaviours reported significantly more positive future thoughts than participants with a history of suicidal thoughts and/or suicidal behaviours (for Pre-PFT M=8.3 versus M =5.8 and for Post-PFT M =7.3 versus M =4.2, respectively).

Our study findings are consistent with a classic study by Williams and colleagues; specifically, this earlier study recruited 32 individuals who reported suicidal ideation when depressed in the past (Williams, van der Does, Barnhofer, Crane, & Segal, 2007) and used the standard future fluency task and the same negative mood induction procedure as in our study. Their findings were consistent with what we found in our suicide history group as Williams *et al*.'s (2007) study showed that participants' mean scores on both positive and negative future fluency tasks decreased after the negative mood induction procedure (for positive condition pre-induction M=7.7 and post-induction M=5.7 and for negative condition pre-induction M=5.3 and post-induction M=4.6) and hopelessness/suicidality scores were associated with greater declines in positive future fluency from pre to post negative mood induction and lower fluency for positive events following a negative mood induction.

Hypothesis 3a suggested that the level of PFT would decline more in the group with a lifetime history of suicidal behaviour and/or suicidal ideation than in a control group (without suicidal history), and hypothesis 3b, that this effect would be independent of depression and hypothesis 3c, that this effect would be independent of depression and suicide ideation.

Hypothesis 3a was partially supported. Mean scores of PFT between the pre- and post-negative mood induction decreased significantly in both groups, however, although this decline was more apparent in the participants with a history of suicidal thoughts and/or suicidal behaviours, the interaction was not significant (PFT difference 1.0 for those without suicidal history and 1.6 for those with suicidal history). As for hypothesis 3b, when depression was added as a covariate the time and suicide status interaction was significant. For hypothesis 3c, when both depression and suicide ideation were controlled, the interaction remained significant. To summarise, the results demonstrated that positive future thinking was influenced by a negative mood induction in individuals with and without a history of suicidal thoughts and/or suicidal behaviours and that the reduction in positive future thinking was most marked in those with a history of suicidal thoughts and/or suicidal behaviours when depression and suicide ideation were controlled.

Hypothesis 4a was fully supported as individuals with a history of suicidal thoughts and/or suicidal behaviours scored significantly more highly than those without past suicidal thoughts or suicidal behaviours on the measures of death-related mental imagery, depression, entrapment, and defeat that is compatible with the IMV model (O'Connor & Kirtley, 2018). The lifetime risk of suicide among patients who have untreated depressive disorder is about 20% (Golub & Hammen, 2002) while the suicide risk among treated patients is 141/100,000 (Isacsson *et al*., 2000). It is also well known that entrapment plays a key role in the pathways that lead to suicidal ideation over time and can even explain the development of suicidal ideation within a few hours (van Ballegooijen, Littlewood, Nielsen, Kapur, & Gooding, 2022). Additionally, as our findings also illustrated, it is well known that significant correlations exist between defeat, entrapment, and suicidal ideation (e.g., Turk, Yasdiman, & Kaya, 2024).

As for death-related mental imagery, individuals with mental images of suicide have more intense suicide ideation in comparison to individuals with no mental images of suicide (Ng *et al*., 2016) and have a greater preoccupation with mental images of suicide than with suicide-related verbal thoughts (Hales *et al*., 2011).

While interpreting our findings, a few limitations have to be borne in mind. It would be beneficial for future research to conduct a study assessing the effectiveness of a training or intervention aimed at improving positive future thinking ability in suicidal participants

divided into two groups (the intervention group versus controls). For instance, Walsh's (1993) study included an assessment of future time perspective (i.e., positive evaluative attitudes toward the future self in social, academic, family, and personal areas of life) in suicidal adolescents via a pretest-posttest-repeated measures design. Participants were divided into an experimental group receiving an Art Future-Image (AFI) intervention (n=21), aimed at increasing self-esteem, improving future time perspective, and decreasing depression, and an attention placebo group who did not receive the intervention (n=18). This study showed the effectiveness of the intervention as the experimental group had greater positive changes than the placebo group (Pre-intervention M=107.8 and M=113.8; post-intervention M=130.1 and M=133.5, respectively). Indeed, in another randomised controlled trial, Van Beek, Kerkhof, & Beekman (2009) developed a future-oriented group training for individuals with suicidal thoughts in which cognitive therapy, problem-solving therapy and future thinking stimulation were supplemented with weekly training sessions, a workbook, an audio CD, and a website. Therefore, the development of an intervention or training similar to those of Walsh (1993) and Van Beek *et al*. (2009) may be useful to increase positive future thinking capacity in individuals with suicidal experiences.

Based on the findings from our survey study in Chapter 3, it would also be useful to include an assessment of negative future fluency. Future research should include an assessment of the negative future thinking in addition to positive future thinking as well as the contents of future thoughts and the effect of time periods. In addition to this, a detailed investigation of the role of death-related mental imagery, which has been a neglected but important factor in suicide risk, could be beneficial while examining the prospective cognitions of individuals who have had suicidal experiences.

The sample size of this study was adequate but relatively small. Therefore, we should be careful about generalising from this data. The size of our sample prevented analyses of the content of positive future thoughts. Ideally, the findings of this study need to be replicated with a larger sample. There is also a need for further research that includes older people, adolescents, and children in the sample groups as our sample consisted of adults with a mean age of 28.42. Future research should also include the assessment or consideration of additional factors, such as self-esteem, problem-solving, hopelessness, social support and coping while investigating the relationship between the risk of suicide and future thinking. In addition to these, the FAS task (Lezak, 1995) may not be sufficiently sensitive to distinguish individuals with a history of suicide from those without any history of suicide.

In this experimental study, we focused on overall PFT rather than breaking it down by time periods because of the small sample size. As a result, we were unable to make clear comparisons in terms of time frames across both groups. Post-covid, it was challenging to recruit participants to laboratory-based research, and it was also difficult to recruit participants to both groups who met the inclusion criteria, especially within the constraints of a time-limited PhD. Therefore, further experimental research with larger samples is required to investigate the influence of different time frames on the relationship between positive future thinking and suicide risk. More specifically, it would be great to have three groups of participants (i.e., those with past suicide attempt history, those with past suicide ideation but without any suicide attempt history, and those without any history of suicide) to make clear group comparisons. We also just focused on PFT rather than NFT due to recruiting participants with a history of suicide (i.e., inviting participants who have had a history of suicidal attempts and/or suicidal thoughts to the lab).

In addition, the negative mood induction may also have led to an increase in the levels of rumination. Given that research has shown some evidence that inducing rumination may increase positive future thinking (Lavender & Watkins, 2004) it would be helpful to conduct an induction of rumination rather than inducing mood (O'Connor & Williams, 2014). Notwithstanding controlling for depression, it would be also beneficial to match the two groups concerning depressive symptoms, along with past suicide attempts and suicidal thoughts.

Finally, conducting the mood induction procedure in the laboratory can be thought of as a limitation and therefore future studies assessing mood that is induced by real-world events or situations may be more beneficial.

Despite its limitations, the current study has a number of implications. The findings yield support for the Integrated Motivational-Volitional model of suicidal behaviour (O'Connor & Kirtley, 2018) and the literature investigating the relationship between future thinking and suicide risk experimentally.

Additionally, it directly tested the relationships between variables (e.g., death-related mental imagery, entrapment, defeat, and depression) that are postulated to have an important role in the development and course of the suicidal process (Taylor, Gooding, Wood, & Tarrier, 2011; O'Connor, Smyth, Ferguson, Ryan, & Williams, 2013). However, future research

should directly examine the relationship between these variables in individuals with suicidal ideation and/or suicide attempt that resulted in admission to hospital or in clinical populations to find out whether the findings are generalisable. In addition, the assessment of the extent to which these variables interacted to predict suicide risk (i.e., suicidal behaviours and suicide ideation) over time is warranted.

Nonetheless, inducing mood in the laboratory was an advantage that allowed us to potentially detect subtle alterations that can be more reliably attributed to fluctuations in mood and may not be owing to changes in life events or circumstances.

Finally, this was the first study that included a comparison of individuals with a history of suicidal thoughts and/or suicidal behaviours and without any suicidal thoughts or suicidal behaviours in terms of positive future thinking using an experimental mood induction procedure. Nonetheless, future experimental work is still needed to further disentangle the nature of the association between positive future thinking and suicide risk.

To conclude, participants who reported suicidal thoughts and/or suicidal behaviours exhibited a dearth of positive future thinking compared to participants without any history of suicidal thoughts or suicidal behaviours for both pre- and post-negative mood induction procedures. Positive future thinking was affected by minor mood fluctuations and participants with a history of suicidal thoughts and/or suicidal behaviours show more pronounced deteriorations in positive future fluency following negative mood induction than those without a history of suicidal thoughts or suicidal behaviours. Participants with a history of suicidal thoughts and/or suicidal behaviours also reported higher scores on the measures of depression, entrapment, defeat, and death-related mental imagery compared to those without a history of suicidal thoughts or suicidal behaviours.

Chapter 5: General Discussion

This section starts by summarising the main findings of the thesis in the context of the research questions. Second, a critical assessment of the studies conducted here is provided, as well as presentation of the theoretical and methodological implications of the findings, and the implications for clinical practice and policymaking. Third, future research directions, personal reflections on the PhD experience, and the impact of the pandemic on the present research are discussed. The chapter ends with evaluations regarding the limitations and strengths of the studies presented within the scope of this thesis.

5.1 A summary of Findings

First, we conducted a systematic review study on the relationship between future thinking and suicide risk (i.e., suicidal thoughts and/or suicidal behaviours) as there was no systematic review on this topic in the literature.

Our systematic review study (Chapter 2) showed that cross-sectional studies of future thinking and suicide risk present sufficient evidence that suicidal individuals tend to have a lack of positive future thinking in the absence of any increase in negative future thinking (e.g., MacLeod, Rose, & Williams, 1993; MacLeod, Pankhania, & Mitchell, 1997; Hunter & O'Connor, 2003; MacLeod & Conway, 2007). With regard to cross-sectional studies examining different aspects of future thinking, such studies generally show that suicidal individuals estimate future negative events to be more likely to occur to them while estimating positive future events to be less likely to happen to them compared to non-suicidal individuals (e.g., MacLeod & Tarbuck, 1994; Sargalska, Miranda, & Marroquín, 2011; Marroquín, Nolen-Hoeksema, & Miranda, 2013).

In the follow-up studies of future thinking and suicide risk that were included in our systematic review, there was some evidence supporting the predictive utility of positive future thinking on suicide risk over time (O'Connor, Smyth, & Williams, 2015; Pollak, Guzmán, Shin, & Cha, 2021; O'Connor, Fraser, Whyte, MacHale, & Masterson, 2008). Nonetheless, at the same time, we see that not all types of positive future thinking (PFT) are protective over time and even some contents/types might be a risk factor (e.g., intrapersonal positive future thinking) (e.g., Pollak, Guzmán, Shin, & Cha, 2021; O'Connor, Smyth, & Williams, 2015).

Very few experimental studies investigating the relationship between different aspects of future thinking and suicide risk were included in the systematic review (i.e., Walsh, 1993; Williams *et al*., 2007; Hales, Deeprose, Goodwin, & Holmes, 2011). In one of these three studies, participants' PFT and NFT mean scores dropped significantly after a negative mood induction procedure and suicidality was associated with higher decreases in PFT between pre- and post-mood induction, and lower PFT following negative mood induction (William *et al*., 2007). In addition to this, another experimental study carried out by Walsh (1993) showed the effectiveness of an intervention designed to improve future thinking perspective (i.e., positive attitudes towards the future self) in suicidal adolescents. The third experimental study demonstrated the importance of mental imagery of suicide, which is a neglected feature of suicide ideation, especially in bipolar disorder (Hales *et al*., 2011).

The systematic review showed that there is limited research on the investigation of the effect of time periods and content of future thoughts on the relationship between future thinking and suicide. As a result, we carried out a comprehensive survey study on the relationship between different aspects of future thinking in terms of valence (positive and negative), time periods (next week, next year, and next 5-10 years), contents (interpersonal/social, intrapersonal, achievement, leisure/pleasure, financial/home, health of others, and other), repetitive future thinking, and considerations of future consequences and suicide risk along with the investigation of suicide risk factors (e.g., depression, defeat, and entrapment) in adults with and without a history of suicidal thoughts and/or suicidal behaviours.

The first aim of the survey study (Chapter 3) was to examine the relationship between future thinking and suicide risk in the context of existing risk factors. To this end, we proposed that participants in the suicidal history group (with past suicidal thoughts and/or suicidal behaviours) would present fewer Positive Future Thoughts (PFT) compared to participants with no history of suicidal thoughts or suicidal behaviours, but that there would be no group differences in Negative Future Thinking (NFT). Surprisingly, results showed that although participants within the suicidal history group had fewer positive future thoughts than participants without any history of suicidal thoughts or suicidal behaviours, this difference was not significant. In addition to this, contrary to our postulation about NFT, participants with a history of suicidal thoughts and/or suicidal behaviours generated significantly more negative future thoughts in comparison with participants without a history of suicidal thoughts or suicidal behaviours.

Second, we aimed to ascertain the relationship between different types of future thinking concerning valence (i.e., PFT and NFT), content (e.g., financial/home, leisure/pleasure, and health of others), time frames (i.e., next week, next year, and next 5-10 years) and suicide risk. Therefore, we expected that participants with a history of suicidal thoughts and/or suicidal behaviours would have higher scores in intrapersonal PFT and lower scores for remaining PFT contents (i.e., interpersonal/social, achievement, leisure/pleasure, health of others, financial/home, and other) in comparison to those without any history of suicidal thoughts or suicidal behaviours. In addition, we hypothesised that there would be no difference in different contents of NFT across groups, and different time periods would not be differentially associated with the two groups' suicidal history status. Participants with a suicidal history had slightly more intrapersonal PFT and fewer achievement PFT than participants without any suicide history although this group differences were not statistically significant. They had slightly higher, but not significantly different scores on interpersonal/social, leisure/pleasure, and financial/home PFTs than ones without any history of suicidal thoughts or suicidal behaviours when the two groups scored equally on the health of others and other PFT types/contents.

Concerning the contents of negative future thoughts, there were no significant group differences in achievement, leisure/pleasure, and health of others NFT types/contents whereas participants with a history of suicidal thoughts and/or suicidal behaviours had significantly more interpersonal/social, intrapersonal and financial/home NFT contents than participants without any history of suicidal thoughts or suicidal behaviours. Additionally, participants without any history of suicidal thoughts or suicidal behaviours had significantly higher scores on the other NFT category than those with a history of suicidal thoughts and/or suicidal behaviours. As for the time periods, there were no significant group differences in terms of next week, next year, and next 5-10 years PFTs; however, next week, next year, and next 5-10 years NFTs were significant predictors of suicide risk, and the most important time period was the next 5-10 years NFT according to the results of a multivariate analysis, including all three NFT time periods.

Third, we aimed to test the influence of positive future thinking independent of depression to predict suicide risk (having versus not having a history of suicidal behaviours and/or suicidal thoughts). To investigate this, we hypothesised that lower levels of PFT would be associated with suicide risk independent of depression and PFT would operate as a motivational

moderator in the relationship between entrapment or defeat and suicide ideation, and entrapment would mediate the relationship between defeat and suicide ideation. Results showed that depression was uniquely significantly associated with suicide ideation; nonetheless, PFT was not significantly associated with suicide ideation, and it did not moderate the effect of entrapment on suicide ideation in contrast to the cry of pain model (Williams, 1997; Williams & Pollock, 2000, 2001) and the Integrated Motivational-Volitional (IMV) model (O'Connor, 2011; O'Connor & Kirtley, 2018) proposing the moderating effect of positive future thinking (a rescue factor) on the relationship between entrapment and suicide risk. Additionally, as expected, entrapment mediated the association between defeat and suicide ideation in line with the cry of pain model (Williams, 1997; Williams & Pollock, 2000, 2001) and the IMV model (O'Connor, 2011; O'Connor & Kirtley, 2018).

Fourth, we investigated which measure of future thinking would be the strongest predictor of suicide risk. Results indicated that the strongest measure of future thinking to predict suicide ideation was the Future-oriented Repetitive Thought Scale (FoRT; Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017).

Fifth, we intended to explore to what extent other measures of future thinking (i.e., future-oriented repetitive thinking and the considerations of future consequences) moderate the relationship between entrapment and suicide ideation. Results demonstrated that future-oriented repetitive thinking and its subtypes of repetitive thinking about future goals and positive indulging about the future, and the Considerations of Future Consequences-Future (CFC-Future) subtype each moderated the effect of internal entrapment on suicide ideation. In addition to this, repetitive thinking about future goals, positive indulging about the future, and CFC-Future each moderated the association between external entrapment and suicide ideation.

The systematic review study has demonstrated that further investigation is required using experimental research designs to better understand the relationship between positive future thinking and suicide risk. It would also be beneficial to conduct the standard future thinking task (Macleod *et al*., 1993) in person as we performed an online adapted version of the standard future thinking task due to the impossibility of face-to-face interviews which may account for some of the contradictory findings.

In the experimental study (Chapter 4), first, we wanted to see whether there would be any differences across groups (i.e., suicidal history versus not suicidal history) in terms of cognitive performance or verbal fluency. We expected that there would be no differences between groups on verbal fluency. Results showed that no significant differences between groups in terms of verbal fluency or cognitive performance exist.

Second, we examined to what extent PFT (Positive Future Thinking) distinguishes between adults with past suicidal thoughts and/or suicidal behaviours and adults without a history of suicide attempts or suicidal thoughts pre- and post-negative mood induction. Here, we hypothesised that people with a history of suicidal thoughts and/or suicidal behaviours would have reduced positive future thinking compared to those without a history of suicidal thoughts or suicidal behaviour. Results indicated that positive future thinking distinguished between adults with and without a history of suicide attempts and/or suicidal thoughts both in the pre- and post-negative mood induction because participants without a history of suicidal thoughts or suicidal behaviours had significantly more positive future thoughts than participants with a history of suicidal thoughts and/or suicidal behaviours.

Third, we aimed to investigate whether positive future thinking is impacted by a negative mood induction in individuals with and without a history of suicidal thoughts and/or suicidal behaviours and whether any differences hold after controlling for depression and suicidal ideation. To explore this, we hypothesised that after a negative mood induction, the level of PFT would decrease more in the group with a lifetime history of suicidal thoughts and/or suicidal behaviours than in a control group (without a history of suicidal thoughts or suicidal behaviours) and that this effect would be independent of depression and suicide ideation. PFT from pre- to post-negative mood induction dropped significantly in both groups, however, even though this decrease was more marked in the participants with a history of suicidal thoughts and/or suicidal behaviours, the interaction was not significant. However, when depression was added as a covariate, the interaction between time and suicide status was significant and when both depression and suicide ideation were controlled, the interaction remained significant. As predicted, therefore, these findings suggest that when baseline depressive symptoms and suicidal ideation are accounted for, that the reduction in positive future thinking is significant and more marked in those with a history of suicidal thoughts and/or suicidal behaviours.

Lastly, we aimed to examine the characteristics of participants with a lifetime history of suicidal thoughts and/or suicidal behaviours. Here, we anticipated that individuals with a history of suicidal thoughts and/or suicidal behaviours would have significantly higher scores than controls (without a history of suicidal thoughts or suicidal behaviours) on the measures of death-related mental imagery, depression, entrapment, and defeat which are key risk factors for suicide. Indeed, as predicted, individuals with a history of suicide ideation and/or suicidal behaviours scored significantly more highly than those without past suicidal thoughts or suicidal behaviours on these measures.

5.2 The Critical Assessment and Implications of the Overall Findings

The systematic review study reminded us of the clinical implications of the research literature on the relationship between future thinking and suicide risk. It highlighted the protective role of having things to look forward to (i.e., PFT) in people who are vulnerable to suicide. Hence, interventions or treatments for individuals with suicidal experiences ought to focus on elevating the levels of positive future thinking, directing suicidal individuals' focus on the present. It would also be beneficial to direct their focus on possible resources to increase the potential realisation of such positive anticipations and drawing suicidal individuals' attention to the possible positive effect they will experience if such positive expectancies are realised.

NFT predicted two group suicide status, but PFT did not in our survey study. Although participants with a history of suicidal thoughts and/or suicidal behaviours reported slightly fewer PFT than participants without a history of suicidal thoughts or suicidal behaviours, this difference was not significant. These findings were contrary to the general findings in the literature, which indicate that suicidal individuals have a lack of positive future thinking in the absence of any increased negative future thinking (e.g., Macleod, Rose, & Williams, 1993; MacLeod, Pankhania, Lee, & Mitchell, 1997; Hunter & O'Connor, 2003). However, to our knowledge, there was one study, conducted by O'Connor, Connery, and Cheyne (2000), which found no significant differences between suicidal individuals and non-suicidal individuals in terms of PFT, although the predicted trend was evident. This lack of a finding may be related to the method of delivery of the future thinking task which we modified so that it could be administered online. Future research should, therefore, investigate the validity of administering the future thinking task online. In addition, this might be related to our sample, as 66% of participants had a history of mental disorder diagnosis, mostly of anxiety and/or

depression. In the literature, decreased positive future thoughts have been shown to be related to depression, with increased negative future thoughts being linked to both anxiety and depression whereas reduced positive future thoughts have been implicated specifically in those with a history of suicidal thoughts and behaviours (Conaghan & Davidson, 2002; MacLeod *et al.*, 1998; MacLeod, Pankhani, Lee, & Mitchell, 1997; Bjarehed, Sarkohi, & Andersson, 2010).

As for NFT, in MacLeod and Tarbuck's (1994) study, suicidal individuals assessed negative events as being more likely to happen to themselves compared to ones without suicidal experiences and in another study, depressed suicidal individuals had increased negative future thinking for the immediate future compared to non-depressed suicidal individuals and matched controls (MacLeod, Pankhania, Lee, & Mitchell, 1997). In line with our findings, another study also showed that the number of negative events showed a relationship with suicidal individuals' hopelessness but only after controlling for the value, likelihood, and number of future positive events (MacLeod, Tata, Tyrer, Schmidt, Davidson, & Thompson, 2005). However, these contradictory findings about negative future thinking in individuals with a history of suicidal thoughts and/or suicidal behaviours need to be explored in future research and if they are robust, they have implications for existing theories of suicide.

According to hopelessness theory, both increased levels of stable and unchangeable negative future anticipations and reduced positive future anticipations (hopelessness) have been linked to suicide ideation (e.g., Rosario-Williams, Rombola, & Miranda, 2021). In our survey study, participants with a history of suicidal thoughts and/or suicidal behaviours reported significantly more negative future thoughts and less positive future thoughts than participants without a history of suicidal thoughts or suicidal behaviours although we have no information on how stable or unchangeable negative future thoughts they generated are.

Very few previous studies have investigated the contents of future thoughts in relation to suicide risk. Furthermore, no cross-sectional studies have looked at the contents of positive and negative future thoughts and suicide risk relationships in the literature. However, O'Connor, Smyth, and Williams' (2015) longitudinal study showed that intrapersonal PFT predicts suicidal behaviour over time. We wanted to explore whether individuals with a lifetime history of suicidal thoughts and/or suicidal behaviours would show higher levels of intrapersonal PFT than those without a history of suicidal thoughts or suicidal behaviours

cross-sectionally. Participants with a suicidal history had slightly more intrapersonal, fewer achievement, slightly higher interpersonal/social, leisure/pleasure, and financial/home; and equal health of others and other positive future thinking scores compared to those without suicide history although none of these differences were significant.

As for NFT, there were no significant group differences in terms of achievement, leisure/pleasure, and health of others NFT contents. However, those with a suicidal history had significantly more interpersonal/social, intrapersonal, and financial/home, and lower scores on other NFT contents than those without a suicidal history. There was no previous study in the literature that investigated whether the relationship between negative future thinking and suicide changes as a function of the contents of negative future thoughts in suicidal individuals. Therefore, interventions should target the intrapersonal negative future thoughts as in our survey study, it predicted suicide risk. A closer inspection of the other negative future thoughts category/content was revealing. Participants in the non-suicidal history group had significantly more responses under the other NFT category than participants with a suicide history. We categorised responses related to climate change, disasters, and moral, economic, or political upheavals under the other type/content of NFT. Hence, suicidal individuals may be less worried about environmental and societal problems due to having more interpersonal, intrapersonal, and financial/home negative future thoughts that are more personal worries.

Additionally, in terms of positive future thoughts for health of others (other-related future thinking), no significant group differences were found in our survey study. This is in line with the results of Macleod and Conway (2007) study in which no difference was found in terms of other-related positive future thinking ability between two groups (i.e., suicidal versus non-suicidal individuals). We also found no significant difference in terms of achievement and leisure/pleasure related future positive and negative thoughts. Lockdowns or other restrictions associated with the pandemic may have had an impact on leisure/pleasure related future thoughts of participants in our study. For the thinking about achievement related future, the participants of our survey study consisted of highly educated individuals as approximately 63% of participants had a bachelor's degree or higher and about 21% had a high-school degree that might have affected the results.

As for time periods, the distant negative future thoughts (next 5-10 years) were the most important time frame to predict suicide risk. This finding is difficult to explain but it might be due to the emotional value of distant negative future thoughts for our survey study participants. Or it may reflect some changes following Covid-19 or the cost-of-living crisis, that people are more concerned about the distant term future because of all of the uncertainties and challenges that we have been through in recent years.

In predicting suicide ideation, the Future-oriented Repetitive Thought Scale (FoRT; Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017) was stronger than the online adapted version of the standard Future Thinking Task (Macleod *et al.*, 1993) and the Consideration of Future Consequences Scale (CFC; Strathman, Gleicher, Boninger, & Edwards, 1994) in our survey study. Therefore, repeatedly thinking about the likelihood of future events may be more pernicious than having a lack of positive future thoughts or the amount of time spent thinking about and being affected by distant consequences of the current behaviours for suicidal individuals. In terms of clinical implications, it may be useful to focus on repeatedly thinking about the likelihood of future events as a clinical target.

Previous cross-sectional studies have often focused on data from hospital records as most earlier research has recruited from those admitted to hospitals with suicidal behaviours. However, our recruitment strategy was different as we recruited individuals with and without a history of suicidal thoughts and/or suicidal behaviours from the community. This may explain, in part, the contradictory findings of our survey study compared to the extant literature.

The experimental study included comparing individuals with a history of suicidal ideation and/or suicidal behaviour and those without a history of suicidal ideation or suicidal behaviour in terms of their positive future thinking capacity using an experimental mood induction procedure. In addition, it included a direct investigation of the relationships between variables that are postulated to have key roles in the development and course of suicide risk, such as death-related mental imagery, entrapment, defeat, and depression. Consistent with the systematic review findings, in the experimental study, participants' mean scores on PFT diminished significantly after the negative mood induction procedure and suicidality was associated with higher decreases in PFT from pre- to post-mood induction and lower PFT following negative mood induction. In our study, PFT was affected by a negative mood

induction in individuals with and without a suicidal ideation and/or suicidal behaviours history and the decline in PFT was most marked in those with a history of suicidal thoughts and/or suicidal behaviours when depressive symptoms and suicide ideation were controlled. Consistent with the IMV model, participants with a history of suicidal thoughts and/or suicidal behaviour also had significantly higher scores than those without a lifetime history of suicidal thoughts or suicidal behaviours on the measures of death-related mental imagery, depression, entrapment, and defeat.

There were no significant differences between groups in terms of verbal fluency or cognitive performance, meaning that any results in the experimental study cannot simply be accounted for by the individuals with a history of suicidal thoughts and/or suicidal behaviours being less cognitively fluent.

All of these findings indicate that individuals with a lifetime history of suicidal thoughts and/or suicidal behaviours are impaired in PFT, and this deficit may get worse following even minor mood swings, and they have higher feelings of defeat and entrapment and higher levels of depression and death-related mental imagery than those who do not have a lifetime history of suicidal thoughts or suicidal behaviours. Clinically, these findings help to explain how even minor fluctuations in mood in people who have a suicidal history can increase suicide risk further by reducing their positive future thoughts. They are also consistent with previous research by Cha and colleagues (2018) which showed that people with a suicidal history's wish to live gets weaker following a negative mood induction.

5.3 Future Research

In this section, we propose possible avenues for future research to further address questions that remain unanswered and to improve future studies.

Building on the work reported herein, there is sufficient evidence to merit conducting a systematic review of the relationship between death-related mental imagery and suicide risk (i.e., a history of suicidal thoughts and/or suicidal behaviours), or indeed, implementation intentions (Gollwitzer, 1999) and suicide risk might be useful in future research direction. Although we did not focus on implementation intentions in this study, as they are 'if-then'

plans for the future, it would be of interest to explore how they relate to the different indices of future thinking and suicide risk.

Future studies should also involve an assessment of the likelihood and value of future thoughts and an assessment of verbal fluency in addition to investigating the number and content of future thoughts and the effect of time periods. There is also a need for a more detailed investigation of the Considerations of Future Consequences-Future (e.g., 'I am willing to sacrifice my immediate happiness or well-being to achieve future outcomes' and 'When I make a decision, I think about how it might affect me in the future.') and repetitive future-oriented thinking in suicidal individuals, while assessing the four worry features (frequency, duration, controllability, and content) and negative affect as covariates.

We had no specific hypothesis about the variations in the contents of negative future thoughts across two groups because there were no previous studies in this respect. However, in our survey study, in relation to the content of future negative thoughts, those with previous suicidal ideation and/or suicidal behaviours generated more negative interpersonal/social future events including at least one other person (e.g., family and friends), such as divorce and break-up than ones without a history of suicidal thoughts or suicidal behaviours. Across our studies, we did not collect any information as to why participants have had suicidal thoughts and/or suicidal behaviours. Hence, it might be useful to have information about the reasons behind suicidal attempts and/or suicidal thoughts of participants in future studies. For example, further investigations through qualitative studies may be useful to explore the interpersonal stressors (such as divorce and relationship break-up) in individuals with a history of suicidal ideation and/or suicidal behaviours. Moreover, such findings have clinical implications for the treatment of people with a past suicidal thoughts and/or suicidal behaviours. Enhancing interpersonal skills and coping strategies for future potential negative social/interpersonal events ought to be treatment targets.

Also, in terms of the content of future thoughts reported by individuals with a history of suicidal thoughts and/or suicidal behaviours, additional investigations using longitudinal designs might be useful to detect how achievable or realistic the future thoughts generated by participants are. A good example of this was a prospective study conducted by Pollak, Guzmán, Shin, and Cha (2021) but such a design was not possible for us to conduct due to the time-limited nature of a PhD. Indeed, in line with the cry of pain model (Williams, 1997;

Williams & Pollock, 2000, 2001), lower than expected performance may lead a person who is sensitive to feelings of defeat to feel defeated and trapped, thereby triggering the pathway to suicide ideation. In addition to this, how stable and unchangeable negative future thoughts generated by participants within the context of hopelessness theory (Abramson *et al*., 1989) or certainty on event predictions might also be tested using a longitudinal design in future studies.

Further work is clearly needed to replicate our survey study in the post-Covid period as the data were gathered throughout the pandemic. There might be an effect of the Covid-19 period on the results of this study, particularly on the contents of future thoughts, and increased negative future thoughts of individuals with a history of suicidal thoughts and/or suicidal behaviours. In addition, how our adapted online version of the future thinking task compares to the gold standard face-to-face method needs to be established.

Additionally, our survey study sample consisted of a well-educated group of people with about 63% having a bachelor's degree or higher and about 21% having a high-school degree and thus, we need to be careful while generalising the findings of this study to the general population. The implication here may be that we need further investigation of the relationship between future thinking and suicide in other population groups. For instance, there is a need for future research to replicate this study in individuals with a wider range of educational levels. Then, in such samples, differences across the two groups (i.e., suicidal history versus non-suicidal history) might be found, particularly related to the achievement type/content of future thoughts which mostly referred to school/university-related failures or successes. As we recruited participants with and without a history of suicidal behaviours and/or suicidal thoughts from the community, the findings need to be examined in clinical samples as well.

There are a number of other research recommendations. First, future experimental research should also involve designing an intervention that aims to improve positive future thinking abilities and testing its effectiveness in non-clinical and clinical samples of suicidal participants. If shown to be efficacious, such an intervention could be integrated into the treatment of suicidal patients. Herein, a randomised controlled trial (van Beek, Kerkhof, & Beekman, 2009), for example, developed a future-oriented group training for people with suicidal thoughts in which cognitive therapy, problem-solving therapy and future thinking stimulation were involved using weekly training sessions, a workbook with an audio CD, and

a website. Hence, the development of such an intervention to improve positive future thinking capacity and testing its effectiveness on individuals with suicidal experiences seems to be a fruitful research direction.

Second, future experimental research should also involve an assessment of the negative future thinking and positive future thinking tasks together with the contents of future thoughts and the effect of time periods. In addition to this, a detailed investigation of the role of death-related mental imagery in the relationship between future thinking and suicide risk is needed. There is also a requirement for further experimental research in different age groups (e.g., older people, adolescents, and children) and other diverse populations in terms of ethnicity. The findings of our experimental study ought to be replicated in a larger sample with equal numbers of male and female participants that will allow researchers to make clear gender comparisons as to the functions of future thoughts' content and different time frames in the relationship between positive future thinking and suicide risk. Other gender identities should also be explored.

Third, future research should also include the assessment or consideration of additional factors, such as self-esteem, self-blame, self-awareness, problem-solving, hopelessness, social support, worry features, positive or negative affect forecasts, and coping while investigating the relationship between the risk of suicide and future thinking. In addition to these, the FAS (Lezak, 1995) may not be sufficiently sensitive to distinguish individuals with a history of suicide from those without any history of suicide. Therefore, using more difficult tasks assessing cognitive performance or verbal fluency might be better to compare individuals with and without suicidal thoughts and/or suicidal behaviours in this respect. In doing so, we can explore whether the lack of difference between suicidal and non-suicidal history groups in terms of cognitive performance is due to the ease of the FAS task (Lezak, 1995).

In addition, in the months following Covid, it was more difficult to find participants for laboratory-based research in general as well as the difficulty in recruiting participants specifically to meet our inclusion criteria, particularly within the constraints of a time-limited PhD. Therefore, further experimental research with larger samples is also required to investigate the influence of different time frames on the relationship between positive future thinking and a history of suicidal thoughts and/or suicidal behaviours.

Above all, it would be great to have three groups of participants (i.e., those with past suicide attempt(s), ones with past suicide ideation without any suicide attempt history, and those without any history of suicide) to make clear group comparisons. We used only two groups of participants because we could not recruit a sufficient number of participants in all three groups. Additionally, previous research generally gathered data from suicidal individuals shortly after a suicidal act or their admission to hospitals with suicidal behaviours. We also just focused on PFT rather than NFT due to recruiting participants with a history of suicide (i.e., inviting participants who have had a history of suicidal attempts and/or suicidal thoughts to the lab). Therefore, future research comparing three groups of participants (suicide attempt history, suicide ideation history, and non-suicidal history groups) is warranted to make clearer comparisons in terms of future thinking.

It is also important to note that the negative mood induction can also result in a rise in the levels of rumination. Considering this, research has displayed some evidence that inducing rumination can elevate positive future thinking (Lavender & Watkins, 2004). Thus, it would be beneficial for future research to perform an induction of rumination rather than inducing negative mood (O'Connor & Williams, 2014). In the future, besides controlling for depression, it would also be useful to match the two groups concerning depressive symptoms, along with the number of past suicide attempts and suicidal thoughts.

Finally, future experimental research ought to consider directly investigating the relationship between death-related mental imagery, entrapment, defeat, and depression in clinical populations to explore whether the findings of this study are generalisable. Additionally, there is a need for future longitudinal research to assess the extent to which these variables interacted to predict suicide risk (i.e., suicidal behaviours and suicide ideation).

5.4 Reflexivity

Conducting a systematic review study helped me to develop a more in-depth understanding of the existing literature, including theories, and models. It also helped me to appreciate how future thinking fits with the existing research literature, as well as to learn how to compare different studies in terms of their quality and to identify research gaps. A challenge I had with the systematic review was recognising that future thinking-related keywords are quite general (e.g., future foresee*, future forecast*, future event* and future thought) and the searches with these keywords, while trying to find the studies investigating future thinking and suicide

relationship, yielded a substantial number of potential studies for inclusion. This was quite overwhelming at first, but it allowed me the opportunity to learn about different but related topics, such as suicidal flashforwards and death-related mental imagery, the latter of which I examined in studies I conducted.

Another challenge I had related to the survey study. Carrying out the survey study on Gorilla Experiment Builder was complicated, mainly due to the limitations of the platform. However, on the plus side, I have now learned how to create and conduct cognitive tasks and experiments on this platform. An achievement was that this was also the first time that the standard future thinking task was administered online.

Although it was rewarding working with participants face to face, conducting the experimental study was very labour intensive. It involved conducting a lot of screening calls and post-Covid, as noted above, it was more difficult to recruit participants for laboratory-based research. It was also challenging to recruit participants to both groups who met the inclusion criteria, especially within the constraints of a time-limited PhD. If I had more time, I would like to conduct a longitudinal study rather than a cross-sectional survey study to see how achievable or realistic the future thoughts participants generated are and to see its impact on future possible suicide ideation and/or suicidal behaviours. It would also be great to carry out a randomised controlled trial using the future oriented group training protocol (van Beek, Kerkhof, & Beekman, 2009) in individuals with and without a history of suicide ideation and/or suicidal behaviours.

Above all, in spite of all the obstacles, conducting a systematic review for the first time on the relationship between thinking about the future and the risk of suicide was rewarding. As was conducting one of the most comprehensive cross-sectional studies by adapting and implementing the standard future thinking task online, allowing us to reach out a wider sample of participants during the pandemic. I also enjoyed the challenge of carrying out an experimental study in light of the scarcity of experimental research in this field.

5.5 Covid-19

The PhD was impacted considerably by Covid-19. During the pandemic, we focused on the systematic review and survey studies as they were possible to be conducted throughout the lockdowns and they were the best methods to follow due to restrictions in face-to-face meetings. We had to be agile in our plan for the PhD programme of research. For example, adapting the standard future thinking task to be administered online allowed us to use this task in our survey study throughout the pandemic as the original task is usually conducted via individual face-to-face interviews. We included a measure of the perceived impact of the Covid-19 on mental health in our survey study as participants completed that study during the pandemic even though we did not include any analyses including Covid-19 related data. However, there were no significant differences between the two groups (suicidal history versus non-suicidal history) mean scores on a measure of the effect of Covid-19 on their mental health and future plans. As noted above, although we conducted our experimental study after the pandemic, the recruitment process was quite slow due to potential participants' reluctance to have a lab visit.

5.6 Limitations

There are a few limitations or shortcomings which may affect the interpretation of our research results or conclusions drawn from the research that should be borne in mind and addressed here.

The IMV model has highlighted that there are key factors that differentiate between those who experience suicidal thoughts and suicidal behaviours and those who do not. However, positive future thinking did not have a significant differentiating role between participants with and without a history of suicidal thought and/or suicidal behaviours in our survey study.

Additionally, these studies were tested only within the context of the IMV model. In the future, it would be helpful to explore the role of future thinking in suicidality within the context of different theoretical frameworks.

Another limitation is that given the cross-sectional nature of the survey study, cause and effect between variables could not be established. As is common with convenience sampling, most

participants in this thesis were young adults, therefore, these findings may not be generalisable to other age groups. Most of the participants were from white backgrounds and female.

In addition to these, since our survey study was performed online by Gorilla Experiment Builder, the findings may not be comparable with findings collected using in-person interviews to conduct future thinking tasks. As noted earlier, future research needs to establish the validity of conducting the standard future thinking task online, as the mode of delivery may have affected the findings. However, during the pandemic and lockdowns, conducting the standard future thinking task using face-to-face interviews was not possible and adapting it online allowed us to collect data about participants' positive and negative future thoughts during the Covid-19 pandemic.

The sample size of the experimental study was relatively small, and thus, we should be cautious when generalising the findings given the limited statistical power. The modest size of our sample prevented conducting detailed investigations and analyses of the contents of positive future thoughts. Ideally, the findings of this study need to be replicated with a larger sample as the larger the sample, the greater our ability to detect smaller effects. The studies in this thesis were all carried out in the English language and advertised on websites based in the United Kingdom (UK). Therefore, the findings across survey and experimental studies may not be generalisable to populations living outside of the UK.

Sixty-six per cent of our survey study participants reported a history of a psychiatric diagnosis, mostly of anxiety and/or depression. Therefore, our results may not be generalisable to the general population. This may also obscure our ability to detect the differences between individuals with and without a history of suicidal ideation and/or suicidal behaviours in terms of how they think about their own future.

Within the experimental study, we focused on overall PFT rather than breaking it down by time periods owing to the small sample size, which prevented us from making clear comparisons regarding time periods across the two groups. Additionally, conducting the mood induction procedure in a laboratory setting may be considered a limitation, and thus future studies assessing mood that is induced by real-world events or circumstances may be more beneficial.

Another limitation was the lack of previous research studies and theoretical research foundations for some of the research questions. Specifically, related to the relationship between positive and negative future thinking and suicidal history, as it was unclear the extent to which the latter are affected by the contents of future thoughts. Additionally, prior research studies that are relevant to the effect of time periods on the relationship between thinking about the future and the risk of suicide is limited. Therefore, further developments in terms of research and theories are needed regarding the influence of time periods and the content of future thoughts on the relationship between future thinking and suicide.

5.7 Strengths

Despite their limitations, our research studies had several strengths. The findings of the survey study may support the early identification of high-risk individuals and promote the implementation of suicide prevention strategies in the community. As a theoretical implication, the findings highlight the importance of considering the contents of negative future thoughts in individuals with previous suicidal ideation and/or suicidal behaviours, particularly during stressful life events (i.e., Covid-19). Additionally, this study revealed that the standard future thinking task may be employed online. By adapting the future thinking task to be administered online, we had the opportunity to collect data during the pandemic on a large sample.

Our experimental study was the first study that included a comparison of individuals with a history of suicidal ideation and/or suicidal behaviours to those without a history of suicidal thoughts or suicidal behaviours in terms of positive future thinking using an experimental mood induction procedure. The findings of the experimental study also yielded further support for the Integrated Motivational-Volitional model of suicidal behaviour (O'Connor & Kirtley, 2018) and the literature exploring the relationship between future thinking and suicide risk experimentally.

In addition to this, it directly investigated the relationships between variables (e.g., death-related mental imagery, entrapment, defeat, and depression) that are proposed to have important roles in the development and course of suicide risk (Taylor, Gooding, Wood, & Tarrier, 2011; O'Connor, Smyth, Ferguson, Ryan, & Williams, 2013). Inducing mood in the laboratory setting may also be thought of as advantage allowing the possibility of uncovering

subtle alterations that may be more reliably attributed to undulations in mood and may not be due to variations in real life events or situations.

We used reliable and valid measures of future thinking and suicide history across two empirical studies and in our survey study, a member of the SBRL (Suicidal Behaviour Research Laboratory) team, independently rated 20% of the participants' responses for the inter-reliability check in terms of the categorisations of future thoughts' content. We also controlled for some variables (i.e., baseline suicide ideation and depression) in our experimental study while investigating the relationship between positive future thinking and suicide risk (i.e., having versus not having a history of suicidal thoughts and/or suicidal behaviours).

5.8 Conclusion

In conclusion, the synthesis of the cross-sectional studies in our systematic review indicated that a lack of positive future thinking rather than elevated levels of negative future thinking is implicated in the suicidal process. Additionally, follow-up studies yielded some evidence indicating the predictive utility of positive future thinking on future suicidal behaviours even though there was a little evidence to suggest that not all contents of positive future thinking (i.e., higher levels of intrapersonal positive future thinking) are protective.

As for the survey study, participants with suicide ideation and/or suicidal behaviours produced fewer, but not statistically significant, numbers of positive future thoughts than participants without any suicidal history. Surprisingly, they reported significantly more negative future thoughts (i.e., interpersonal/social NFT, intrapersonal NFT, and financial/home NFT) compared to participants without suicidal history although there were no significant group differences for achievement, leisure/pleasure, other, and health of others NFT contents. As for the different time periods, there were no significant group differences for PFT. However, NFTs – over the next week, next year, and next 5-10 years – were significant predictors of suicidal history, and the most important time frame was the next 5-10 years. The Future-oriented Repetitive Thought Scale (Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017) was the strongest measure of future thinking to predict suicide ideation.

In relation to the experimental study, participants without any history of suicidal thoughts or suicidal behaviours generated significantly more positive future thoughts (PFT) in comparison to participants with a lifetime history of suicidal thoughts and/or suicidal behaviours. Mean scores for PFT from pre- to post-negative mood induction declined significantly in both groups, however, this decrease was most marked in the participants with a history of suicidal thoughts and/or suicidal behaviours, but only significant when depression and/or suicide ideation were controlled. Additionally, individuals with a history of suicidal thoughts and/or suicidal behaviours reported significantly higher levels of death-related mental imagery, depression, entrapment, and defeat compared to participants without a history of suicidal thoughts and suicidal behaviours.

As for the overall implications of this PhD project for measurement, theory and further research, we can conclude that there is a lack of positive future thinking in individuals with past suicidal experiences in line with the cry of pain model (Williams, 1997; Williams & Pollock, 2000, 2001) and the IMV model (O'Connor, 2011; O'Connor & Kirtley, 2018). However, future research needs to explore the extent to which other factors, such as personality status (e.g., borderline or dissocial), physical illness, and cognitive impairments (e.g., semantic dementia, multiple sclerosis, and dyslexia) are implicated in the relationship between future thinking and suicide risk (i.e., suicide ideation and/or suicidal behaviours).

Interventions or treatments with individuals with past suicidal experiences should focus on increasing their levels of positive future thinking, if possible. In addition, further work is essential on the contents of future negative thoughts considering the unexpected findings from our survey study. Overall, having reduced positive future thinking, increased negative future thinking, and repetitive thinking about the future seem to be detrimental in individuals with a history of suicidal behaviours and/or suicidal thoughts.

To conclude, it seems that the relationship between future thinking and suicide risk is complex, in that it changes as a function of thoughts' content. However, future orientation, as a measure, shows promise as a cognitive variable associated with suicide risk. Its role in suicidality needs to be better understood, especially with respect to how it relates to other established markers of suicide risk. As noted above, treatments designed to improve future orientation (reducing negative future thoughts and increasing positive future thoughts) may reduce the risk of suicide. In short, it is hoped that understanding better why individuals think

about suicide or attempt suicide, in the context of theoretical models, such as the IMV model (O'Connor, 2011; O'Connor & Kirtley, 2018), may help researchers and health professionals in the evaluation and treatment of suicidal thinking and suicidal behaviour. Future research should also attempt to replicate the findings of this PhD project.

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APPENDICES

APPENDIX A - The Keywords of Future Thinking, Suicide and Related Terms

Table 2.1 *Literature Search Terms*

Future Thinking	Suicide Risk
future thinking	self injur* behavio?r*
future exp*	suicid*
future imag*	parasuicid*
future event*	self injur*
prospection	self harm*
episodic future thinking	self-mutilation
future-directed thinking	
future-oriented thinking	
future anticipation*	
mental imag*	
mental time travel	
prospective memor*	
future foresee*	
future forecast*	
future thought	

APPENDIX B - A standardised Data Extraction Tool

Table 2.2 *Data Extraction Tool*

Identifiable Details	
Title:	Journal:
Author(s):	Year:
Study Design:	Place of Origin:
Study Setting:	Time Period of Study:
Participant Demographics	
No. groups (Add more details: 'Group' columns as appropriate):	Further population (e.g. *Ethnicity, clinical population, geographic location etc.)* Age:
Sample size #1:	Mean(SD): Range:
Sample size #2:	Mean(SD): Range:
(Use space at bottom of form for details of more samples) Group condition: *(e.g. control or comparison group(s) etc.)* Number of participant groups:	
Criteria	
Inclusion:	Exclusion:
Follow-Up Time Points	
Duration of study Participation:	Number of follow-up points: *(Inc. baseline)* Intervals between follow-up time points:
Aim(s)/Objective(s) & Measures	
Aim:	
Future Thinking assessed:	(*e.g. positive-or negative-future thinking, mental time travel into the future, episodic future thinking etc.)*
Method to measure Future Thinking:	
Suicide Risk assessed:	(*e.g. NSSI, suicidal ideation, attempt, history or behaviour etc.)*
Method to measure suicide risk:	

For follow-up studies:

Data collection method at baseline:	(*e.g., self-report measure)*	Data Collection method at follow-up (If different):	(e.*g., patient online database)*

Other measures:

Other psychological factors measured/controlled for? (List topic & measure):

Outcome(s):

Between suicide risk and future thinking	Findings:	**Relationship present? (Y/N)**

Other relevant results (e.g. multiple regression/controlling for other factors/confounding variables):

Findings:

Limitations

Author/reviewers reported limitations:

Authors Conclusion(s)

Details:

Other

Researcher bias? (Y/N)	Details: *(e.g. study funding sources or conflicts of interests, and whether ethical approval or consent was attained from participants etc.)*

Other comments regarding the study:

This form is developed from information provided by ROBINS-I, AXIS, Cochrane Collaboration's Handbook for Systematic Reviews of Interventions and other SBRL team members.

APPENDIX C - A Quality Assessment Tool

Table 2. 3 *Quality Assessment Tool*

	Criteria/Rate	0	1	2	CURRENT STUDY
1.	**Design**	Cross-Sectional	Case Comparison, Case Control, Correlational, Mixed design studies	Longitudinal, Randomised Controlled-Clinical Trials Experimental studies	
2.	**Suicide Risk (Suicidal Ideation/Behaviour) Assessment(s)**	Unclear assessment of suicide risk (suicidal ideation or behaviour) Measure(s) is/are invalid or unreliable	Assessment form(s) using 1 or 2 items taken from a standardised measure of a wider psychological assessment to evaluate suicidal ideation or suicidal behaviour	Full measure or subscale targeted to assess suicidal ideation or suicidal behaviour (e.g., assessment from hospital records, death certificate etc.)	
3.	**Sample**	Opportunity/Convenience sampling (social media sampling)	Representative samples (e.g., individuals admitting to hospital)	-	
4.	**Future Thinking Assessment**	Single-item assessment with no valid or reliable backing	Assessment form using 1 or 2 items taken from a standardised measure of a wider psychological assessment	Full measure or subscale aimed to examine future thinking (Valid or Reliable Study Measure)	
5.	**Attrition (for prospective studies)**	Significant attrition/ loss of target population; No report of attrition	Good participant retention ≥ 60%	-	

6.	**Confounding Variables**	Not controlled for confounding variables during recruitment or analysis	Partially controlled for confounding variables/Controlled for only certain main confounders (e.g., demographics)	The consideration of additional confounding variables /Controlled for confounders (e.g., personality, other psychological variables)	
Total:					

This quality assessment tool was developed specifically for this review by using well-designed quality rating tools, such as the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool (Sterne et al., 2016), a critical appraisal tool to assess the quality of cross-sectional studies (AXIS) (Downes et al., 2016) and the Cochrane Collaboration's Handbook for Systematic Reviews of Interventions (Higgins et al., 2011). The quality assessment framework was based on the aims of this review and therefore any comprehensive analysis of measures used for other variables were not considered in the appraisal of each study based on the quality assessment criteria. Quality assessments were completed by the first author and 20% of the papers was checked by another researcher for inter-rater reliability. Disagreements between the researchers were resolved through discussion between reviewers. Quality assessment scores were calculated with higher totals reflecting higher-quality studies (max score= 10).

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TABLE 2.4 (Cross-sectional Studies on Future Thinking and Suicide Risk

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size/source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Main Results
1 Macleod, Rose, & Williams, 1993 UK) *Quality:* 5	N = 72 24 hospitalized suicidal participants: Admission to general medical wards at Adden Brookes Hospital in London, England, following acute self-poisoning. 24 hospital controls: From the same hospital, have minor physical problems. 24 non-hospital controls: From the Applied Psychology subject's panel.	Suicidal participants: 16 women- 8 men Mean age. 34 SD: 12.0 Hospital Controls: 17 women- 7 men Non-hospital Controls: 16 Women - 8 men	Construct: Suicidal Behaviour Measure: Admission to hospital, following acute self-poisoning	Construct: Future Thinking Measure: Personal-Future Task (MacLeod *et al*., 1993)	Suicidal participants demonstrated deficits to think future positive events both for the near and distant future, however, they did not differ from controls in terms of the generation of future negative events.
2 Macleod & Tarbuck, 1994 (UK) *Quality:* 5	N=36 Suicidal participants: Admission to hospitals in Cambridge. Controls: From a large subject panel of volunteers.	Suicidal participants: Age Range: 17-68 (M age=38.3 SD=15.9), 9 men and 9 women Controls: Age Range: 19-67 (M age=38.2 SD=15.4), 9 men and 9 women	Construct: Suicidal Behaviour Measure: Admission to hospital, following self-poisoning.	Construct: Subjective probabilities of future negative events and their accessibility of explanations for why those events would or would not occur. Measure: Judgement Task (MacLeod et al., 1991)	Compared to control group, suicidal individuals judged negative events to be more likely. Suicidal participants had difficulty to think of why those negative events might not happen but did not differ from controls in their ability to think of reasons why the events would happen. The effect of thinking about reasons against negative experiences happening was to decrease pessimism in suicidal participants.

TABLE 2.4 (Continued)

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size/source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Main Results
3 Williams, Ellis, Tyers, Healy, Rose, & MacLeod, 1996 (UK) *Quality:* 6	Experiment 1: N = 72 24 patients admission to medical wards at Addenbrooke's Hospital, Cambridge, England, following self-poisoning 24 hospital patients 24 Community controls from a subject panel. Experiment 2: N=40 from the Undergraduate Subject Panel of the University of Wales, Department of Psychology. Experiment 3: From the Undergraduate Subject Panel of University of Wales, Department of Psychology.	Experiment 1: Suicidal Patients: 16 women; 8 men. The age range: 18-66, mean age: 34 (SD = 12.0) Hospital Control: 15 women; 9 men Community Control: 16 women; 8 men Experiment 2: 28 Female 12 Male, with a mean age of 28.5 Experiment 3: 29 Female; 5 Male, with a mean age of 23.76	Construct: Suicidal Behaviour Measure: Admission to hospital, following overdose	Construct: Future Thinking Measure: Future Task (generating future events in response to cues)	Experiment 1: Suicidal patients' memory and future tasks' responses were more generic. Experiment 2 and 3: The induction of a generic retrieval style decreased the specificity of future images.
4 MacLeod, Pankhania, Lee, & Mitchell, 1997 (UK) *Quality:* 5	Depressed suicide patients: Acute self-poisoning- admission to a hospital in the UK. Non-depressed suicide patients: Controls: From a convenience sample (N=91)	Suicide patients 37 females 20 males with a mean age of 34 Controls: 21 females 13 males with an mean age of 35	Construct: Suicidal Behaviour Measure: Admission to Hospital	Construct: Future Thinking Measure: The personal-Future Task (MacLeod et al., 1993)	Suicide patients had an overall decreased anticipation of positive experiences and no overall increased expectation of negative experiences. Suicide patients showed evidence of increased negative anticipation for the immediate future. The results for depressed and non-depressed suicide patients were the same, with reduced positive future thoughts in the non-existence of any increase in negative future thoughts.

TABLE 2.4 (Continued)

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size/source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Results
5 O'Connor, Connery, & Cheyne, 2000 (UK) *Quality:* 6	Suicide patients admission to hospitals in Glasgow Hospital Controls in Glasgow (N=40, 20 per groups)	The mean ages: (35.6; SD = 12.18) Controls (37.6; SD = 12.14) Gender: 11 men, 9 women Controls: 13 men, 7women	Construct: Suicide attempt Measure: Admission to a Glasgow hospital with an episode of deliberate self-harm (ICD-codes X60-X84)	Construct: Future Thinking Measure: The future thinking task (MacLeod et al., 1993; 1997).	There was no significant difference between the suicide patients and the controls in terms of positive future thoughts, although the predicted trend was evident. Future positive thinking, depression and negative cognitive style explained 70.5% of the hopelessness variance. Future positive thinking was not correlated with either depression or negative cognitive style, while negative cognitive style was correlated with depression and hopelessness. Future directed thinking contributes to hopelessness independently of depression and does not seem to be associated with cognitive vulnerability. Both positive future thinking and negative cognitive style are associated with hopelessness However, positive future thinking has its influence regardless of cognitive style.
6 Hunter & O'Connor, 2003 (UK) Quality: 7	N = 65 Suicide patients (N = 22 admitted overnight, via the Accident & Emergency department, to the acute receiving wards Hospital controls (N = 22) Community controls (N = 21)	Gender: Suicide patients11 men and 11 women), hospital controls (12 men and 10 women); community controls (9 men and 12 women) Mean Ages: 35.8 years for the hospital controls (SD = 10.3), and 32.9 years for the community controls (SD = 11.5)	Construct: Suicide attempt Measure: Admission to hospital	Construct: Future Thinking Measure: The future thinking task (FTT, MacLeod et al., 1998)	Social perfectionism and positive future thinking discriminated suicide patients from controls beyond the effects of hopelessness, depression, and anxiety. Suicidal individuals had reduced ability to think of future positive experiences and no overall increased ability to think of future negative experiences.

TABLE 2.4 (Continued)

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size/source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Main Results
7 MacLeod, Tata, Tyrer, Schmidt, Davidson, & Thompson, 2005 (UK) *Quality:* 7	N = 441 Repeat suicide patients from one of nine accident and emergency departments across five centres (West London, South London, Nottingham, Glasgow, and Edinburgh)	Age Range = 16-65 Gender. Not stated	Construct: Suicide attempt Measure: Admission to hospital	Construct: Future Thinking Measure: Future Thinking Task (MacLeod et al., 1998)	The correlation of hopelessness and positive future expectations was stronger than the correlation of hopelessness and negative future anticipations. Both positive and negative future thinking related to hopelessness beyond their relationships to depression and anxiety. Number and likelihood of positive events and likelihood and value of negative events related to hopelessness. Number of negative events showed relationships to hopelessness but only after the control of other future thinking variable. The value of positive events showed no longer relationships to hopelessness after the control of other variables.
8 Hirsch *et al*., 2006 (USA) *Quality*: 6	N = 202 Recruited from inpatient and outpatient services of 3 teaching hospitals in Rochester, New York, involving a community hospital, tertiary care facility, and an academic medical centre.	86 men (43%) and 116 women (57%). Age ranged 50–88. (mean age: 61.7, (SD=10.6))	Construct: Suicide. Ideation – suicide attempt Measure: The Scale for Suicide Ideation (SSI) (Beck, Kovacs, & Weissman, 1979). Admission to hospital	Construct: Future Thinking/Future Orientation Measure: 6 items from the Reasons for Living Inventory–Older Adults Version (RFL-OA; Edelstein, 1999)	Higher future orientation scores were associated with lower current suicidal ideation, less intense suicidal ideation at its worst point, and lower possibility of attempted suicide history after accounting for age, depression, hopelessness, and gender. Future orientation was not associated with current attempt status.

TABLE 2.4 (Continued)

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size/source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Main Results
9 MacLeod, Tata, Tyrer, Symth, Davidson, & Thompson, 2004. (UK) *Quality*: 5	N = 442 Suicide patients recruited from a large treatment trial in a hospital in the UK.	67% Female and a mean age of 31 years (SD=11).	Construct: Suicidal behaviour Measure: Admission to hospital	Construct: Future Thinking Measure: The Future Thinking Task (Macleod, et al., 1998)	Suicidal participants with personality disorder were lower in positive future thinking, but not in negative future thoughts, than suicidal participants with personality difficulty and those without any personality disorders or difficulties.
10 MacLeod & Conway, 2007 (UK) *Quality:* 6	Study 1. N = 84 Community Sample/Volunteers Study 2. N=48 n= 24 Suicide patients from the Accident and Emergency Department at a hospital in London. n= 24 controls from A&E for reasons different from suicidal behaviour	Study 1. 40 men; 44 women Mean age: 48 Study 2. Suicide patients: 15 women; 9 men; Mean age: 35 Controls: 13 Women; 11 Men Mean age. 40	Construct: Suicidal behaviour Measure: Admission to hospital	Construct: Future Thinking Measure: The standard Future Thinking Task (FTT; MacLeod & Byrne, 1996).	In both of two studies, there was a relation between future thinking and well-being. Self-related future thinking impairments in low well-being was observed, however, this was not the case for other related future thinking. When compared to control group, a reduced positive future thinking was observed in suicide patients. No relationship was found between other-related future thinking and well-being, showing that suicidal individuals' ability to think about possible positive future events that other individuals anticipate was not impaired in study
11 Bjärehed, Sarkohi, & Anderson, 2010 (Sweden) *Quality:* 6	N= 40 20 individuals with mild to moderate depression without suicidal thoughts or intents 20 non-depressed individuals	Depressed Group: 7 male 13 female Age Range: 22-65 Mean Age: 39.1 SD= 13.5 Controls: 7 male 13 Female Age Range: 22-64 Mean Age: 38.9 SD= 13.2	Construct: Suicidal Thoughts or intents Measure(s): The Montgomery-Åsberg Depression Rating Scale (MADRS; Svanborg & Åsberg) / not expressing suicidal intents or thinking.	Construct: Future Thinking Measure: The Future Thinking Task (MacLeod et al., 1993).	Depressed patients received lower scores for future positive events, but they did not differ from controls regarding future negative events. The lack of anticipation of future positive events is a characteristic of depression, in the non-existence of suicidal thinking.

TABLE 2.4 (Continued)

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size/source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Main Results
12 Sargalska, Miranda, & Marroquin, 2011. (USA) *Quality*: 6	N = 864 Undergraduates	Gender: 71% Women (n= 613) and 29% Men (n=251) Mean Age (SD): 20.44(4.57); 18-59.	Construct: Suicide Ideation Measure: Beck Scale for Suicide Ideation (BSS; Beck & Steer, 1991).	Construct: Future Thinking Measure: Future Events Questionnaire (FEQ; Miranda & Mennin, 2007) including certainty and likelihood ratings.	Being 'as certain as one can be' when anticipating an absence of positive future outcomes (Certainty-AP)—but not certainty about negative outcomes (Certainty-N)—statistically predicted concurrent suicidal ideation, beyond the effects of simple pessimism about positive and negative outcomes, and hopelessness partially mediated this relationship. Certainty-AP statistically predicted suicidal ideation even after adjusting for hopelessness and symptoms of depression.
13 Marroquin, Nolen-Hoeksema, & Miranda, 2013 (USA) *Quality*: 5	Study 1. N= 119 Undergraduates Study 2: N= 289 Undergraduates and Community members of Yale University and Hunter College	Study 1. Mean age = 19.; 65 female 54 Male Study 2. 81 men; 208 women, Mean Age: 20.2	Construct: Suicide patients Measure: The Beck Scale for Suicide Ideation (SSI; Beck, Kovacs, & Weissman, 1979)	Construct: Future Thinking Measure: Future Events Questionnaire (FEQ; Miranda & Mennin, 2007)	Blunted affective forecasts for future positive events were associated with greater appeal of escape fantasies but not general fantasies (Study 1), and distinguished suicide attempters' future cognitions from healthy controls and matched individuals in terms of depressive symptoms but lacking a history of a suicide attempt (Study 2).

TABLE 2.4 (Continued)

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size/source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Main Results
14 Gorday, Rogers, & Joiner, 2018. (USA) *Quality*: 6	N = 548 Recruiting community participants via Amazon's MTurk	53.6% female, 45.4% male, 0.5% transgender male, 0.2% transgender female, and 0.2% gender non-binary. Aged 19–98 years (M = 36.54, SD = 12.33)	Construct: Suicide ideation Measure: Beck Scale for Suicide Ideation (BSS; Beck & Steer, 1991). Construct: Lifetime suicide attempts Measure: Single question: "Have you ever made a suicide attempt with at least some intent to die?" with Yes/No response options.	Construct: Future Thinking Measure: The Future-Oriented Repetitive Thought Scale (FoRT; Miranda *et al*., 2017).	The controllability of worry was associated with depression, anxiety, and suicidal ideation above and beyond other components of worry, demographic variables, negative affect, and future thinking. Lifetime suicide attempts were found non-significant to these outcomes in mental health. Frequency of worry was positively related to depression. *Future-oriented repetitive thinking was uniquely associated with depression and anxiety symptoms. *Future-oriented negative thinking was unrelated to suicidal ideation and attempts after taking into account the four worry features – (frequency, duration, controllability, content) and negative affect.
15 Ballerd, Patel, Ward, & Lamis, 2015 (USA) *Quality:* 5	N = 140 Undergraduate Sample reporting moderate to severe depression	Age Range: 18-26 (M age=20.09, SD=1.69), 77.9% (n=109): Female.	Construct: Suicide ideation Measure: Beck Scale for Suicide Ideation (BSS; Beck & Steer, 1991). .	Construct: Future Thinking Future Thoughts and Feelings Measure: UTSA Future Disposition Inventory-24 (FDI-24; Osman *et al*., 2010)	Subjective depression (sadness or anhedonia) mediated the relationship between positive expectations of the future and suicidal ideation. The relationship between negative expectations of the future and suicidal ideation was mediated by self-blame or negative attributions. The reverse of these relationships was not significant.

TABLE 2.4 (Prospective Studies on Future Thinking and Suicide Risk)

Study no. Authors, year Quality Assessment	POPULATION			CONSTRUCTS and MEASURES		Results
	Sample size /source	Follow-up Duration	Gender/age	Suicidal ideation/behaviors	Future Thinking	
16 Sidley, Calam, Wells, Hughes, & Whitaker, 1999 (UK) *Quality:* 10	N = 66 Suicide patients admitted to hospital	Over 12-month period	Gender: Male: 36 Female: 30 Mean age 33.6 years. Age range 19-58	Construct: Suicide attempt Measure: Admission to the Accident and Emergency Department of North Manchester General Hospital following a deliberate drug overdose	Construct: Future Thinking Measure: Personal Future Task (PFT; MacLeod et al., 1993)	Neither of over-generality of autobiographical memory and future fluency for positive events was found to enhance suicide attempt repetition prediction over and above the utility of scores on the BHS and number of previous suicide attempts. Significant differences were shown between repeaters and non-repeaters on future-fluency for positive events and generality of autobiographical memories, besides significant correlation of hopelessness and future positive fluency.
17 O'Connor, Whyte, Fraser, Masterton, Miles, & MacHale, 2007 (UK) *Quality*: 8	N = 267 From the acute receiving ward or Accident and Emergency department	2 months	Mean age of 35.1 (SD=13.3) Age range=16–78 Gender: 149 Women; 118 Men	Construct: Suicide ideation Measure: The Suicide Probability Scale (Suicidal ideation-T1; Cull & Gill, 1988). (At Time 1 and Time 2) Construct: Suicide Intent Measure: By asking about current self-harm episode, particularly concerning if they had intended to kill themselves. Construct: Self-harm History Measure: By asking if they had engaged in self-harm in their past.	Construct: Future Thinking Measure: The future thinking task (FTT) (MacLeod et al., 1997)	Better outcomes for those high on positive future thoughts compared to those low on positive future thinking were seen. There was not such positive improvement in outcome amongst the high social perfectionists. No significant interactive effects exist amongst the non-repetitive self-harmers.

TABLE 2.4 (Continued)

Study no. Authors, year Quality Assessment	POPULATION			CONSTRUCTS and MEASURES		
	Sample size/source	Follow-up Duration	Gender/age	Suicidal ideation/behaviors	Future Thinking	Main Results
18 O'Connor, Fraser, Whyte, MacHale, & Masterton, 2008. (UK) Quality: 8	N = 237 from acute receiving ward or Accident and Emergency department	Approx. 2.5 months	151 females; 86 males with a mean age of 36.9 years (SD = 13.0, range = 16 to 73 years)	Construct: Suicide idation Measure: The Suicide Probability Scale (Suicidal ideation-T1; Cull & Gill, 1988) Construct: Suicide Intent Measure: The SSI (Beck *et al.*, 1974)	Construct: Positive Future Thinking Measure: The future thinking task (FTT) (MacLeod *et al.*, 1997)	Specific positive future thoughts were better predictors of Time 2 suicidal ideation than global hopelessness. Negative future thinking was not independently associated with suicidal ideation.
19 Krajniak Mirranda, & Wheeler, 2013 (USA) *Quality:* 7	N = 143 Undergraduates from a public college in the northeastern United States	2-3 years	114 Female 29 Male Age Range18–25 (M = 18.5, SD = 1.1)	Construct: Suicide ideation Measure: Beck Scale for Suicidal Ideation (BSS; Beck & Steer, 1991) Construct: Suicide Behaviour (Lifetime Suicide Attempt) Measure: Suicidal Behaviour Screening (SBS) :6 questions derived from the Diagnostic Interview Schedule for Children (Shaffer, Fisher, Lucas et al., 2000). Construct: Suicide Attempt Outcome Measure Readmission to hospital with a suicide attempt	Construct: Future Thinking Measure: Future Events Questionnaire (FEQ; Miranda & Mennin, 2007)	Lifetime suicide attempts were related to higher suicidal ideation at baseline Rumination and P-Certainty mediated this relationship at follow-up.

TABLE 2.4 (Continued)

Study no. Authors, year Quality Assessment	POPULATION			CONSTRUCTS and MEASURES		
	Sample size /source	Follow-up Duration	Gender/age	Suicidal ideation/behaviors	Future Thinking	Main Results
20 O'Connor, Smyth, & William 2015. (UK) *Quality:* 8	N = 388 Hospitalized patients attempting suicide	15 months	N = 388 220 females and 168 males, with an overall mean age of 35.3 years (SD = 13.91, range = 16–71 years). The men (M = 38.40, SD = 14.04) and women (M = 32.92, SD = 13.36)	Construct: SI. Measure: the 21-item Scale for Suicide Ideation (SSI; Beck, Steer, & Ranieri, 1988; Beck, Steer, & Brown, 1996). Construct: Suicide Intent Measure: the SSI (Beck *et al*., 1974) Construct: Suicide Attempt Outcome Measure Readmission to hospital with a suicide attempt	Construct: Positive Future Thinking Measure: The future thinking task (FTT) (MacLeod *et al*., 1997)	During follow-up, 25.6% of linked participants were readmitted to hospital following a suicide attempt. Previous suicide attempts, suicidal ideation, hopelessness, and depression, as well as low levels of achievement, low levels of financial positive future thoughts, and high levels of intrapersonal (thoughts about the individual and no one else) positive future thoughts predicted repeat suicide attempts. Only previous suicide attempts, suicidal ideation, and high levels of intrapersonal positive future thinking were significant predictors of repeat suicide attempts in multivariate analyses.
21 Pollak *et. al*., 2021. (USA) *Quality:* 7	74 Community-based adolescents	6 months	Mean Age: 16.27 Gender distribution was not reported.	Construct: Suicide Ideation and suicidal behaviors Self-injuries thoughts and behaviors interview-revised (Fox *et al.,* 2020) The Suicidal Ideation Questionnaire (Reynolds, 1988)	Construct; Future Thinking Measure; The Future Thinking Task (Macleod *et al*., 1998)	The association between defeat/entrapment and suicide ideation was strongest amongst adolescents who reported greater positive future thinking. This may be due to a tendency to have more less realistic and achievable positive future thoughts.

TABLE 2.4 (Correlational Studies on Future Thinking and Suicide Risk)

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size /source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Main Findings
22 MacLeod, Tata, Tyrer, Schmidt, Davidson, & Thompson, 2005 (UK) *Quality:* 6	N = 441 Repeat Suicide patients from one of nine accident and emergency departments across five centres (West London, South London, Nottingham, Glasgow, and Edinburgh)	Age Range = 16-65 Gender: 145 Male (33%) and 296 Female (67%)	Construct: Suicide Attempt, Suicidal History Measure: Admission to hospital, YES/NO-Single Question	Construct: Future Thinking Measure: Future Thinking Task (MacLeod *et al.*, 1998)	In suicidal individuals, lack of positive future thinking is more important than the presence of negative future thinking. Positive future thinking was related to depression and negative future thinking was related to anxiety.
23 Rasmussen *et al*., 2010 (UK) *Quality*: 6	N = 140 Suicide patients (n= 103) admitted overnight to two central Scotland general hospitals following an episode of SH. Hospital Controls (n= 37)	Suicide Patients: 61 Female; 42 Male Mean Age Female: 34.92 (SD= 13.40) Mean Age Male: 33.98 (SD= 11.20) Hospital Controls: 21 Female 16 Male Mean Age: 42 (SD= 9.54)	Construct: Suicide Ideation Measure: The Suicide Probability Scale (Cull & Gill, 1988) Measure-Construct(s): General questions (i) type of SH, (ii) suicidal intent (measured via the suicidal intent question from Beck's Suicide Intent Scale (Beck Weissman, Lester, & Trexler, 1974), and (iii) Self-harm history	Construct: Positive Future Thinking Measure: The future thinking task (FTT; MacLeod *et al*., 1998)	Hierarchical regression analysis illustrated that total entrapment and internal entrapment mediated defeat and suicidal ideation relation, while reduced ability to think positively as to the future (not social support) moderated total and internal entrapment and suicidal ideation relationship.

TABLE 2.4 (Mixed Studies on Future Thinking and Suicide Risk)

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size/source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Results
24 MacLeod *et al*., 1998 (UK) *Quality*: 7 *Include Clinical Trial in designs	N= 52 18 Community Controls 34 suicide patients Admission to 2 west London hospitals (St. Mary's Hospital and Chelsea and Westminster Hospital) with an episode of deliberate self-harm	Suicide Patients: 21 Female 13 Male Age Range: 19-49, with a mean age of 32 Community Controls 7 Female 11 Male Mean Age: 35	Construct: Suicidal History (Suicidal Behaviour) Measure: Admission to hospital	Construct: Future Thinking Measure: The Future Thinking Task (MacLeod *et al*., 1993; 1997).	Suicide patients had a lack of positive future thinking without no Increase in negative future thinking. Patients in MACT group exhibited a significant improvement in positive future thoughts over the follow-up period. The TAU group did not show any improvement in positive future thinking over the follow-up. The control group also showed a significant improvement in positive future thinking.
25 Conaghan & Davidson, 2002 (UK) *Quality*: 6	N = 66 22 admitted to hospital following a non-fatal suicidal act; 22 treated for depression; 22 community volunteers not experiencing any significant psychological symptoms.	Mean (SD) ages: Suicide patients 73.14 (6.56) Depressed controls 74.68 (5.74) Community Controls 77.95 (6.40) Gender: not stated as numbers per group or in total sample no differences between groups in terms of gender composition (X^2 (2) = .59, n.s.);	Construct: Suicide Attempt, Suicide Intent Measure: Consecutive admissions to medical and psychiatric receiving wards, following a parasuicidal episode. Demographics (Demographic & Clinical Data), the Suicidal Intent Scale (SIS; Beck, Schuyler, & Herman, 1974)	Construct: Future Thinking Measure: The Personal Future Task (PFT; MacLeod *et al*., 1993, 1997, 1998)	Suicidal and depressed participants demonstrated reduced positive future thinking, but no rise in negative future thinking, compared to the community controls.

TABLE 2.4 (Continued)

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size/source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Main Findings
26 Gorday, Rogers, & Joiner, 2018. (USA) *Quality:* 7	N = 548 Recruiting community participants via Amazon's MTurk	53.6% female, 45.4% male, 0.5% transgender male, 0.2% transgender female, and 0.2% gender non-binary. Aged 19–98 years (M = 36.54, SD = 12.33)	Construct: Suicide Ideation, Lifetime Suicide Attempts Measure: Beck Scale for Suicide Ideation (BSS; Beck and Steer, 1991). Single question: "Have you ever made a suicide attempt with at least some intent to die?" with Yes/No response options.	Construct: Future-Directed Repetitive Thinking (To what extent people repetitively think about the likelihood of positive and negative future events.) Measure: The Future-Oriented Repetitive Thought Scale (FoRT; Miranda *et al*., 2017).	The controllability of worry was significantly associated with depression, anxiety, and suicidal ideation above and beyond other components of worry, demographic variables, negative affect, and future directed repetitive thinking. Lifetime suicide attempts were not associated with depression, anxiety and suicide ideation. Future-oriented repetitive thinking was uniquely associated with depression and anxiety symptoms. Future-oriented repetitive thinking was unrelated to suicidal ideation and attempts after taking into account the four worry features – (frequency, duration, controllability, content) and negative affect.

TABLE 2.4 (Experimental Studies on Future Thinking and Suicide Risk)

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size/source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Main Findings
27 Walsh (1993) (USA) *Quality:* 9	N =39 * Adolescent Inpatients with suicide attempt	Gender: 44% boys and 56% girls Mean Age (SD)/Age Range: 15 /13-17	Construct: Suicidal Behaviour Measure: Admission to hospitals	Construct: Future time perspective: Positive future thinking Measure: The Heimberg (1963) Future Time Perspective (FTP) Inventory, interviews to see the effectiveness of the AFI (Art future intervention) targeting at increasing positive future thinking.	*The AFI is effective to improve future positive thoughts, self-esteem, and to reduce depression levels. The Experimental group had higher positive changes than the placebo group.

TABLE 2.4 (Randomized Controlled Trial on Future Thinking and Suicide Risk)

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size/source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Results
28 Di Simplicio *et al*., 2020 (UK) *Quality:* 8	N = 38 Through community self-referral and mental health services with suicidal behaviours *Follow-up*: At 3 and 6 months	Age range: 16-25 Gender. 31 women. 7 men	Construct: Suicide Severity Measure: the Columbia Suicide Severity Rating Scale (C-SSRS, Posner *et al*., 2011) Construct: Self-harm Measure(s):Self-Harm Imagery Interview adapted from Hales *et al.* (2011). Self-Efficacy for Control (SEC) of self-harm. (Bandura & Bandura, 2006). Construct: Motivation to control self-harm Measure: The Strength of Motivation for reducing Self-Harm (SM-SH) scale (Parham et al., 2017; Robinson, Kavanagh, Connor, May, & Andrade, 2016) Construct: Self-harm Frequency Measure: The open-ended question: "In the last 3 months, have you tried to hurt yourself on purpose? If yes, how many times approximately?" (Note: Answers were rated according to an adaptation of the Clinician-rated Severity of Non-suicidal Self-Injury Scale (American Psychiatric Association, 2013) Construct: Suicidal Behaviour Measure: Admission to hospital	Construct: Future Thinking Measure: The Impact of Future Events Scale (IFES; Deeprose & Holmes, 2010)	FIT resulted in moderate decreases in suicidal behaviors frequency at 3 months after immediate (d = 0.65) and delayed delivery (d = 0.75). The Immediate FIT group had improvements from 3 to 6 months (d = 0.05). Reduced self-harm (d = 0.47) was seen in usual care subjects.
29 Jaegere *et al*., 2023 (Western Europe) *Quality:* 7	N = 46 Control Group: n=15 Intervention Group: n=31	Total: Gender. 30 women. 16 men. Mean Age: 42.2 Control group (12 Women and 3 Men, a mean age of 36.5) Intervention Group (18 Women and 13 Men, a mean age of 45)	Construct: Suicide Ideation Measure: The Beck Scale for Suicide Ideation (Beck & Steer, 1991)	Construct: Repetitive Future-oriented thinking Measure: Future-Oriented Repetitive Thought Scale (Miranda *et al*., 2017)	A future-oriented group training was effective on suicide ideation and other suicide risk factors (e.g., worrying, depression, and hopelessness).

TABLE 2.4 (Case Study on Future Thinking and Suicide Risk)

Study no. Authors, year Quality Assessment	POPULATION		CONSTRUCTS and MEASURES		
	Sample size/source	Gender/age	Suicidal ideation/behaviors	Future Thinking	Results
30 Hsiao, Kaiser, Fong, & Mendez, 2013 (USA) *Quality:* 6	N = 1 Case Report Admission to the psychiatry service at VA Greater Los Angeles Medical Centre after attempting suicide by medication overdose.	Men; 63-year-old	Construct: Suicidal Behaviour Measure. Admission to hospital	Construct: Future Thinking Measure: Future Self-Projections Task developed by the authors.	The patient was able to return to the past and project himself into the familiar scenarios, however, he could not could not do this for the future. This was related to the lack of semantic details of future events related to impairments in semantic autobiographical memory. He had concrete and specific self-representations instead of abstract and generalizable. Semantic dementia was shown to impact the ability to imagine oneself as capable in the future negatively, directing some individuals to suicidal acts.

APPENDIX E - Survey Study Advert

Understanding the Relationship between Future Thinking and Suicide Risk

Researchers at the University of Glasgow are seeking adults (18 years or older) to take part in a study aimed at understanding thoughts and feelings individuals experience that are related to future thinking, suicide risk, personality and mental health.

- If you participate, you will be offered prize draw entry (£200 in shopping vouchers) for your time in this confidential study.
- Participation involves completing some online questionnaires and a future thinking task.
- To learn more, please visit https://research.sc/participant/login/dynamic/31D78FFB-8686-4B3E-8DE8-067AADDE96F8 or email the researcher Gonca Kose [xxxxxxxx@student.gla.ac.uk]

*This is a research study and taking part in it does not imply receiving psychological treatment. If you need to talk to someone; you can do by calling The Samaritans from any phone on 116 123.

APPENDIX F - Participant Information Sheet - Survey Study

PARTICIPANT INFORMATION SHEET V2- 07/09/2020

1. Study title

Survey Study: Understanding the Relationship between Future Thinking and Suicide Risk

2. Invitation paragraph

You are being invited to participate in a study, investigating psychological factors that may be associated with suicidal thoughts and behaviours. The study is being conducted by Gonca Kose, a postgraduate researcher in the Institute of Health and Wellbeing (IHW) at the University of Glasgow. Before deciding whether to take part, it is important for you to understand why this research is being done and what it will include. Please take time to read the following information carefully and discuss it with others if you want. If you have any questions or if anything is unclear, please do not hesitate to ask the researcher for more details.

3. What is the purpose of the study?

This is an online questionnaire which is investigating whether positive- and negative-future thinking is associated with suicidal thoughts and behaviours. Future thinking refers to thinking about possible future events, which could be positive or negative. The study aims to build a better understanding of the factors associated with suicidal thinking and behaviour in adults aged 18 years and over.

4. Why have I been invited to participate?

You have been invited to participate in this study as you are a member of the general population aged 18+ years. Approximately 300 men and women will be taking part in this study.

5. Do I have to take part?

Being a part of this study is entirely voluntary. After reading this information sheet, if you do decide to participate, you will be asked to provide consent by ticking a box after reading the consent form. If you do not wish to be a part of the study, you can choose not to complete the survey and, you may withdraw from the research whenever you want without giving a reason.

6. What will happen to me if I take part?

First, you will be asked to fill in the demographic questionnaire. Then, you will be asked to complete an online future thinking task that requires you to give information about your expectations concerning future events. Finally, you will be asked to complete some questionnaires in which we will ask you to give information about your feelings, thoughts, and behaviours (e.g., stress, suicide, depression, anxiety, being optimistic/pessimistic).

It is estimated that it will take you approximately 30 minutes to complete the questionnaire. If you

complete this study, we will ask you if you would like to be entered into a prize draw to win £200 of High Street vouchers. You will be asked to provide your e-mail address if you wish to enter the prize draw.

7. What do I have to do?

After you read this information sheet and give your consent, you will be asked to complete a demographics form, a future thinking task and some questionnaires.

8. What are the possible disadvantages and risks of taking part?

As in all research that asks about mood, the future and well-being, there is a possibility that some questions and the future thinking task requirements may lead you to think about certain experiences in your life that you find upsetting. You are free to withdraw from the study at any point. You will be given a list of contacts, such as Breathing Space and Samaritans if you want to gain more information or to talk with someone.

9. What are the possible benefits of taking part?

Participation in this study will not be of direct benefit to the research participants. However, the information obtained through this research will give us a better understanding of the most prominent psychological markers of suicidal risk in adults. The results might help to improve the treatment of suicidal thoughts and behaviours, in addition to informing policies on suicide prevention.

10. Will my taking part in this study be kept confidential?

Your participation and all the information you provide throughout the study will be kept strictly confidential. You will be identified by an ID number and in compliance with BPS (The British Psychological Society) requirements, demographic information and performance data are all stored separately. All data in electronic format will be stored on secure password-protected computers provided by the University of Glasgow and destroyed ten years after the project ends. Only the research team or appropriate governance staff will be able to access information that might identify you.

11. What will happen to my data?

Researchers from the University of Glasgow collect, store, and process all personal information in compliance with the General Data Protection Regulation (GDPR) (2018). If

you are deemed a risk to yourself or others, the PhD researcher may need to break confidentiality and contact emergency services, your loved ones or support network on your behalf.

12. What will happen to the results of the research study?

The data will be stored in archiving facilities following the University of Glasgow retention policy of up to 10 years. After this period, further retention can be agreed, or your data will be destroyed securely in line with the relevant standard procedures.

Your personal information could be shared with individuals who check that the study is done properly and, if you agree, anonymised data could be shared with other organisations or universities to conduct research to increase scientific understanding. Your data will form part of the study results that will be published in presentations, expert journals, student dissertations/theses -if applicable- and on the Internet, for other researchers to use.

13. Who is organising and funding the research?

This research is organised by the University of Glasgow and funded by the Turkish Government and funds held within the Department of Mental Health and Wellbeing at the University of Glasgow.

14. Who has reviewed the study?

The study has been reviewed by the College of Medical, Veterinary and Life Sciences (MVLS) Ethics Committee at the University of Glasgow (UofG).

15. Contact for Further Information

If you have any questions or require further information, please contact:

GONCA KOSE: PhD Student, The University of Glasgow, xxxxxxxx@student.gla.ac.uk

RORY O'CONNOR: Professor of Health Psychology, The University of Glasgow, Rory.OConnor@glasgow.ac.uk

JONATHAN EVANS: Professor of Applied Neuropsychology, The University of Glasgow,

Jonathan.Evans@glasgow.ac.uk

Suicidal Behaviour Research Laboratory (SBRL), Institute of Health and Wellbeing (IHW), University of Glasgow (UofG), Gartnavel Royal Hospital, Administration Building, (2nd Floor Room 23, Room 30, and 1st Floor Room 12, respectively) 1055 Great Western Road, Glasgow, G12 0XH, Scotland, UK.

Thank you for taking the time to read this information sheet!

University of Glasgow | College of Medical, Veterinary & Life Sciences

APPENDIX G - Consent Form - Survey Study

Title of Project: Understanding the Relationship between Future Thinking and Suicide Risk

Name of Researcher(s): Miss Gonca Kose, Professor Rory O'Connor and Professor Jonathan Evans

If you wish to enter a prize draw for a £200 voucher, please write your email address below:

……..

Please Tick Box

- ☐ I confirm that I have read and understood the Participant Information Sheet version 2 dated 07/09/2020.
- ☐ I confirm that I have read and understood the Privacy Notice version 2 dated 07/09/2020.
- ☐ I have had the opportunity to think about the information and ask questions and understand the answers I have been given.
- ☐ I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my legal rights being affected.
- ☐ I confirm that I agree to the way my data will be collected and processed, and that data will be stored for up to 10 years in university archiving facilities in accordance with relevant Data Protection policies and regulations.
- ☐ I understand that all data and information I provide will be kept confidential and will be seen only by study researchers and regulators whose job it is to check the work of researchers.
- ☐ I agree that my contact details (e-mail address, if it was provided) and data described in the information sheet will be kept for the purposes of this research project.
- ☐ I understand that if I withdraw from the study, my data collected up to that point will be retained and used for the remainder of the study.
- ☐ I understand that my information and things that I say in the survey including statements in the future thinking task may be quoted in reports and articles that are published about the study, but anything else that could tell people who I am will not be revealed.
- ☐ I agree for the data I provide to be anonymously archived in the UK data archive or other approved archiving facilities, and that other researchers can have access to this data only if they have scientific and ethical approval and agree to preserve the confidentiality of this information as set out in this form.
- ☐ I agree to take part in the study.

APPENDIX H - Measures - Survey Study

All survey study measures included in the Appendix H are as follows:

1-Adapted future thinking task (the AFTT; an online adapted version of the standard Future Thinking Task (FTT; MacLeod et al., 1997) that was created by Kose, O'Connor, and Evans (2020) on the Gorilla Experiment Builder for this study.
2-Demographics.
3-Suicidal ideation (the Suicide Ideation subscale of the Suicide Probability Scale, SPS; Cull & Gill, 1989).
4-Suicidal history (2 items from the Adult Psychiatric Morbidity Survey; McManus, Bebbington, Jenkins, & Brugha, 2016).
5-Future oriented repetitive thinking (the Future-oriented Repetitive Thought (FoRT) Scale; Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017).
6-Consideration of future consequences (the Consideration of Future Consequences Scale (CFC); Strathman, Gleicher, Boninger, & Edwards, 1994).
7-Stress (the Perceived Stress Scale-Short Form (PSS-short); Cohen & Williamson, 1988)
8-Defeat (3 items from the Defeat Scale; Gilbert & Allan, 1998).
9-Entrapment (Entrapment Scale Short-Form (E-SF) (De Beurs *et al*., 2020)
10-Anxiety (the General Anxiety Disorder-7 Scale (GAD-7); Spitzer, Kroenke, Williams, & Löwe, 2006).
11-Depression (the Patient Health Questionnaire Depression (PHQ-9) Scale; Cameron, Crawford, Lawton & Reid, 2008).
12-Optimism/pessimism (the Revised Life Orientation Test (LOTR); Scheier, Carver, & Bridges, 1994).

1-Adapted future thinking task (The AFTT, an online adapted version of the standard Future Thinking Task (FTT; MacLeod et al., 1997) that was created by Kose, O'Connor, and Evans (2020) on the Gorilla Experiment Builder for this study.

Instructions:

In this task, we would like you to write about positive things (that you are looking forward to, that you will enjoy) and negative things (that you are not looking forward to, that you will worry about) that might occur to you in the future (next week/year/5-10 years). These could be trivial or important things, and they could be things you know are going to happen or things that you think might reasonably happen. However, you are asked to think about **specific events** that you are looking forward to or not looking forward to.

We want you to be as specific about these events as you possibly can, so you should try to think of **particular things** that you are looking forward to or not looking forward to. These could be things that would happen in a particular place and at a particular time. So, for things you are looking forward to "meeting up with my family at the London Eye next Saturday" would be an example, whereas, "relaxing" would not be an example because it isn't a specific event or experience.

As for things you are not looking forward to, "going for a job interview in Glasgow next week" would be an example, whereas "crying" would not be an example because it isn't a specific event or experience.

You will be asked to do this for different time periods.

Instructions for the things that you are looking forward to over the next week

Now, on the next page, we would like you to write a brief description of as many **positive things** as possible that might occur to you **over the next week** in line with the instructions in the previous page.

You will have a time limit of **one minute** to generate as many responses as you can. Please, keep trying until the time limit is up!

When you are ready to start, please click on to the next page. There is a timer, so you know how long you have left.

What are you looking forward to **over the next week**? Please, write as many positive things (that you are looking forward to or that you will enjoy) as you can think of over the next week and keep trying until the time limit is up!

Instructions for the things that you are looking forward to over the next year

Now, on the next page, we would like you to write a brief description of as many **positive things** as possible that might occur to you **over the next year**.

We want you to be as specific about these events as you possibly can, so you should try to think of **particular things** that you are looking forward to **over the next year**. These could be things that would happen in a particular place and at a particular time. So, "having a holiday in Majorca next year" would be an example, whereas, "relaxing" would not be an example because it isn't a specific event or experience.

Once again, you will have a time limit of **one minute** to generate as many responses as you can. Please, keep trying until the time limit is up!

When you are ready to start, please click on to the next page. There is a timer, so you know how long you have left.

What are you looking forward to **over the next year**? Please, write as many positive things (that you are looking forward to or that you will enjoy) as you can think of over the next year and keep trying until the time limit is up!

Instructions for the things that you are looking forward to over the next 5 to 10 years

Now, on the next page, we would like you to write a brief description of as many **positive things** as possible that might occur to you **over the next 5 to 10 years**. We want you to be as specific about these events as you possibly can, so you should try to think of **particular things** that you are looking forward to **over the next 5 to 10 years**. These could be things that would happen in a particular place and at a particular time. So, "buying a big house in Antalya city centre over the next 5 to 10 years" would be an example, whereas, "relaxing" would not be an example because it isn't a specific event or experience.

Once again, you will have a time limit of **one minute** to generate as many responses as you can.

Please, keep trying until the time limit is up! When you are ready to start, please click on to the next page. There is a timer, so you know how long you have left.

What are you looking forward to **over the next 5 to 10 years**? Please, write as many positive things (that you are looking forward to or that you will enjoy) as you can think of over the next 5 to 10 years and keep trying until the time limit is up!

Instructions for the things that you are **not** looking forward to over the next week

Now, on the next page, we would like you to write a brief description of as many **negative things** as possible that might occur to you **over the next week**. We want you to be as specific about these events as you possibly can, so you should try to think of **particular things** that you are **not** looking forward to **over the next week**. These could be things that would happen in a particular place and at a particular time. "going for a job interview in London next week" would be an example, whereas "crying" would not be an example because it isn't a specific event or experience.

Once again, you have a time limit of **one minute** to generate as many responses as you can.

Please, keep trying until the time limit is up! When you are ready to start, please click on to the next page. There is a timer, so you know how long you have left.

What are you **not** looking forward to **over the next week**? Please, write as many negative things (that you are not looking forward to or that you are worried about) as you can think of over the next week and keep trying until the time limit is up!

Instructions for the things that you are **not** looking forward to over the next year

Now, on the next page, we would like you to write a brief description of as many **negative things** as possible that might occur to you **over the next year**. We want you to be as specific about these events as you possibly can, so you should try to think of **particular things** that you are **not** looking forward to **over the next year**. These could be things that would happen in a particular place and at a particular time. So, "having difficulties while answering questions in my exam next year" would be an example, whereas "crying" would not be an example because it isn't a specific event or experience.

Once again, you have a time limit of **one minute** to generate as many responses as you can.

Please, keep trying until the time limit is up! When you are ready to start, please click on to the next page. There is a timer, so you know how long you have left.

What are you **not** looking forward to **over the next year**? Please, write as many negative things (that you are not looking forward to or that you are worried about) as you can think of over the next year and keep trying until the time limit is up!

Instructions for the things that you are **not** looking forward to over the next 5 to 10 years

Now, on the next page, we would like you to write a brief description of as many **negative things** as possible that might occur to you **over the next 5 to 10 years**. We want you to be as specific about these events as you possibly can, so you should try to think of **particular things** that you are **not** looking forward to **over the next 5 to 10 years**. These could be things that would happen in a particular place and at a particular time. So, "a family member getting cancer over the next 5 to 10 years" would be an example, whereas "crying" would not be an example because it isn't a specific event or experience.

Once again, you have a time limit of **one minute** to generate as many responses as you can.

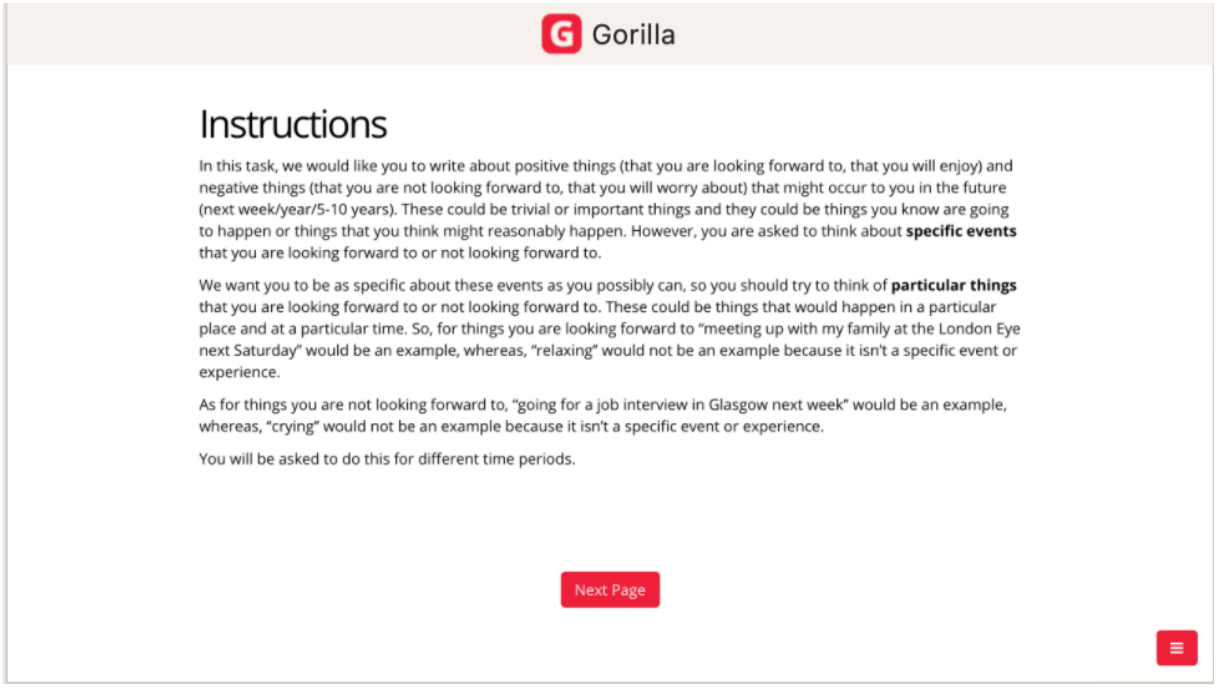
Please, keep trying until the time limit is up! When you are ready to start, please click on to the next page. There is a timer, so you know how long you have left.

What are you **not** looking forward to **over the next 5 to 10 years**? Please, write as many negative things (that you are not looking forward to or that you are worried about) as you can think of over the next 5 to 10 years and keep trying until the time limit is up!

Adapted Future Thinking Task (AFTT) - Screenshots

Note: The texts used in the task are clearly readable in the instructions above and on the screens of the participants. Here, we provide these screenshots from the Gorilla Experiment Builder only to give you an idea of how the AFTT is implemented online.

Screen 1:



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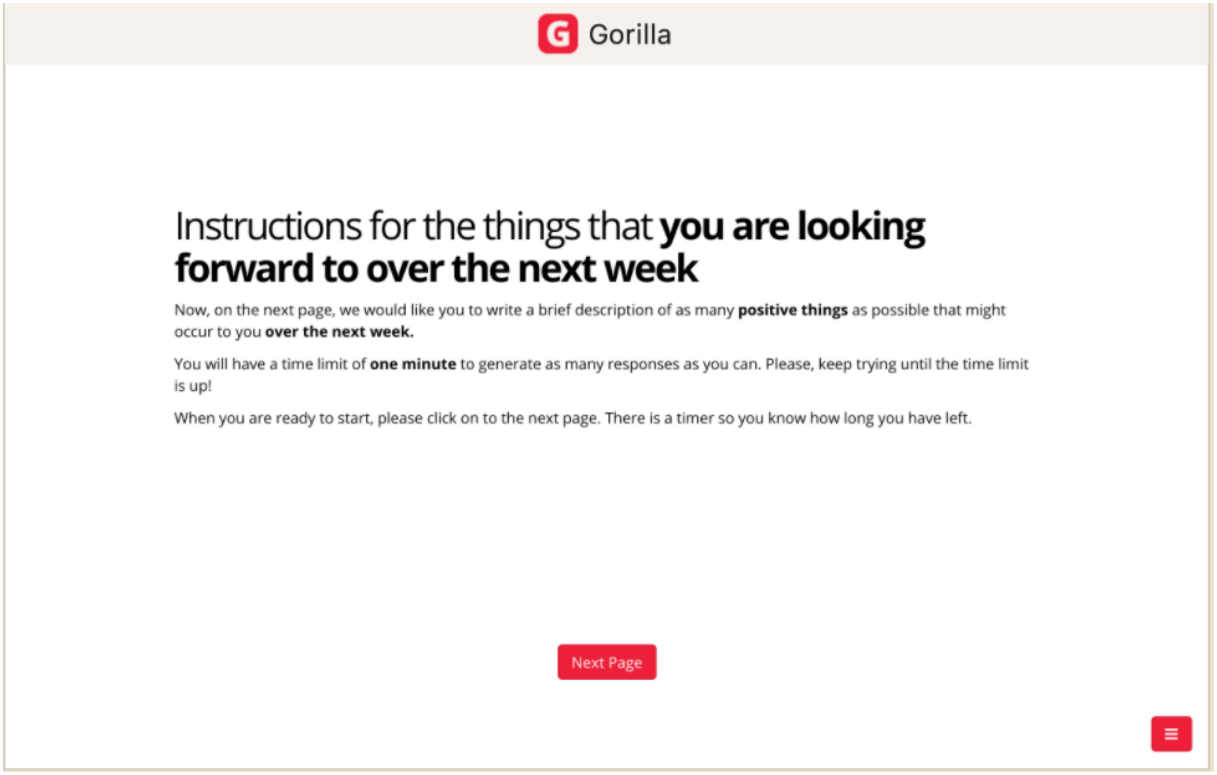

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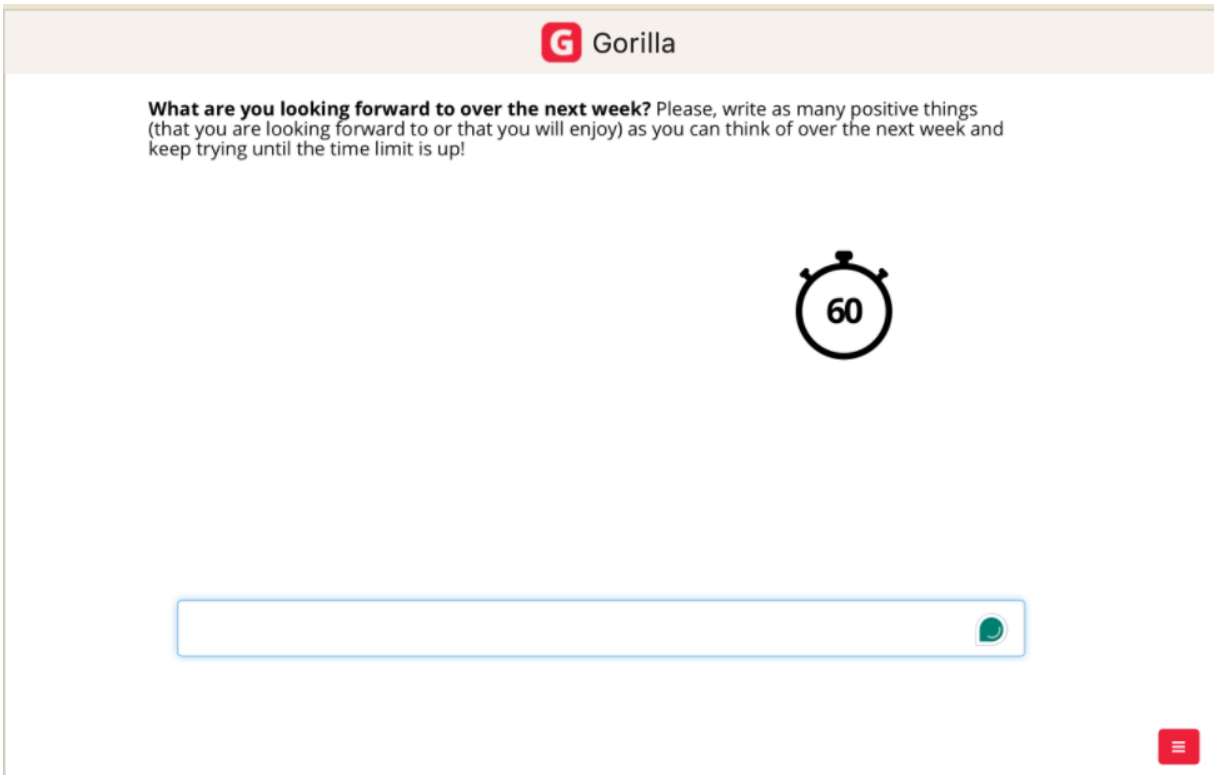

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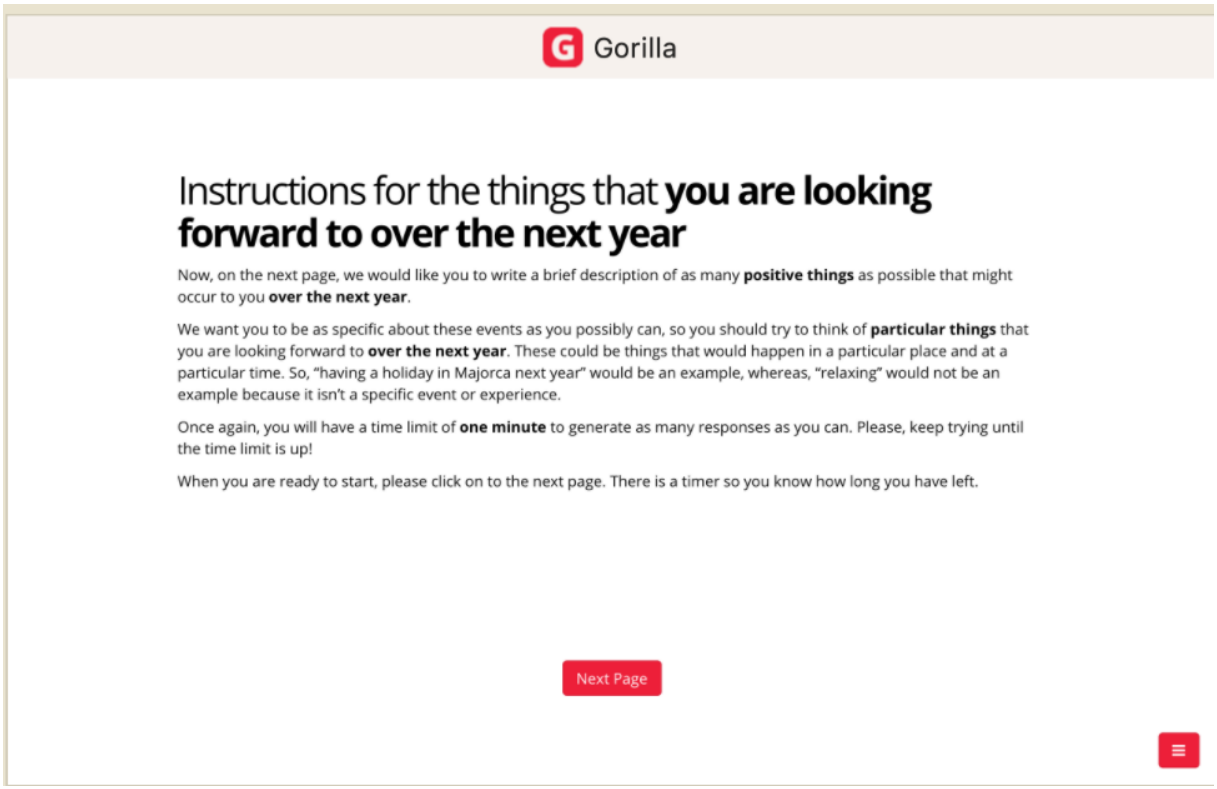

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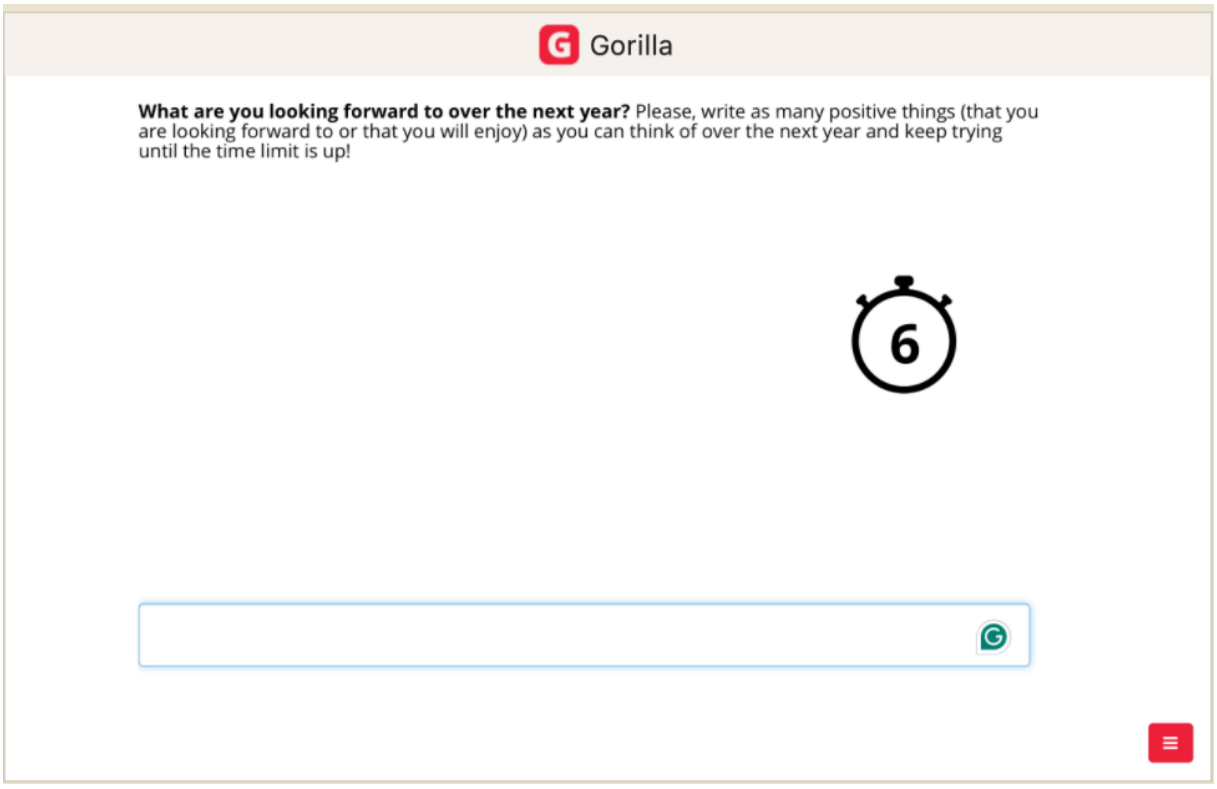

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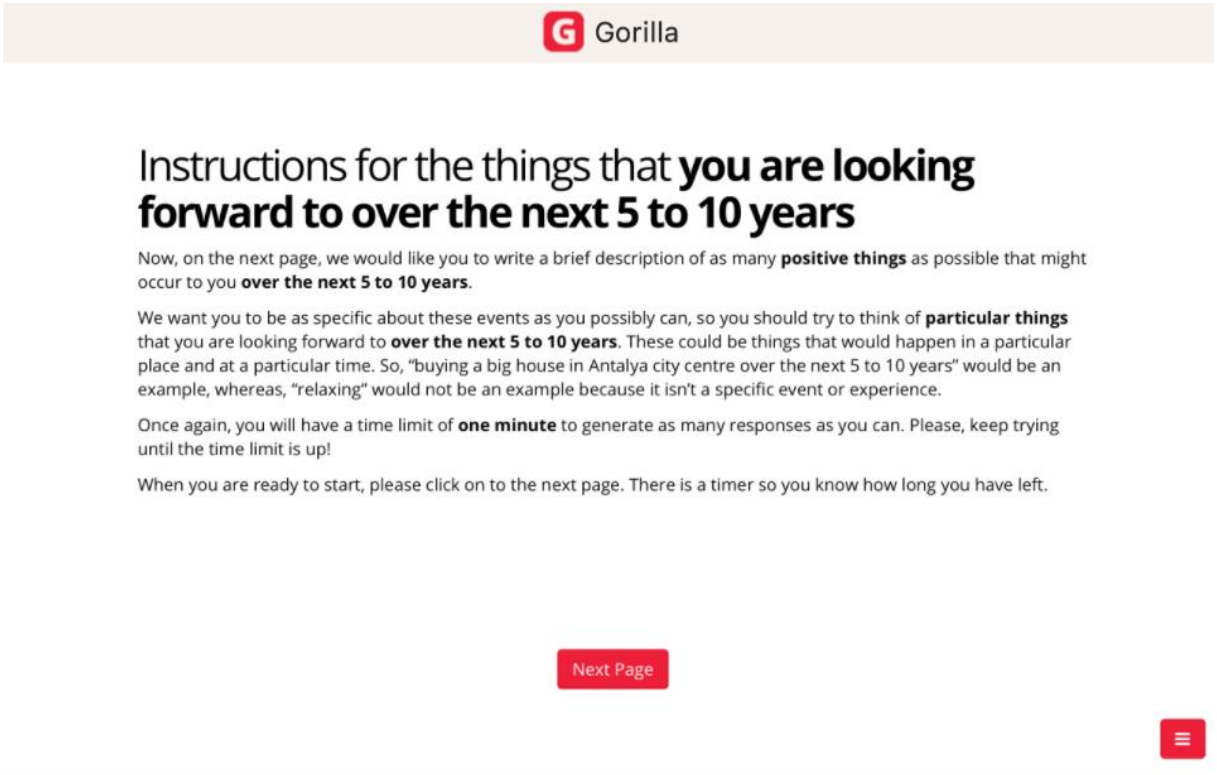

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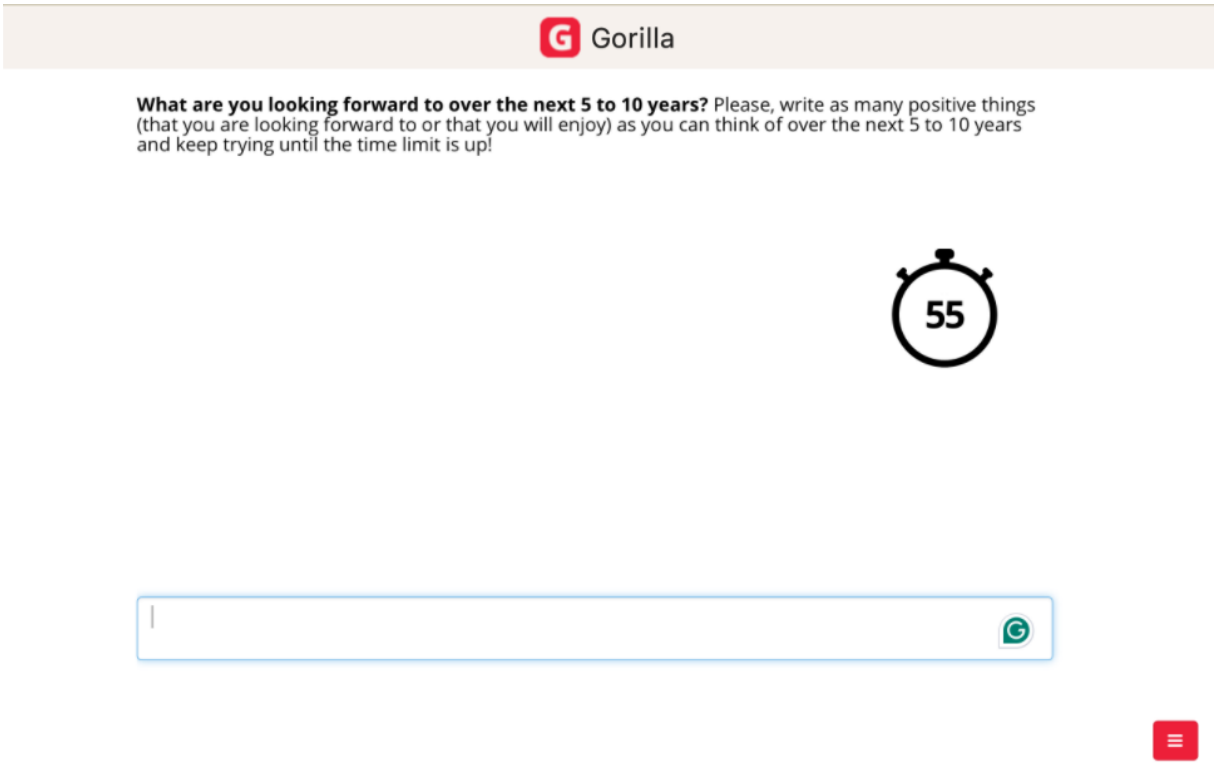

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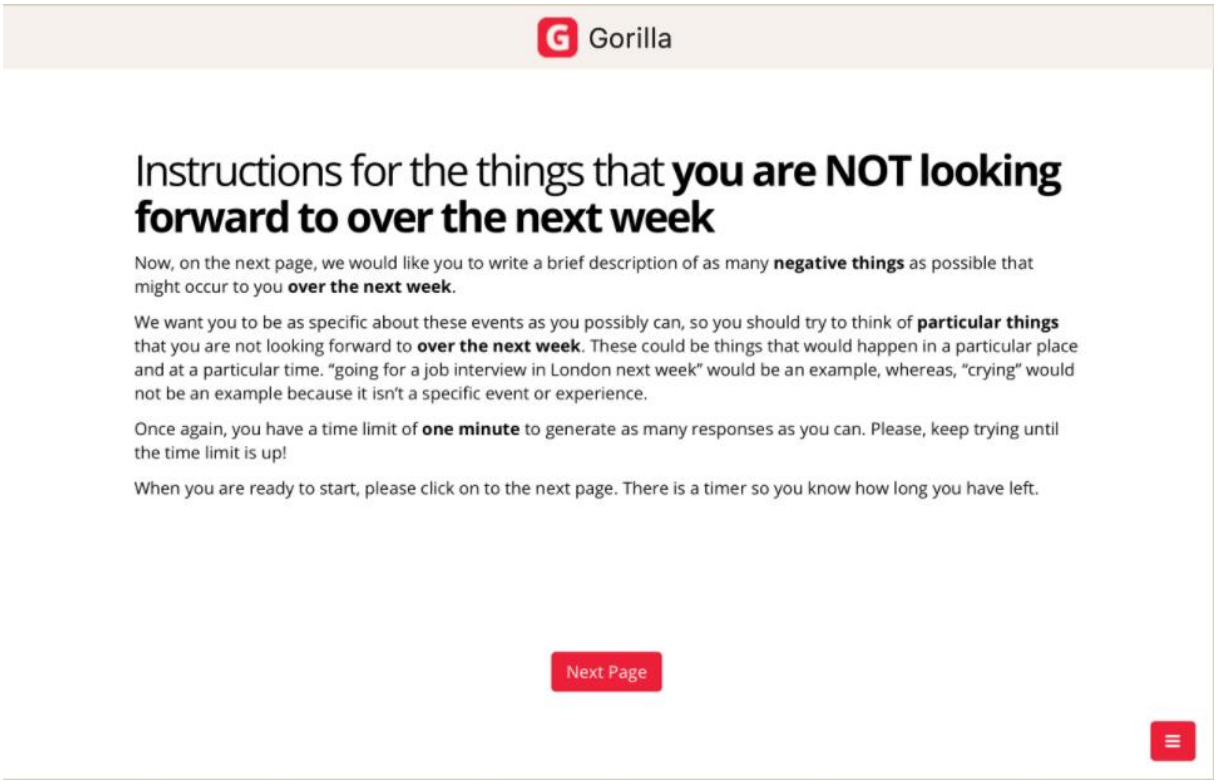

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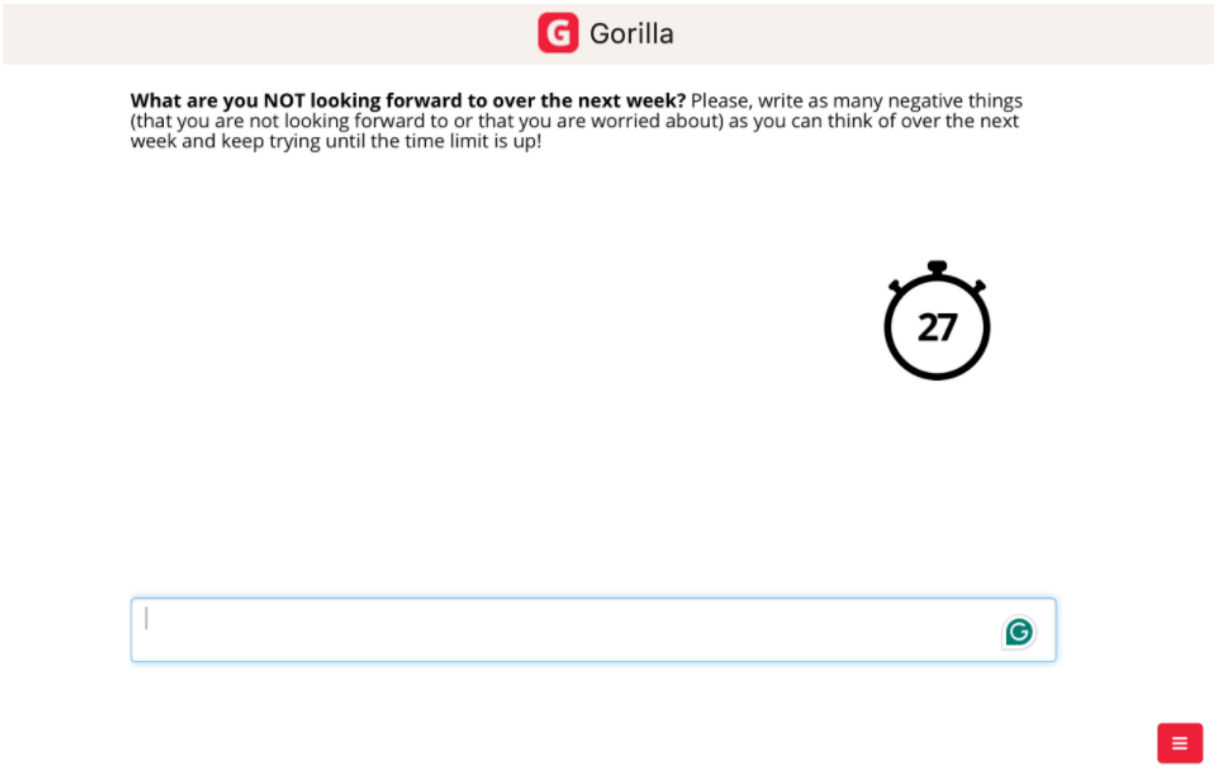

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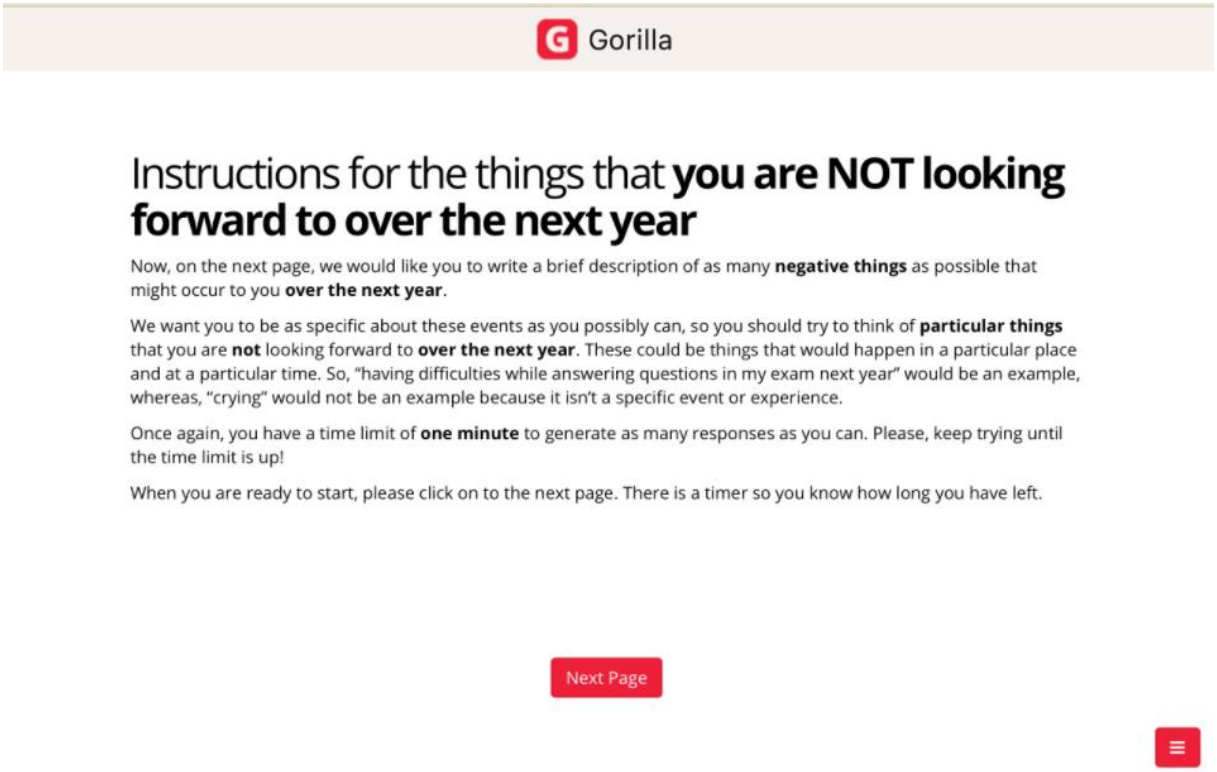

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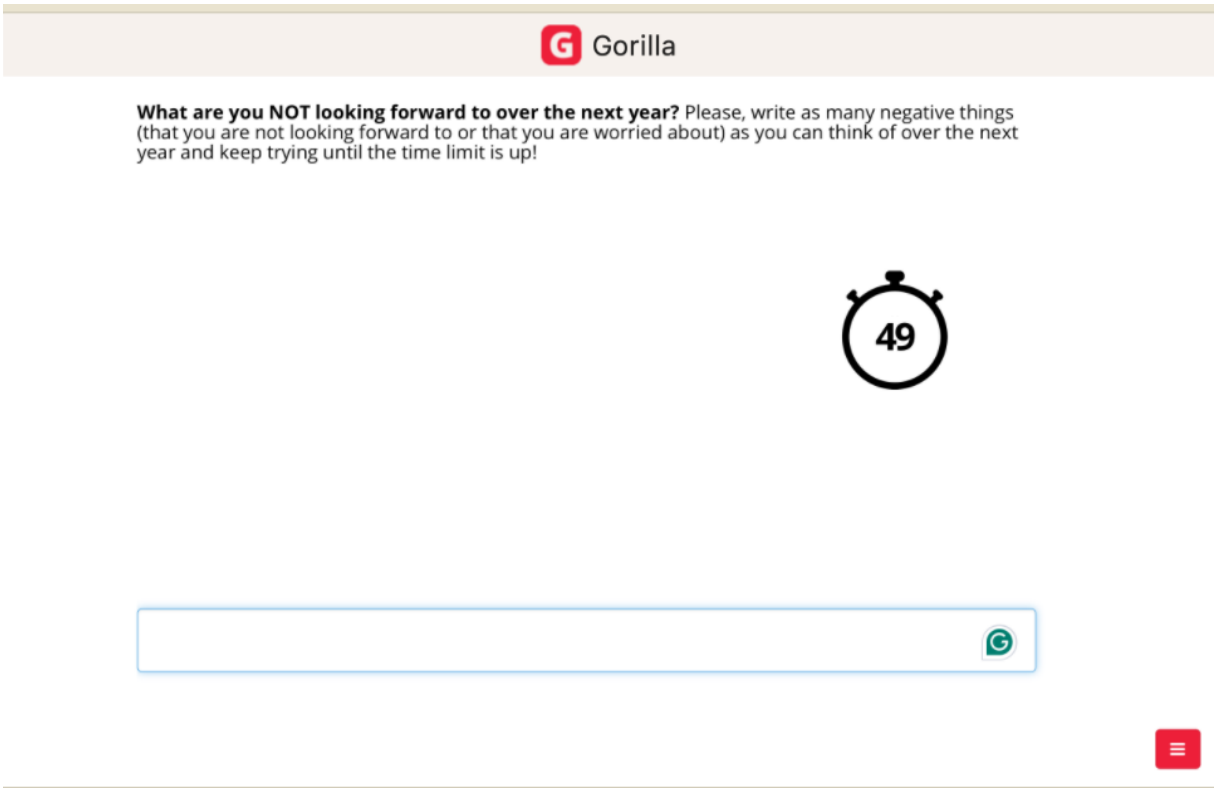
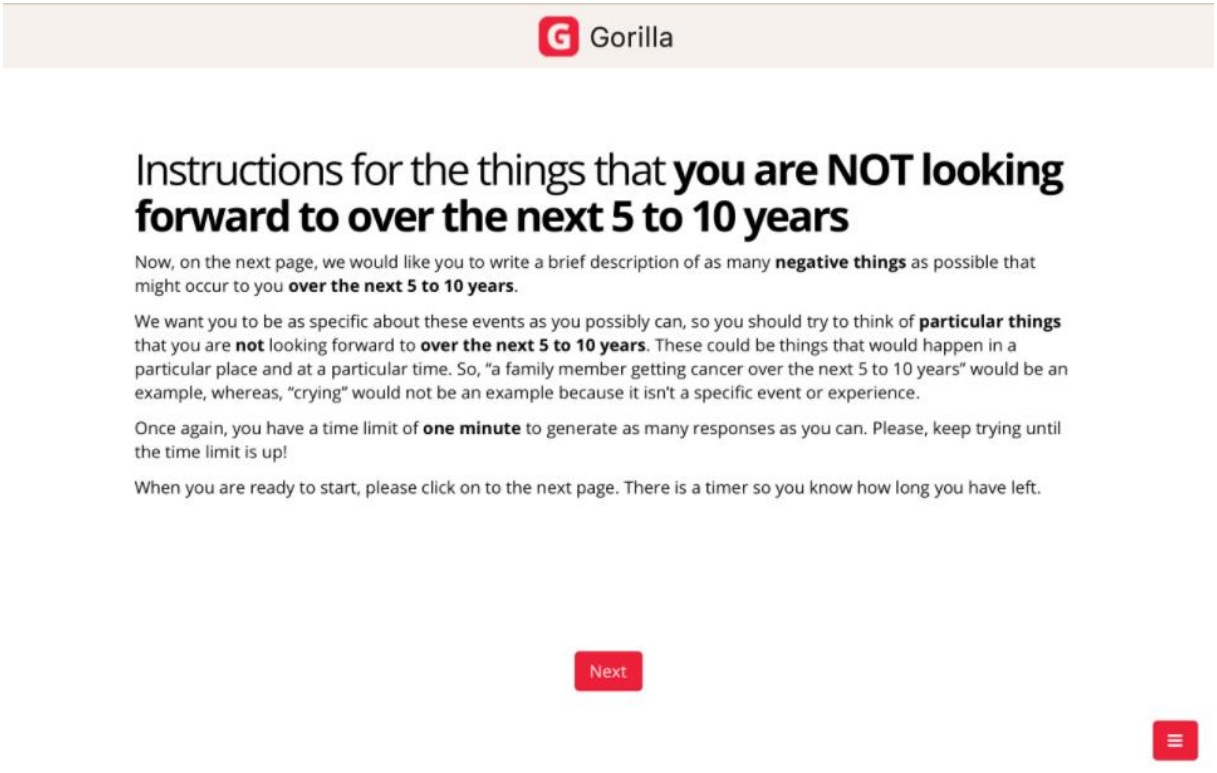
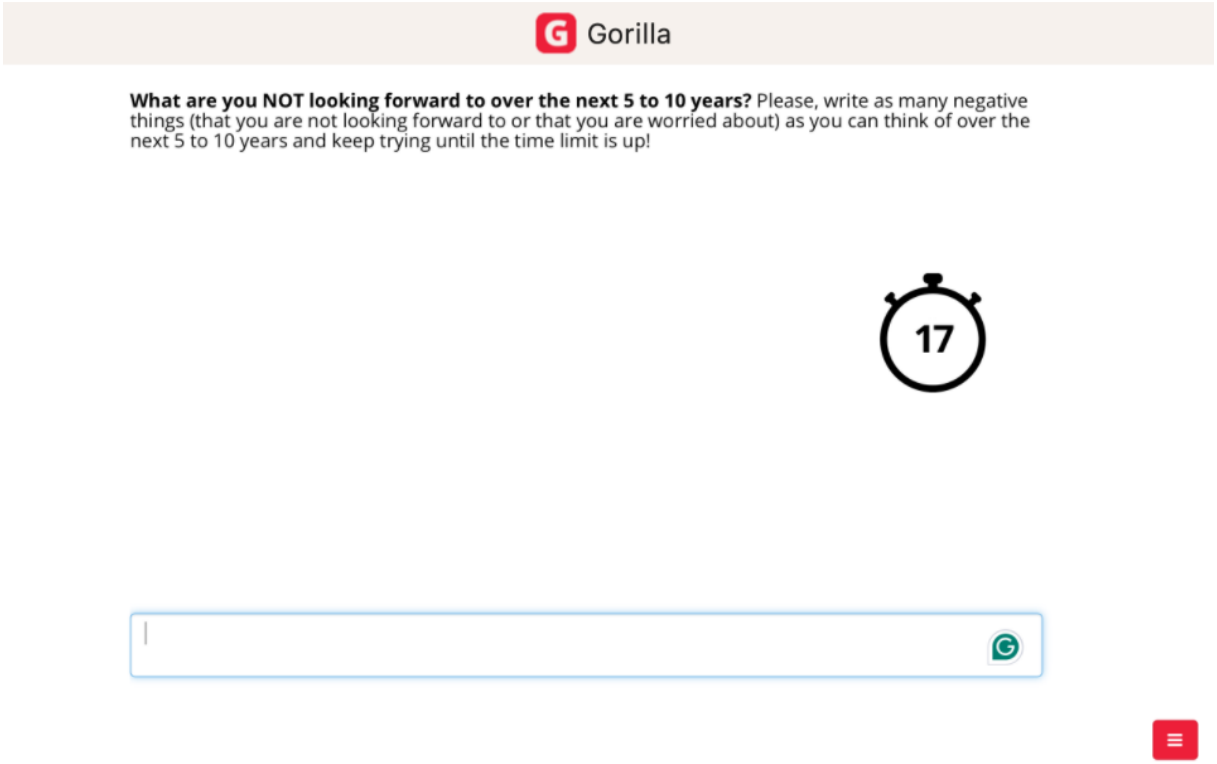


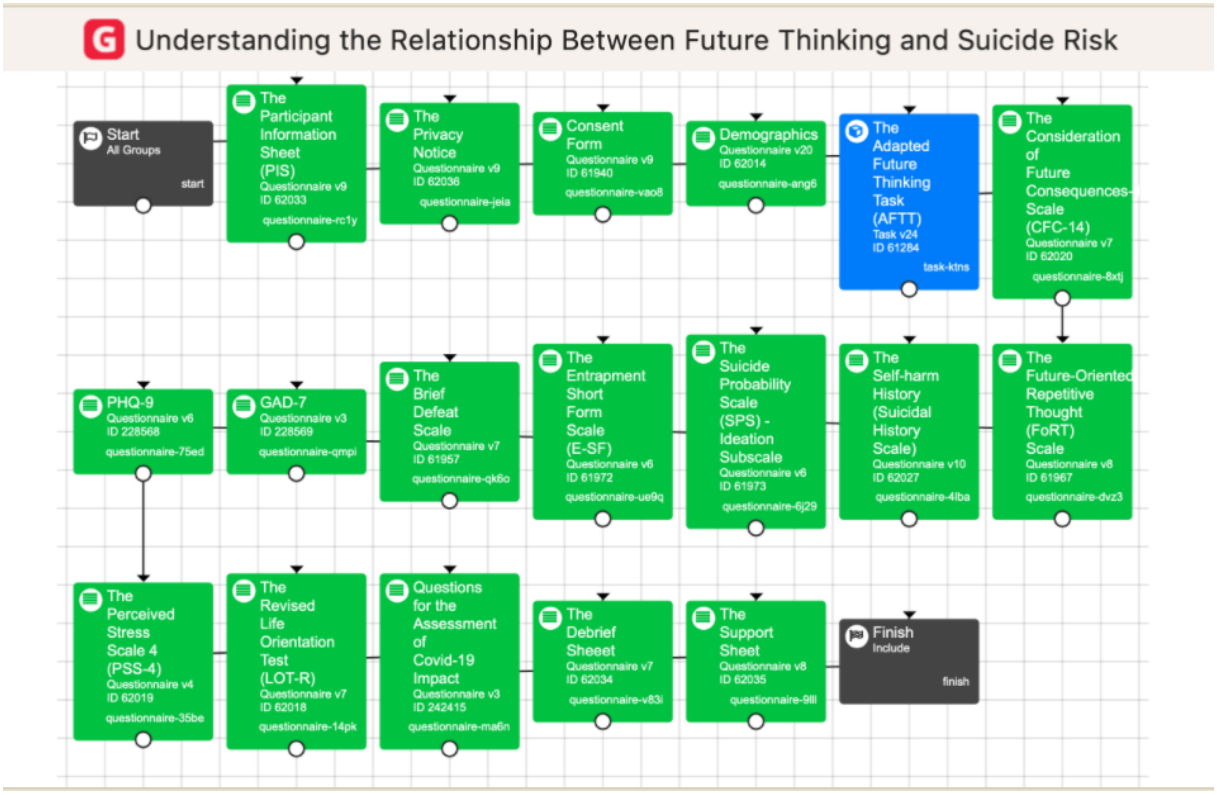
Screen 12:



Screen 13:



The completion of the AFTT occurred in step 5 of the survey study:



2- Demographics

1	Participant ID Code: _____
2	Age: _____
3	a. What is your sex? ( ) Male ( ) Female ( ) Intersex ( ) Other:_____( ) Prefer not to Say b. What is your gender? ( ) Man ( ) Woman ( ) Transgender (Man) ( ) Transgender (Woman) ( ) Other: _____ ( ) Prefer not to Say
4	a. What is your ethnic group? Please click/tick one below. ( ) White ( ) Black/African/Caribbean/Black British ( ) Mixed/Multiple Ethnicities ( ) Other Ethnic Group: _____ ( ) Asian/Asian British ( ) Unknown ( ) Prefer not to Answer b. What is your nationality? _____ c. What country do you live in? _____
5	What is your current marital status? Please click/tick one below. ( ) Single ( ) Divorced ( ) Other: _____ ( ) Married ( ) Widowed ( ) Unknown ( ) Separated ( ) Common-Law Marriage
6	Who do you currently live with? Please tick all that apply below. ( ) Live Alone ( ) Halfway/ Group Home ( ) Spouse / Common Law Partner ( ) Residential Treatment Centre ( ) Partner ( ) Psychiatric Hospital ( ) Own Children ( ) Academic Institution ( ) Parents ( ) Homeless/ Shelter ( ) Siblings ( ) Other: _____
7	What is your education level? Please click/tick one below. ( )No Schooling Completed ( ) Standard Grades/ GCSE/O-Levels ( ) Degree ( ) Highers/ A-Levels ( ) Postgraduate Qualification ( ) HNC/HND/NQ/ SVQ ( ) Unknown ( ) Other (please, specify) _____
8	What is your current employment status? Please click/tick the one that applies to you the most. ( ) Employed ( ) Retired ( ) Unemployed And Seeking Work ( ) Student ( ) Unemployed Due To Disability/Incapacity ( ) Unknown ( ) Stay At Home Parent If employed, what is the occupation:_____ If not employed, what was your previous occupation:_____
9	Which of the following options best describes how you think of yourself? Please click one below. (1) Heterosexual or straight (5) Bisexual (2) Gay (male) (6) Not sure (3) Lesbian (7) Other (please specify) _____ (4) Gay (female) (8) Prefer not to Say
10	Do you take antidepressants (medication to treat depression) or anxiolytic (medication to control anxiety feelings) or any other medication for mental health problems? Please click one below. (1) Yes (2) No If yes, please specify: ……
11	Have you ever been diagnosed with Depression, Anxiety, Schizophrenia, Borderline Personality Disorder (BPD), Eating Disorder (Anorexia/Bulimia), or other mental health issue? (1) Yes (2) No If yes, please specify:_____

3- Suicide Ideation Subscale of the Suicide Probability Scale (SPS; Cull & Gill, 1988)

Listed below are a list of statements that some people might use to describe their feelings and behaviours. Please read each statement and decide how often the statement is true for you. Click the number that corresponds with the appropriate box to show how often you feel the statement applies to you.

1 = None or a little of the time
2= Some of the time
3 = Good part of the time
4 = Most or all the time

	None or a little of the time	Some of the time	Good part of the time	Most or all the Time
1. I think of things too bad to share with others.	1	2	3	4
2. In order to punish others, I think of suicide.	1	2	3	4
3. I need to punish myself for things I have done or thought.	1	2	3	4
4. I feel the world is not worth continuing to live in.	1	2	3	4
5. I feel people would be better off if I were dead.	1	2	3	4
6. I feel it would be less painful to die than to keep living the way things are.	1	2	3	4
7. I have thought of how to do myself in.	1	2	3	4
8. I think of suicide	1	2	3	4

4-Suicidal History

(2 items from the Adult Psychiatric Morbidity Survey; McManus, Bebbington, Jenkins, & Brugha, 2016)

Listed below are some questions about suicidal thoughts and behaviours. On questions A and B, please select one of the options by clicking the number that shows your responses. On questions C and D, please type the answer if it applies to you.

1	A	Have you ever seriously thought of taking your life, but not actually attempted to do so?	1	Yes
			2	No (If no, please go to 2A)
			3	Would rather not say
	B	When did you last think about taking your life?	1	The past week
			2	The past year
			3	Longer ago
			4	Would rather not say
	C	And, how many times has this occurred?		Answer:
				Would rather not say
	D	And, how old were you the first time you had this thought?		Answer:
				Would rather not say

2	A	Have you ever made an attempt to take your life, by taking an overdose of tablets or in some other way?	1	Yes
			2	No (If no, please go to 3A)
			3	Would rather not say
	B	When did you last attempt to take your life?	1	The past week
			2	The past year
			3	Longer ago
			4	Would rather not say
	C	And, how many times have you made an attempt to take your life?		Answer:
				Would rather not say
	D	And, how old were you the first time you made an attempt?		Answer:
				Would rather not say

5-Future oriented repetitive thinking (the Future-oriented Repetitive Thought (FoRT) Scale; Miranda, Wheeler, Polanco-Roman, & Marroquin, 2017).

Please read the following statements, and, for each one, consider how often, in general, you think about the future in these ways and indicate whether you do so *almost never*, *sometimes*, *often*, or *almost always*. (Note that these questions are concerned with *how often* you generally think about the future in these ways rather than whether you tend to hold these as attitudes or beliefs about the future).

1 = Almost Never 2 = Sometimes 3 = Often 4 = Almost Always

1. I think about the possibility of good things not happening in the future. _____**(PT)**
2. I spend time thinking about bad things that could happen. _____**(PT)**
3. When something bad happens, I can't stop myself from thinking about whether it will happen again. _____**(PT)**
4. I think about how to accomplish my future goals. _____**(FG)**
5. When I don't get something that I want, I think about whether I will ever get the things that I want in life. _____**(PT)**
6. When I am looking forward to something, I can't stop myself from thinking about what it will be like. _____**(PI)**
7. I imagine the steps I need to take to get things that I want in life. _____**(FG)**
8. I think about the worst possible things that could happen. _____**(PT)**
9. When I picture good things happening in my future, it is as if they were actually happening to me now. _____**(PI)**
10. I daydream about the things that I want happening to me in the future. _____**(PI)**
11. I make specific plans for how to get things that I want in life. _____**(FG)**
12. I think about the possibility of losing people or things that are important to me. _____**(PT)**
13. When I think about something bad happening, I have a hard time thinking about anything else. _____**(PT)**
14. I play out scenes in my head over and over again about bad things that could happen. _____**(PT)**
15. When I picture something good happening to me, I get so caught up in the moment that I don't pay attention to other things. _____**(PI)***
16. I think about the ways in which my life will be good in the future. _____**(FG)**

Scoring for the FoRT Scale (Scores may be summed or averaged):

Pessimistic Repetitive Future Thinking (PT): Items 1, 2, 3, 5, 8, 12, 13, 14
Repetitive Thinking about Future Goals (FG): Items 4, 7, 11, 16 Positive Indulging about the Future (PI): Items 6, 9, 10, 15*

* Note that in the development of the FoRT Scale, the item "When I picture something good happening to me, I get so caught up in the moment that I don't pay attention to other things" loaded onto the PI scale in an exploratory factor analysis but had a low loading onto the PI scale (and was thus removed) in a confirmatory factor analysis.

Reference:

Miranda, R., Wheeler, A., Polanco-Roman, L., & Marroquín, B. (2017). The Future-Oriented Repetitive Thought (FoRT) Scale: A measure of repetitive thinking about the future. *Journal of Affective Disorders, 207*,336-345.

6-Consideration of future consequences (the Consideration of Future Consequences Scale (CFC); Strathman, Gleicher, Boninger, & Edwards, 1994).

For each of the statements shown, please indicate whether or not the statement is characteristic of you. If the statement is **extremely uncharacteristic of you (not at all like you)** please choose a **1** in the scale provided to the below of the statement; if the statement is **extremely characteristic of you (very much like you)** please choose **7** in the scale provided. And, of course, **use the numbers in the middle if you fall between the extremes**.

---

1. I consider how things might be in the future, and try to influence those things with my day to day behaviour. (F)
2. Often I engage in a particular behaviour in order to achieve outcomes that may not result for many years. (F)
3. I only act to satisfy immediate concerns, figuring the future will take care of itself. (I)
4. My behaviour is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions. (I)
5. My convenience is a big factor in the decisions I make or the actions I take. (I)
6. I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes. (F)
7. I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years. (F)
8. I think it is more important to perform a behaviour with important distant consequences than a behaviour with less important immediate consequences. (F)
9. I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level. (I)
10. I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time. (I)
11. I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date. (I)
12. Since my day to day work has specific outcomes, it is more important to me than behaviour that has distant outcomes. (I)
13. When I make a decision, I think about how it might affect me in the future. (F)
14. My behaviour is generally influenced by future consequences. (F)

Note. Strathman et al.'s (1994) original CFC scale = items 1-12. *CFC-14 Scale Instructions*: "For each of the statements shown, please indicate whether or not the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please write a "1" in the space provided to the right of the statement; if the statement is extremely characteristic of you (very much like you) please write a "7" in the space provided. And, of course, use the numbers in the middle if you fall between the extremes."

F = CFC-Future subscale item. I = CFC-Immediate subscale item.

Reference for CFC-14 Scale:

Joireman, J., Shaffer, M., Balliet, D., & Strathman, A. (2012). Promotion orientation explains why future oriented people exercise and eat healthy: Evidence from the two-factor consideration of future consequences 14 scale. Personality and Social Psychology Bulletin, 38, 1272-1287.

Brief History and Notes on the CFC Scale:

The consideration of future consequences scale was developed by Strathman, Gleicher, Boninger & Edwards (1994). The original items on the scale are items 1-12. Most research using the CFC scale has treated it as a uni-dimensional construct. Internal reliability for the overall, 12-item scale is high (typically ranging from .80 to .85) with a five-week temporal stability of .72 (Strathman et al., 1994) (for a recent review of the CFC literature, see Joireman, Strathman, & Balliet, 2006).

While the internal reliability of the overall scale is quite high, recent research suggests the scale contains two subscales, one tapping consideration of immediate consequences (CFC-I), the other tapping consideration of future consequences (CFC-F) (Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008).

More recently, the CFC scale has been expanded to a 14-item scale (with 2 new future items to improve the reliability of the CFC- Future subscale) (Joireman, Shaffer, Balliet, & Strathman, 2012).

To obscure the purpose of the scale, we often call it the SGBE scale.

Strathman et al. originally used a 5-point scale. To create more variance, researchers have often used the 7-point scale shown above.

Shown below are instructions for computing the two subscales and the overall CFC scale score. Note on Scoring:

CFC-Immediate Sub-Scale: cfc3, cfc4, cfc5, cfc9, cfc10, cfc11, cfc12 CFC-Future Sub-Scale: cfc1, cfc2, cfc6, cfc7, cfc8, cfc13, cfc14

CFC-Total Scale: recode the immediate items (3, 4, 5, 9, 10, 11, 12), then average these recoded items with the future items (1, 2, 6, 7, 8, 13, 14).

References for the Brief History and Notes on the CFC Scale:

Joireman, J., Balliet, D., Sprott, D., Spangenberg, E., & Schultz, J. (2008). Consideration of future consequences, ego -depletion, and self-control: Support for distinguishing between CFC-immediate and CFC-future sub-scales*. Personality and Individual Differences, 48*, 15-21.

Joireman, J., Shaffer, M., Balliet, D., & Strathman, A. (2012). Promotion orientation explains why future oriented people exercise and eat healthy: Evidence from the two-factor consideration of future consequences 14 scale. *Personality and Social Psychology Bulletin, 38*, 1272-1287.

Joireman, J., Strathman, A., & Balliet, D. (2006). Considering future consequences: An integrative model. In L. Sanna & E. Chang (Eds.), *Judgments over time: The interplay of thoughts, feelings, and behaviours* (82-99). Oxford: Oxford University Press.

Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S. (1994). The consideration of future consequences: Weighing immediate and distant outcomes of behaviour. *Journal of Personality and Social Psychology, 66*, 742-752.

7-Stress (the Perceived Stress Scale-Short Form (PSS-short); Cohen & Williamson, 1988)

INSTRUCTIONS

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, please indicate your response by using scale below representing how often you felt or thought a certain way.

1 = Never
2 = Almost Never
3 = Sometimes
4= Fairly Often
4 = Very Often

	Never 1	Almost Never 2	Sometimes 3	Fairly Often 4	Very Often 5
1. In the last month, how often have you felt that you were unable to control the important things in your life?	☐	☐	☐	☐	☐
2. In the last month, how often have you felt confident about your ability to handle your personal problems?	☐	☐	☐	☐	☐
3. In the last month, how often have you felt that things were going your way?	☐	☐	☐	☐	☐
4. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	☐	☐	☐	☐	☐

Reversed items: Questions 2 and 3

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*, 385-396

8-Defeat (3 items from the Defeat Scale; Gilbert & Allan, 1998)

Below is a series of statements, which describe how people can feel about themselves. Read each item carefully and click the number below the statement that best describes how you have felt in the last 7 days. Use the scale below shown to rate each item. Please do not omit any item.

1= Never
2 = Rarely
3= Sometimes
4 = Mostly (a lot)
5= Always

1. I feel defeated by life.

1	2	3	4	5

2. I feel that there is no fight left in me.

1	2	3	4	5

3. I feel that I am one of life's losers.

1	2	3	4	5

9-Entrapment (Entrapment Scale Short-Form (E-SF) (De Beurs *et al*., 2020)

For each of the following attitude statements indicate the extent to which you think it represents your own view of yourself. Read each item carefully and click the number below of the statement that best describes the degree to which each statement is like you. Use the scale below. Please do not omit any item.

Scale:

1 = Not at all 2 = A little bit 3 = Moderately 4 = Quite a bit 5 = Extremely

1-I often have the feeling that I would just like to run away.

1	2	3	4	5

2-I feel powerless to change things.

1	2	3	4	5

3-I feel trapped inside myself.

1	2	3	4	5

4-I feel I'm in a deep hole I can't get out of.

1	2	3	4	5

10-Anxiety (the General Anxiety Disorder-7 Scale (GAD-7); Spitzer, Kroenke, Williams, & Löwe, 2006)

Over the <u>last 2 weeks</u>, how often have you been bothered by the following problems? *(Use "✔" to indicate your answer"*		Not at all	Several days	More than half the days	Nearly every day
1.	Feeling nervous, anxious or on edge	1	2	3	4
2.	Not being able to stop or control worrying	1	2	3	4
3.	Worrying too much about different things	1	2	3	4
4.	Trouble relaxing	1	2	3	4
5.	Being so restless that it is hard to sit still	1	2	3	4
6.	Becoming easily annoyed or irritable	1	2	3	4
7.	Feeling afraid as if something awful might happen	1	2	3	4

11-Depression (the Patient Health Questionnaire Depression (PHQ-9) Scale; Cameron, Crawford, Lawton & Reid, 2008)

PATIENT HEALTH QUESTIONNAIRE -PHQ-9

Over the last 2 weeks, how often have you been bothered by any of the following problems? Read each item carefully and click the number below the statement. Use the scale below shown to rate each item. Please do not omit any item.

1= Not at all
2= Several days
3= More than half the days
4 = Nearly every day

1. Little interest or pleasure in doing things.

1	2	3	4

2. Feeling down, depressed, or hopeless.

1	2	3	4

3. Trouble falling or staying asleep or sleeping too much.

1	2	3	4

4. Feeling tired or having little energy.

1	2	3	4

5. Poor appetite or overeating.

1	2	3	4

6. Feeling bad about yourself - or that you are a failure or have let yourself or your family down.

1	2	3	4

7. Trouble concentrating on things, such as reading the newspaper or watching television.

1	2	3	4

8. Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual.

1	2	3	4

9. Thoughts that you would be better off dead or of hurting yourself in some way.

1	2	3	4

12-Optimism/pessimism (the Revised Life Orientation Test (LOTR); Scheier, Carver, & Bridges, 1994)

Revised Life Orientation Test (LOT-R)

Instructions:
Please answer the following questions about yourself by indicating the extent of your agreement using the following scale:

[0] = strongly disagree
[1] = disagree
[2] = neutral
[3] = agree
[4] = strongly agree

Be as honest as you can throughout, and try not to let your responses to one question influence your response to other questions. There are no right or wrong answers.

_____ 1. In uncertain times, I usually expect the best.
_____ 2. It's easy for me to relax.
_____ 3. If something can go wrong for me, it will.
_____ 4. I'm always optimistic about my future.
_____ 5. I enjoy my friends a lot.
_____ 6. It's important for me to keep busy.
_____ 7. I hardly ever expect things to go my way.
_____ 8. I don't get upset too easily.
_____ 9. I rarely count on good things happening to me.
_____ 10. Overall, I expect more good things to happen to me than bad.

Scoring:
1. Reverse code items 3, 7, and 9 prior to scoring (0=4) (1=3) (2=2) (3=1) (4=0).
2. Sum items 1, 3, 4, 7, 9, and 10 to obtain an overall score.

Note Items 2, 5, 6, and 8 are filler items only. They are not scored as part of the revised scale.

The revised scale was constructed in order to eliminate two items from the original scale, which dealt more with coping style than with positive expectations for future outcomes. The correlation between the revised scale and the original scale is .95.

Reference:
Scheier, M.F., Carver C.S., and Bridges, M.W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A re-evaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, **67**, 1063-1078.

APPENDIX I - Support Sheet

Note: This support sheet is used in both survey and experimental studies.

Sometimes, we may feel down, depressed, or blue, in such cases, it is normal to ask for help. Nevertheless, it can be difficult for you to know when to ask for help, and how to go about asking for it. Therefore, if you are feeling down, or are worried about something and want to talk to someone, please find the list of organisations below that may help you in such circumstances. You can also wish to contact your GP or other healthcare professionals.

If you think that your life or someone's life is in danger, you should immediately visit an emergency department or call an ambulance by dialling 999.

NHS 24. Health Information and Self Care Advice for Scotland

NHS 24 provides detailed up-to-date information about health and self-care advice for the people of Scotland. If your GP surgery is closed and you cannot wait until it opens, you may call NHS 24 to get urgent health advice. Then, they will direct you to the right care for you or the individual whom you are calling for. This might be to the out of hours services of your local Health Board, Accident and Emergency department, or the Scottish Ambulance Service. If appropriate, they may recommend you take some steps to look after yourself at home.

www.nhs24.com Tel: 111

Link

Link

Samaritans

Samaritans is accessible 24 hours a day for individuals who are experiencing depression, loneliness, stress, feelings of distress or despair, including thoughts of suicide to provide confidential emotional support.

Link

Tel: 08457 90 90 90

jo@samaritans.org 116 23

By a letter: Chris; Freepost RSRB-KKBY-CYJK PO Box 9090 STIRLING FK8 2SA

Breathing Space

Breathing Space is a confidential and free service for people, who are experiencing low mood or depression, or who are unusually worried about something and would like to speak to someone. The phone line is open 24 hours at weekends (from 6 pm on Friday to 6 am on

Monday) and from 6 pm to 2 am on weekdays (from Monday to Thursday). Link Tel: 0800 83 85 87

Queen Elizabeth University Hospital Accident and Emergency Department

Glasgow, Accident and Emergency Department (A&E), 1345 Govan Road, G51 4TF.

The Emergency Department prioritises persons who have a serious injury or an accident or who have a sudden serious illness or a medical condition. If you think that your life or someone's life is at risk, you should immediately call 999.

Telephone: 0141 201 1100. Location name: Langlands Drive, Level 0 - Entrance from Langlands Drive (opposite Car Park 3).

Scottish Association for Mental Health (SAMH)

SAMH is a mental health organisation, and its phone line is available from 9 am to 5 pm, Monday to Friday. Information service staff and volunteers may response general mental health enquiries, offer advice on your rights and direct you to your local services.

Address: Brunswick House 51 Wilson Street Glasgow G1 1UZ

Telephone: 0141 530 1000

Link

Link

Alcohol Focus Scotland

Alcohol Focus Scotland is the national charity, which aims to prevent and decrease alcohol harm. Their website links include information about the contact details of a wide range of support services should you wish to talk to or get advice as to your drinking.

Link

Smokeline

Smokeline is the national stop smoking helpline, open every day from 8 am-10 pm in Scotland. Trained smoking cessation advisers may advise you on quitting, support during cravings, information about using NRT and signpost to local services. Link

Tel: 0800 84 84 84

University of Glasgow Counselling & Psychological Services

CaPS may be accessed by students of the University of Glasgow. It provides one to one support to discuss issues. Drop-in appointments may be scheduled by MyCampus, or through phone.

0141 330 4528 or studentcounselling@glasgow.ac.uk or Link

College of Medical, Veterinary & Life Sciences Ethics Committee for
Non-Clinical Research Involving Human Subjects

APPENDIX J - Screening Tool - Experimental Study

PART A:

Thanks for reaching out to me.

This process will take about five- to ten- minute to complete. First, I will describe what is included in this study. Then, if you are interested, I will ask you some questions to see whether you are an eligible study participant.

Before I describe the study, I want to remind you that some questions I will ask you are about sensitive topics, and so, you might want to be in a private room. Everything that you say here is confidential. However, I must inform you that if you tell me that you are at imminent risk of suicide, then, I must take some steps to ensure your safety such as contacting emergency services. Is it ok for you?

In case we may have a problem in connection, and if I need to contact emergency services, may I take your contact information at this point, please?

Name:_____ Participant Code:_____

Address:_____

Phone #s: 1) home: _____

2) work: _____

3) mobile: _____

4) e-mail address: _____

Thank you. Now, let me explain the study but please stop me if you have any questions. This study aims to understand the relationship between thinking about the future and suicide risk. ***We are looking for adults who have had experienced suicidal thoughts or suicidal behaviours and those who have not. I*** *should also let you know that you will be invited to visit our SBRL Health Lab in Glasgow for the experimental component of the study. Is this ok for you?* [If yes, continue].

To give you more detailed information about the study: During this study, you will complete an online survey at baseline after this screening call if you are seen as an eligible study participant and visit our SBRL Health Lab that is part of the University of Glasgow and on the grounds of Gartnavel Royal Hospital in Glasgow for the experimental part of the study. Due to the sensitive nature of this research, some questions will be about suicidal thoughts and feelings. Within the survey link, you will be provided with the Participant Information Sheet and Privacy Notice to read and a Support Sheet. Then, you will be given the Consent Form in which you will confirm that you have read and understood these two forms and state if you agree to participate in the study or/not through tick/clicking corresponding statements. If you choose to participate in this study in this way, you will also be asked to complete demographics and baseline measures within this survey link. After the completion of the survey link, we will arrange a study appointment that will require you to visit our SBRL Health lab. By the way, there is no NHS involvement in this study. And this lab session will take about one hour and include completing a few tasks regarding your mood and thoughts about the future (the experimental component of the study). You will receive £30 as compensation for your study completion and to contribute to your travel cost when leaving the lab (additional compensation may be offered for participants who reside a long distance away (25 miles away) from the Gartnavel Royal Hospital, up to a maximum of £10). Are you still happy to continue this screening process? So far, do you have any questions?

[If not interested]: *That is ok, thank you so much for your time. Please do not hesitate to get in touch with me if you change your mind or have any questions.*

[If the person is interested]: *As a research procedure, we ask all potential participants some questions to decide if they are eligible for study participation. We are looking for adults (18 years or older) who have had suicidal experiences and adults without any history of suicide attempts or suicidal thoughts. There are no right or wrong answers, but we are asking you to detect if you are eligible for this study. Some questions will be about suicide attempt history. Are you still happy to continue the screening process? Do you have any questions before we start?*

Age (must be ≥18)? _____

Do you have any special requirements (e.g., a hearing aid, personal assistance/support, wheelchair ramp)?

Do you have a learning disability or cognitive impairment (e.g., dyslexia because some tasks in this study will require writing ability)? _____

PART B:

[Suicide Attempt]

* *Have you attempted suicide at least once that required hospital assistance in the past?*
If yes, when was the last time?

[If they have made at least one lifetime suicide attempt in the past then a Risk Assessment (Part E-Appendix M) must be completed]

[Current Suicidality]

* *At present, how would you rate your desire to live, with "10" being you really desire to be alive and "0" being you very much wish to be dead?*

[Go to risk assessment (Part E)]

NOTE: Risk assessments will be conducted at three-time points for this study regardless of circumstances requiring risk assessment according to the standard procedure described above: During the screening calls, if they attend the lab at the beginning and the end of the experimental sessions.

[Experiencing a Psychotic Episode]

* *Have you seen things that others can't see or don't appear to see?* ( ) Yes / ( ) No.
* *Do you hear sounds or voices that others cannot hear? (In your head, or out of your head)?*
    Follow-up:
    * *Do you feel like other people are watching you or talking about you?*
    * *What are others saying or talking about you?*
    * *When was the last time you experienced this?*

* *Do you have any unusual beliefs other people around you do not have?*
    Follow-up if necessary:
    * *Do you feel you are able to read other people's minds? or do you feel you have special powers?*

[In case the participant has these symptoms and ask questions, such as "Am I becoming mad?", reply: "No, it is very common for people to have such feelings and thoughts. If you think these feelings and thoughts are causing any problem for you, then it would be good to see your GP"]

PART C:

[If the person does NOT qualify]: *Thank you so much for answering these initial questions and for your interest in this study. According to your initial responses, it seems you are not an eligible study participant for this study. However, thanks a lot for your call and for taking the time to speak to me. There are lots of studies going on in our lab so if you see one you are interested in the future, please do not hesitate to get in touch with us again.*

[If the person asks about the reason for not being eligible]: *For this study, we are looking for participants of a certain age, gender, and history – so there was nothing wrong with anything you reported. Just, you do not have the features we are looking for in this study. OK, thank you so much again for your time.*

[If more persistent]: *Your scores on some of the questions were just a bit more varied than what we are looking for right now. OK, thanks a lot again.*

PART D:

[If the person qualifies, and completes the first survey link in which s/he gives her/his consent after reading the participant information sheet and privacy notice, fills out some baseline measures schedule the Lab meeting]

Thank you very much for answering these initial questions and for your interest in this study. According to your initial responses, it seems you are an eligible study participant. Thus, if you are still interested, I want to send you a survey link including a participant information sheet, privacy notice, and consent form as well as some questionnaires.

PART E: RISK ASSESSMENT

RISK FACTORS FOR SUICIDE (*The researcher completes the known parts on her own*.)

☐ Gender (females more attempts, males more completions) _____
☐ Ethnicity (white attempt & complete more than others) _____
☐ Age ≥16 years? _____

☐ Current psychiatric disorder?
- ☐ Mood disorder (MDD, Bipolar)
- ☐ Substance use disorder (alcohol, drugs)
- ☐ Psychotic disorder
- ☐ Personality disorder (esp. borderline personality disorder (BPD) or antisocial personality disorder (ASPD))

☐ Suicide history
- ☐ Past suicide attempt (yes/no)
- ☐ Family history of suicide attempts/completions (yes/no)?
- ☐ Current suicide ideation (0-10 scale)?
- ☐ Current plan (yes/no)?
- ☐ Access to lethal means of suicide (e.g., Medications, firearms, sharp objects, etc.)?
- ☐ Current suicidal intent (On scale 0 – 10, what is your current intent to end your life?___)

☐ Other risk factors
- ☐ Recent loss, separation/divorce/break-up?
- ☐ Impulsiveness?
- ☐ Hopelessness for the future?
- ☐ Current distress, irritability, agitation, or other "abnormal" mental state
- ☐ Depressed mood (On scale 0 – 10 [0 = neg., 10 = pos.] At present, how would you rate your mood? ___)

NOTES:

PROTECTIVE FACTORS & SAFETY PLAN:

☐ In treatment? If so, is the clinician aware of the risk? _____
☐ Are family/housemate/friends aware of the risk? _____
☐ Having children in the home, partner, or other positive relationships?

[If YES to Access to Lethal Means of Suicide]
☐ Means restriction
(e.g., sharp objects, drugs, firearms etc.) (By family/social support or monitoring)? _____

[STEPS TO INCREASE SUBJECT SAFETY (CHECK ALL THAT APPLY)]:

LOW RISK: No previous attempt or current self-injurious thoughts and behaviours (SITB):
- ☐ Validate participant's levels of feelings, thoughts, intents etc.
- ☐ Encourage the participant to contact a clinician if distressed or need help in the future
- ☐ Provide referrals if needed

MODERATE RISK: Previous attempt, but suicide intent ≤6
- ☐ Check all completed above
- ☐ Participant articulated own safety plan (i.e., what to do if thoughts/feelings increase)
- ☐ Provide the subject with emergency contact details (such as 999, Samaritans and Breathing Space)

HIGH RISK: Current suicide intent is present, and 7-8, but there is no plan or access to lethal means of suicide
- ☐ Check all completed above
- ☐ Encourage subject to contact support(s) and clinician(s)/psychiatric emergency services immediately to inform of risk.
- ☐ Call your supervisors, Rory O'Connor, and Jonathan Evans (must do)

IMMINENT RISK: Current suicidal intent: 7-8 with specific plan/access or 9-10 regardless of the plan
- ☐ Check all completed above
- ☐ Call Rory O'Connor and Jonathan Evans (must do)
- ☐ Respondent contacts clinician or people in the support network to let them know about the level of risk and enlist their help in getting subject to a clinician (preferably)
- ☐ If in with researcher participant should not leave alone. The participant can leave with a family member or friend, or the researcher should accompany participant to Hospital Emergency Department (must do)
- ☐ If on the phone participant should not stay at home alone. The researcher contacts the clinician and/or people in the support network to let them know about the level of risk and enlist their help in getting the subject to a clinician (must do)
- ☐ If an ambulance is sent, wait on the phone with the respondent until the ambulance comes.
- ☐ Call 999 and tell the participant's location and level of risk.

NOTES:

SAFETY PLAN FOR AFTER RISK ASSESSMENT:

Do you know what the safety plan is? Is it suitable for you to briefly review this with you, because we usually do with other participants? A safety plan has a list of things you may follow when you have suicidal thoughts. For example, if the thoughts' level is moderate, we usually suggest that you reach out to your clinician, or family or friends if you feel comfortable doing so. You may also want to call Breathing Space on 0800 83 85 87, or the Samaritans on 08457 90 90 90. If the thoughts' intensity rises, we recommend you call 999 or visit the nearest emergency department.

Researcher:_____ Date: _____

APPENDIX K - Experimental Study Advert

University of Glasgow | College of Medical, Veterinary & Life Sciences

An Experimental Study of the Relationship between Future Thinking and Suicide Risk

Researchers at the University of Glasgow are looking for **individuals (18 years or older) who have had experienced suicidal thoughts or suicidal behaviours and those without any history of suicide attempts or suicidal thoughts** to participate in an experimental study to better understand the relationship between future thinking and suicide risk.

*Participation includes:
(1) Contacting the researcher, Gonca Kose through this advert
(2) Completing a survey link, and
(3) One visit to our SBRL Health Lab which is part of the University of Glasgow and on the grounds of Gartnavel Royal Hospital.

*Eligibility for this study will be assessed via a screening call.
*Participants who complete this confidential study will receive compensation for their participation and travel costs.

To learn more, please email the researcher with your contact details.
**This is a research study and taking part in it does not imply receiving psychological treatment. If you need to talk to someone, you can do so by calling The Samaritans from any phone on 116 123.*

APPENDIX L - Participant Information Sheet - Experimental Study

PARTICIPANT INFORMATION SHEET -V2 26.02.2022

1. Study title

An Experimental Study of the Relationship between Future Thinking and Suicide Risk.

2. Invitation paragraph

You are being invited to participate in an experimental study examining the relationship between suicide risk (suicidal thoughts and suicidal behaviours) and the way we think about the future. Before you decide to take part, it is important for you to understand why the research is being done and what it will involve. Please read the following information carefully and discuss it with others if you want. The study is being conducted by Gonca Kose, a postgraduate researcher within the Suicidal Behaviour Research Laboratory (SBRL-Institute of Health and Wellbeing) that is part of the University of Glasgow and on the grounds of Gartnavel Royal Hospital. If you have any questions or if anything is not clear, please do not hesitate to reach out to the researcher for more details.

3. What is the purpose of the study?

The main purpose of this study is to better understand the relationship between the way people think about the future and suicide risk. This project will aim to investigate whether people with and without suicidal experiences differ in their way of thinking about the future. The information provided by participants during the study will contribute to a growing evidence base to help understand and decrease the risk of suicide. The findings from this study should also help researchers, policymakers, and health professionals by informing future prevention, policymaking, and treatment interventions aiming at reducing suicide.

4. Why have I been invited to participate?

You responded to an advertisement regarding the research and met the eligibility criteria to take part in this study. This study will involve adults with and without suicidal experiences.

5. Do I have to take part?

No, taking part in this study is entirely voluntary. If you decide to participate in this study, you will be provided with a survey link including a copy of this Participant Information Sheet and a Privacy Notice to read, and a Consent Form to record your agreement to take part in this study. You are free to withdraw from the study at any time without giving a reason until the findings from this study are written in the study report.

6. What will happen to me if I take part?

Approximately 40 individuals aged 18 years or older people who have had suicidal experiences and people without any history of suicide attempts or suicidal thoughts will take part in this experimental study. After expressing your interest in this study, your eligibility will be assessed via a screening call that will take about 5-10 minutes. Then, if you are seen as an eligible study participant and still interested in the study, you will be asked to complete a survey, including the participant information sheet, privacy notice, consent form, demographics form, baseline questionnaires, and support sheet which will take about 15 minutes to complete. The experimental session of the study will be conducted in the University of Glasgow's Suicidal Behaviour Research Lab (SBRL) on the grounds of Gartnavel Royal Hospital, Administration Building in Glasgow. Each participant is expected

to attend the SBRL Health lab for the experimental component of the study which will take about one hour.

7. What do I have to do?

After contacting the researcher to express your interest in this study that you have seen advertised and sharing your contact details with the researcher, you will be informed more about the study and assessed for your eligibility to participate in this study by the researcher. This will be via a 10-minute screening call on the phone or via Zoom. Then, if you are an eligible participant for the study and still interested in this study, you will be provided with a survey link in which you will be asked to read a participant information sheet and a privacy notice and give your consent by ticking/clicking the boxes corresponding to the statements to confirm that you have read and accepted each statement and agreed to participate in the study and complete a demographic form and some questionnaires to complete before attending a lab appointment for the experimental component of the study. At the lab, you will complete a few tasks regarding your thoughts about the future and mood through interviews with the researcher.

8. What are the possible disadvantages and risks of taking part?

As in all research that asks about well-being and suicidal behaviour, there is a possibility that some questions may lead you to think about upsetting experiences you had in your life. You are free to withdraw from the study at any point. You will be provided with a list of contacts, such as Breathing Space and Samaritans if you wish to get more information or to speak to someone.

9. What are the possible benefits of taking part?

There will be no direct benefit from taking part in this study. The information collected through this study will give us a better understanding of the relationship between thinking about the future and suicide risk in adults who have had suicidal experiences and those who have not. The results might help improve the treatment of suicidal thoughts and behaviours as well as informing policies on suicide prevention. Participants will receive a £30 Amazon Voucher as compensation for their study completion and to contribute to their travel costs when leaving the lab (additional compensation may be offered for participants who reside a long distance away (25 miles away) from the SBRL Health lab, Administration building on the grounds of Gartnavel Royal Hospital that is part of the University of Glasgow up to a maximum of £10 Amazon Voucher).

10. Will my taking part in this study be kept confidential?

Your participation and all information that is collected about you during this study process will be kept strictly confidential. Any personal information, including your name and contact details, will be stored separately from the information you provide during the course of the study. The data in paper form will be held securely in locked cabinets in University rooms that have restricted access, and all electronic data will be stored on secure servers.

Only the research team members or appropriate governance staff who may check that the study is conducted properly will be able to access your personal information. However, if significant concerns regarding your mental or physical health arise during your participation in the study, a member of an appropriate clinical team or family members or support network will be immediately informed.

The data will be stored in archiving facilities according to the University of Glasgow's retention policy of up to 10 years. After this period, further retention may be agreed upon, or your data will be securely deleted in line with the relevant standard procedures.

Your rights to access, change or move the information we hold may be limited because we need to manage your information in particular ways for the research to be reliable and accurate. If you withdraw from the study, your data collected up to that point will be retained and used for the remainder of the study. To safeguard your rights, we will try to use the

minimum personally identifiable information. You can learn more about how we will use your information from the researcher at xxxxxxxx@student.gla.ac.uk.

11. What will happen to my data?

Researchers from the University of Glasgow collect, store, and process all personal information under the General Data Protection Regulation (GDPR) (2018). All study data will be stored in line with the General Data Protection Regulation (2018). However, if you are deemed a risk to yourself or others, the PhD researcher may need to break confidentiality and contact emergency services, your loved ones, or your support network on your behalf.

12. What will happen to the results of the research study?

The findings may be disseminated by peer-reviewed scientific journals and presented at conferences by a poster or oral presentation in addition to forming part of the researcher's PhD thesis. Your name will not appear in any publication although anonymised quotes may be used in resulting publications or reports. You will be asked if you want to receive a summary of the research findings. If so, you will be provided with a summary of the research findings.

13. Who is organising and funding the research?

This research is organised by the University of Glasgow and funded by the Turkish Government and funds held in the Department of Mental Health and Wellbeing (MHW) at the University of Glasgow.

14. Who has reviewed the study?

This study has been reviewed by the College of Medical, Veterinary and Life Sciences (MVLS) Ethics Committee at the University of Glasgow (UofG).

15. Contact for Further Information

If you have any questions or need any further information about the study, please contact GONCA KOSE: PhD Student, The University of Glasgow, xxxxxxx@student.gla.ac.uk.

RORY O'CONNOR: Professor of Health Psychology, The University of Glasgow, Rory.OConnor@glasgow.ac.uk, 0141 211 3924.

JONATHAN EVANS: Professor of Clinical Neuropsychology, The University of Glasgow, Jonathan.Evans@glasgow.ac.uk, 0141 211 3978.

Suicidal Behaviour Research Laboratory (SBRL), Institute of Health and Wellbeing (IHW), University of Glasgow (UofG), **Gartnavel Royal Hospital, Administration Building, (The SBRL Health Lab, 2nd Floor, Room 28) 1055 Great Western Road, Glasgow, G12 0XH, Scotland, The UK.**

Thank you for taking the time to read this information sheet!

APPENDIX M - Privacy Notice - Experimental Study

Privacy Notice for An Experimental Study of the Relationship between Future Thinking and Suicide Risk - V2 26.02.2022

Your Personal Data

The PhD researcher together with the University of Glasgow (UofG) will be what is known as the 'Joint Data Controllers' of your personal data that will be processed in relation to the study titled "An Experimental Study of the Relationship between Future Thinking and Suicide Risk". This privacy notice will describe how your personal data will be processed.

Why we need it

We are collecting your personal information such as your name, contact details (email, phone number etc.) and education level, and where relevant, special categories data, such as ethnicity, gender, suicidal thoughts, and behaviours, thinking, mental health status, ethnicity, verbal fluency, mental imagery, psychiatric history, and sexual orientation to get a better understanding of the relationship between positive future thinking and the risk of suicide. Legal basis for processing your data.

To process all personal data, we must have a legal basis. This processing is for Academic Research, and so, we will be relying upon Task in the Public Interest to process basic personal data that you will provide. For any Special Categories data that will be collected during this study, we will be relying upon Task carried out for Public Interest, Scientific or Historical Research Purposes. Alongside this, we will ask for your consent to take part in the study for Ethical Considerations however this will not form part of our legal basis for processing your data.

What we do with it and who we share it with

- All the personal data you provide will be processed by the PhD researcher at the UofG in the United Kingdom (UK). Your data will be stored on University Servers in the UK, and hence, will be subject to relevant organisational and technical safeguards. Your personally identifiable information e.g., your name will be replaced by an ID number.

- Your data will be used as part of the PhD student's research project and will be disseminated in scientific papers which will be submitted to peer-reviewed scientific journals. However, your name or anything else that could tell people who you are will not be revealed.

- Only the research team members or appropriate governance staff who may check that the study is conducted properly will be able to access your personal information. However, should significant concerns regarding your mental or physical health arise during your participation in the study that a member of an appropriate clinical team or family members or support network might be immediately informed.

- The data will be stored in archiving facilities according to the University of Glasgow retention policy of up to 10 years. After this period, further retention may be agreed upon, or your data will be securely deleted in line with the relevant standard procedures.
- Your rights to access, change or move the information we hold may be limited because we need to manage your information in particular ways for the research to be reliable and accurate. If you withdraw from the study, your data collected up to that point will be retained and used for the remainder of the study. To safeguard your rights, we will try to use the minimum personally identifiable information. You can find out more about how we will use your information from the researcher at xxxxxxxx@student.gla.ac.uk.

How long do we keep it for?

Candidates accepted on the study

If accepted on the research study the University will continue to keep your data for ten years. After this period, further retention may be agreed upon, or your data will be securely deleted following the relevant standard procedures.

Candidates that are not accepted

If you are not accepted onto the study all your data will be securely deleted upon decision, and you will be notified if this is the case.

Candidates who wish to withdraw from the study

If you wish to withdraw from the study, please let the researcher know at the earliest opportunity. Your data collected up to that point will be retained and used for the remainder of the study.

What are your rights?

You may request access to the information processed about you at any time. If you believe that the information processed relating to you is incorrect, you may want to see this information. In some cases, you may also request to have it restricted, corrected, or erased. In addition, you may have the right to object to data processing and the right to data portability, and to withdraw your consent at any time without giving any reasons. If you wish to exercise any of these rights, please feel free to submit your request via the webform or contact **dp@gla.ac.uk**.

*The ability to exercise these rights will vary and depend on the legal basis on which the processing is being done.

Complaints

If you want to complain about how we have dealt with your personal data, you can reach out to the University Data Protection Officer who will investigate the matter.

Our Data Protection Officer can be contacted at **dataprotectionofficer@glasgow.ac.uk.**

If you are still not satisfied with our response or believe we are not processing your personal data according to the law, you can raise a complaint to the Information Commissioner's Office (ICO) https://ico.org.uk/

University of Glasgow | College of Medical, Veterinary & Life Sciences

APPENDIX N - Consent Form - Experimental Study

- I confirm that I have read and understood the Participant Information Sheet version 2 dated 26.02.2022.
- I confirm that I have read and understood the Privacy Notice version 2 dated 26.02.2022.
- I have had the opportunity to think about the information and ask questions and understand the answers I have been given.
- I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my legal rights being affected.
- I confirm that I agree to the way my data will be collected and processed, and that data will be stored for up to 10 years in university archiving facilities in accordance with relevant Data Protection policies and regulations.
- I agree that my name, contact details and data described in the information sheet will be kept for the purposes of this research project.
- I understand that if I withdraw from the study, my data collected up to that point will be retained and used for the remainder of the study.
- I understand that things that I say during the study may be quoted in reports and articles that are published about the study, but my name or anything else that could tell people who I am will not be revealed.
- I understand that all data and information I provide will be kept confidential and will be seen only by study researchers and regulators whose job it is to check the work of researchers. However, I also agree that should significant concerns regarding my mental or physical health arise during my participation in the study that a member of an appropriate clinical team or family members or support network will be immediately informed.

I agree to participate in the study.

Yes	**No**

APPENDIX O - Measures - Experimental Study

All experimental study measures included in the Appendix O are as follows:

1-Demographics Form

2-Suicidal ideation (the Suicide Ideation subscale of the Suicide Probability Scale, SPS; Cull & Gill, 1989).

3-Suicidal history (2 items from the Adult Psychiatric Morbidity Survey; McManus, Bebbington, Jenkins, & Brugha, 2016).

4-Depression (the Patient Health Questionnaire Depression (PHQ-9) Scale; Cameron, Crawford, Lawton & Reid, 2008).

5-Entrapment (Entrapment Scale Short-Form (E-SF) (De Beurs et al., 2020).

6-Defeat (3 items from the Defeat Scale; Gilbert & Allan, 1998).

7- Death-related Mental Imagery

8-The Verbal Fluency Task (FAS) (Lezak 1995)

9-Positive Future Thinking Task (MacLeod et al., 1997)

10-Negative and Positive Mood Induction (Moore & Oaksford, 2002)

11-Visual Analogue Scale (VAS) Mood Rating

1- Demographics Form

1	Participant ID Code: _____
2	Age: _____
3	a. What is your sex? ( ) Male ( ) Female ( ) Intersex ( ) Other:_____( ) Prefer not to Say b. What is your gender? ( ) Man ( ) Woman ( ) Transgender (Man) ( ) Transgender (Woman) ( ) Other: _____ ( ) Prefer not to Say
4	a. What is your ethnic group? Please click/tick one below. ( ) White ( ) Black/African/Caribbean/Black British ( ) Mixed/Multiple Ethnicities ( ) Other Ethnic Group: _____ ( ) Asian/Asian British ( ) Unknown ( ) Prefer not to Answer b. What is your nationality? _____ c. What country do you live in? _____
5	What is your current marital status? Please click/tick one below. ( ) Single ( ) Divorced ( ) Other: _____ ( ) Married ( ) Widowed ( ) Unknown ( ) Separated ( ) Common-Law Marriage
6	Who do you currently live with? Please tick all that apply below. ( ) Live Alone ( ) Halfway/ Group Home ( ) Spouse / Common Law Partner ( ) Residential Treatment Centre ( ) Partner ( ) Psychiatric Hospital ( ) Own Children ( ) Academic Institution ( ) Parents ( ) Homeless/ Shelter ( ) Siblings ( ) Other: _____
7	What is your education level? Please click/tick one below. ( )No Schooling Completed ( ) Standard Grades/ GCSE/O-Levels ( ) Degree ( ) Highers/ A-Levels ( ) Postgraduate Qualification ( ) HNC/HND/NQ/ SVQ ( ) Unknown ( ) Other (please, specify) _____
8	What is your current employment status? Please click/tick the one that applies to you the most. ( ) Employed ( ) Retired ( ) Unemployed And Seeking Work ( ) Student ( ) Unemployed Due To Disability/Incapacity ( ) Unknown ( ) Stay At Home Parent If employed, what is the occupation:_____ If not employed, what was your previous occupation:_____
9	Which of the following options best describes how you think of yourself? Please click one below. (1) Heterosexual or straight (5) Bisexual (2) Gay (male) (6) Not sure (3) Lesbian (7) Other (please specify) _____ (4) Gay (female) (8) Prefer not to Say
10	Do you take antidepressants (medication to treat depression) or anxiolytic (medication to control anxiety feelings) or any other medication for mental health problems? Please click one below. (1) Yes (2) No If yes, please specify: ……
11	Have you ever been diagnosed with Depression, Anxiety, Schizophrenia, Borderline Personality Disorder (BPD), Eating Disorder (Anorexia/Bulimia), or other mental health issue? (1) Yes (2) No If yes, please specify:_____

2- Suicidal ideation (the Suicide Ideation subscale of the Suicide Probability Scale, SPS; Cull & Gill, 1989)

Listed below are a list of statements that some people might use to describe their feelings and behaviours. Please read each statement and decide how often the statement is true for you. Click the number that corresponds with the appropriate box to show how often you feel the statement applies to you.

1 = None or a little of the time
2= Some of the time
3 = Good part of the time
4 = Most or all the time

	None or a little of the time	Some of the time	Good part of the time	Most or all the Time
1. I think of things too bad to share with others.	1	2	3	4
2. In order to punish others, I think of suicide.	1	2	3	4
3. I need to punish myself for things I have done or thought.	1	2	3	4
4. I feel the world is not worth continuing to live in.	1	2	3	4
5. I feel people would be better off if I were dead.	1	2	3	4
6. I feel it would be less painful to die than to keep living the way things are.	1	2	3	4
7. I have thought of how to do myself in.	1	2	3	4
8. I think of suicide	1	2	3	4

3-Suicidal history

(2 items from the Adult Psychiatric Morbidity Survey; McManus, Bebbington, Jenkins, & Brugha, 2016)

Listed below are some questions about suicidal thoughts and behaviours. On questions A and B, please select one of the options by clicking the number that shows your responses. On questions C and D, please type the answer if it applies to you.

1	A	Have you ever seriously thought of taking your life, but not actually attempted to do so?	1	Yes
			2	No (If no, please go to 2A)
			3	Would rather not say
	B	When did you last think about taking your life?	1	The past week
			2	The past year
			3	Longer ago
			4	Would rather not say
	C	And, how many times has this occurred?		Answer:
				Would rather not say
	D	And, how old were you the first time you had this thought?		Answer:
				Would rather not say

2	A	Have you ever made an attempt to take your life, by taking an overdose of tablets or in some other way?	1	Yes
			2	No (If no, please go to 3A)
			3	Would rather not say
	B	When did you last attempt to take your life?	1	The past week
			2	The past year
			3	Longer ago
			4	Would rather not say
	C	And, how many times have you made an attempt to take your life?		Answer:
				Would rather not say
	D	And, how old were you the first time you made an attempt?		Answer:
				Would rather not say

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4-Depression

(The Patient Health Questionnaire Depression (PHQ-9) Scale; Cameron, Crawford, Lawton & Reid, 2008)

PATIENT HEALTH QUESTIONNAIRE -PHQ-9

Over the last 2 weeks, how often have you been bothered by any of the following problems? Read each item carefully and click the number below the statement. Use the scale below shown to rate each item. Please do not omit any item.

1= Not at all
2= Several days
3= More than half the days
4 = Nearly every day

1. Little interest or pleasure in doing things.

1	2	3	4

2. Feeling down, depressed, or hopeless.

1	2	3	4

3. Trouble falling or staying asleep or sleeping too much.

1	2	3	4

4. Feeling tired or having little energy.

1	2	3	4

5. Poor appetite or overeating.

1	2	3	4

6. Feeling bad about yourself - or that you are a failure or have let yourself or your family down.

1	2	3	4

7. Trouble concentrating on things, such as reading the newspaper or watching television.

1	2	3	4

8. Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual.

1	2	3	4

9. Thoughts that you would be better off dead or of hurting yourself in some way.

1	2	3	4

5-Entrapment (Entrapment Scale Short-Form (E-SF) (De Beurs *et al*., 2020)

For each of the following attitude statements indicate the extent to which you think it represents your own view of yourself. Read each item carefully and click the number below of the statement that best describes the degree to which each statement is like you. Use the scale below. Please do not omit any item.

Scale:

1 = Not at all
2 = A little bit
3 = Moderately
4 = Quite a bit
5 = Extremely

1. I often have the feeling that I would just like to run away.

1	2	3	4	5

2. I feel powerless to change things.

1	2	3	4	5

3. I feel trapped inside myself.

1	2	3	4	5

4. I feel I'm in a deep hole I can't get out of.

1	2	3	4	5

6- Defeat (4 items from the Defeat Scale; Gilbert & Allan, 1998)

Below is a list of statements, which describe how people can feel about themselves. Read each item carefully and click the number to the below of the statement that best describes how you have felt in the last 7 days. Use the scale below to rate each item. Please do not omit any item.

1 = Never
2 = Rarely
3 = Sometimes
4 = Mostly (a lot)
5 = Always

1. I feel defeated by life

1	2	3	4	5

2. I feel that there is no fight left in me

1	2	3	4	5

3. I feel that I am one of life's losers

1	2	3	4	5

4. I feel powerless.

1	2	3	4	5

7- Death-related Mental Imagery

At times when you are feeling down or distressed, how often do the following mental images popinto your mind? **Please choose one response only per question.**

		None of the time 1	A little of the time 2	Some of the time 3	Most of the time 4	All of the time 5	Rather not say 6
1	Images of a time when you tried to harm yourself in the past	1	2	3	4	5	6
2	Images of yourself planning/preparing to harm yourself or make a suicide attempt	1	2	3	4	5	6
3	Images of what might happen to you if you died	1	2	3	4	5	6
4	Images of what might happen to other people if you died	1	2	3	4	5	6
5	Images of things you were escaping from	1	2	3	4	5	6
6	Images of another (non-suicide related) distressing event that happened to you (e.g., a traumatic event)	1	2	3	4	5	6
7	Images that made you feel safe or better	1	2	3	4	5	6
8	Images that were fleeting/unclear	1	2	3	4	5	6

The tasks used in the experimental component of the study are:

The Verbal Fluency Task (FAS) (Lezak 1995)
Positive Future Thinking Task (MacLeod *et al*., 1997)
Negative and Positive Mood Induction (Moore & Oaksford, 2002)
Visual Analogue Scale (VAS) Mood Rating

8-The Verbal Fluency Task (FAS) (Lezak 1995)

Control task (FAS): This is a standard task that provides a general measure of verbal fluency (Lezak, 1995). It includes asking the participant to write as many words as they can think of beginning with each of three letters (F, A, S), excluding proper nouns, numbers, the same word with a different suffix, and repetitions. Participants are given 1 minute for each letter, and the three letters are given in a fixed order. The score is the mean number of acceptable words produced for each letter. We used this task at baseline just before the positive future thinking task.

9-Positive Future Thinking Task (MacLeod *et al*., 1997)

Note: Participants will be given four time intervals (next week/month/year/5-10 years). They will be randomly allocated to receive two time intervals before negative mood induction and two time intervals following negative mood induction such that the four time intervals will be completed by each participant.

Instructions.

In this task, we would like you to write about positive things (that you are looking forward to, that you will enjoy) that might occur to you in the future (next week/month/year/5-10 years). These could be trivial or important things, and they could be things you know are going to happen or things that you think might reasonably happen. However, you are asked to think about specific events that you are looking forward to or not looking forward to.

Instructions for the things that you are looking forward to over the next week:

Now, we would like you to write a brief description of as many positive things as possible that might occur to you over the next week.

We want you to be as specific about these events as you possibly can, so you should try to think of particular things that you are looking forward to. These could be things that would happen in a particular place and at a particular time. So, for things you are looking forward to "meeting up with your family at the London Eye next Saturday" would be an example, whereas, "relaxing" would not be an example because it isn't a specific event or experience.

You will have a time limit of one minute to generate as many responses as you can. Please, keep trying until the time limit is up!

What are you looking forward to over the next week?

Please, write as many positive things (that you are looking forward to or that you will enjoy) as you can think of over the next week and keep trying until the time limit is up!

Instructions for the things that you are looking forward to over the next month:

Now, we would like you to write a brief description of as many positive things as possible that might occur to you over the next month.

We want you to be as specific about these events as you possibly can, so you should try to think of particular things that you are looking forward to. These could be things that would happen in a particular place and at a particular time. So, for things you are looking forward to "Visiting Birmingham's famous Christmas market in Birmingham, West Midlands next Month" would be an example, whereas, "relaxing" would not be an example because it isn't a specific event or experience.

You will have a time limit of one minute to generate as many responses as you can. Please, keep trying until the time limit is up!

What are you looking forward to over the next month?

Please, write as many positive things (that you are looking forward to or that you will enjoy) as you can think of over the next month and keep trying until the time limit is up!

Instructions for the things that you are looking forward to over the next year:

Now, we would like you to write a brief description of as many positive things as possible that might occurto you over the next year.

We want you to be as specific about these events as you possibly can, so you should try to think of particular things that you are looking forward to over the next year. These could be things that would happen in a particular place and at a particular time. So, "having a holiday in Majorca next year" would be an example, whereas, "relaxing" would not be an example because it isn't a specific event or experience.

Once again, you will have a time limit of one minute to generate as many responses as you can. Please, keeptrying until the time limit is up!

What are you looking forward to over the next year?

Please, write as many positive things (that you are looking forward to or that you will enjoy) as you can think of over the next year and keep trying until the time limit is up!

Instructions for the things that you are looking forward to over the next 5 to 10 years:

Now, we would like you to write a brief description of as many positive things as possible that might occurto you over the next 5 to 10 years.

We want you to be as specific about these events as you possibly can, so you should try to think of particularthings that you are looking forward to over the next 5 to 10 years. These could be things that would happenin a particular place and at a particular time. So, "buying a big house in Antalya city centre over the next 5 to 10 years" would be an example, whereas, "relaxing" would not be an example because it isn't a specific event or experience.

Once again, you will have a time limit of one minute to generate as many responses as you can. Please, keeptrying until the time limit is up!

What are you looking forward to over the next 5 to 10 years?

Please, write as many positive things (that you are looking forward to or that you will enjoy) as you can think of over the next 5 to 10 years and keep trying until the time limit is up!

10-Negative and Positive Mood Induction (Moore & Oaksford, 2002)

NEGATIVE MOOD INDUCTION:

It will involve reading a list of negative statements and listening to sad music (Alexander Nevsky, Russia under the Mongolian) simultaneously.

You are now about to go through a negative mood induction procedure. Mood induction procedures have been designed to alter your mood through presentation of certain statements. The statements you will be presented with should induce a negative mood. To have your mood changed you must read each of the statements presented out loud.

This task requires your co-operation it that you must want to enter the given mood state. Therefore, while you read the statements, try to feel how would you feel if you found yourself saying each of them to a close friend.

Press the spacebar to continue.

A list of negative statements:

1- I feel a little low today.
2-I get the feeling people who are friendly to me are just being "nice' and don't really like me
3- I'm afraid the economic situation for my generation looks pretty bleak.
4-I can remember times when everybody but me seemed happy and full of energy.
5-Often I have found myself staring into the long distance, my mind blank, when I definitely should be studying.
6-People annoy me, I wish I could be by myself.
7-I've had important decisions to make in the past, and I've sometimes made the wrong one's.
8-There have been days when I felt confused and everything went miserably wrong and I was powerless to stop it.
9-No matter how har I try, I just can't help feeling that things are going to get worse and worse.
10- I've had daydreams in which I kept reliving past mistakes- sometimes I wish I could start over again.
11-I'm ashamed that I've caused my parents needles worry.
12-Just, when I think things are going to get better, something else goes wrong.
13-The world is full of suffering and happiness that no matter how hard I try, sometimes it really gets me down.

14- At times, I've felt so tired and discouraged that I went to sleep rather than facing important problems.
15-My life is so tiresome- the same old thing day after day depresses me.
16-I couldn't remember things well right now if I had to.
17-I just can't make up my mind, it is so hard to make simple decisions.
18-I've doubted that I'm a worthwhile person.
19- It often seems that no matter how hard I try, things still go wrong.
20- I've noticed that no one seems to really understand or care when I complain or feel unhappy.
21-I'm uncertain about my future.
22-I am discouraged and unhappy about myself.
23- Things are worse now than when I was younger.
24- The way I feel now, the future looks boring and hopeless.
25- Some very important decisions are almost impossible for me to make.
26-I feel horribly guilty about how I've treated my parents at times.
27-Things are easier and better for other people than for me. I feel like there's no use in trying again.
28-It takes too much effort to convince people of anything; there's no point in trying.
29-Often people make me very upset. I don't like to be around them.
30-I fail in communicating with people about my problems.
31- I've felt so alone before that I could have cried.
32- My thoughts are so slow and downcast I don't want to think or talk.
33-I've lain awake at night worrying so long that I hated myself.
34-I've the feeling that I just can't reach people.
35-I just don't care about anything. Life just isn't any fun.
36-I have too many bad things in my life.
37-It's so discouraging the way people don't really listen to me.
38-Everything seems utterly futile and empty.
39-I'm haunted with thoughts about myself and how I come across the others.
40-All of the unhappiness of my past is taking possession of me.

POSITIVE MOOD INDUCTION:

It will involve reading a list of positive statements and listening to happy music (Mozart or Delibes Coppelia Waltz) simultaneously.

You are now about to go through a positive mood induction procedure. Mood induction procedures have been designed to alter your mood through presentation of certain statements. The statements you will be presented with should induce a positive mood. To have your mood changed you must read each of the statements presented out loud.

This task requires your co-operation it that you must want to enter the given mood state. Therefore, while you read the statements, try to feel how you would feel if you found yourself saying each of them to a close friend.

Press the spacebar to continue.

A list of positive statements:

1-I feel good today.
2- I have complete confidence in myself.
3-I feel light-hearted.
4-If your attitude is good, then things are good, and my attitude is good.
5-I've certainly got energy and self-confidence to spare.
6-Sometimes it feels good to get away from the noise by going to a park.
7-I usually feel at ease when I meet new people.
8-I'm pleased that most people are friendly to me.
9-I feel cheerful and lively.
10-My parents are pretty proud of me most of the time.
11-I can just imagine myself on a warm summer day on the beach, the surf gently rolling in, gulls calling, the salt in the air, the warm sun on my body.
12-I have a fresh outlook on life. I'm secure in my optimism.

13-There should be opportunity for a lot of good times
coming.14-My judgement about most things is sound.
15-This is one of those days when I can grind out schoolwork with practically no effort at
all.16-I feel enthusiastic and confident now.
17-I feel a calm acceptance of everyone.
18-I like to imagine myself high up on a mountain top, fresh air, so quiet.
19-I feel that no matter what happens, I can make the best of it and be
happy.20-I feel laid-back and content.
21-I know I can achieve the goals I set.
22-I know that in the future I won't let so called "problems" get me down.
23-I'm optimistic that I can get along very well with most of the people I
meet.24-I'm feeling amazingly good today!
25-I have sense of power and vigour.
26-Things look good. Things look great!
27-I feel that many of my friendships will stick with me in the
future.28-I can find good in almost anything.
29-I feel so happy and playful
today.30-I am free and
unencumbered.
31-Things will be better and better today.
32-I can almost imagine sea breeze gently blowing through my
hair.33-When I want to, I can make friends extremely easily.
34-I'm full of energy and ambition.
35-My favourite tune keeps going through my
head.36-Life is firmly in my control.
37-This is great- I really do feel good.
38-I feel like bursting with laughter- I wish somebody would tell me a joke and give me an
excuse!39-This is one of those days when I'm ready to go!
40-I feel great!!!

11-Visual Analogue Scale (VAS) Mood Rating

Please indicate how **sad** you're feeling right in this moment by vertically marking once along the horizontal line.

Low _____ **High**

Please indicate how **happy** you're feeling right in this moment by vertically marking once along the horizontal line.

Low _____ **High**

APPENDIX P- Safety Plan Form

Participant ID:
Researcher ID:
Date of completion:

Step 1

Warning signs or triggers (patterns of thinking, specific mental images, mood, situation, behaviour) showing that a crisis may be approaching

1. _____
2. _____
3. _____

Step 2:

Internal coping strategies: Things that I can try on my own to take my mind off my problems or to minimize the risk of me acting on the suicidal thoughts (relaxation techniques, physical activity, removing myself from looking at shooting resources, images, messages, or a situation):

1. _____
2. _____
3. _____

Step 3

People and social settings that provide a distraction from suicidal thoughts

1. Name:_____Relationship:_____Phone: _____
2. Name:_____Relationship:_____Phone: _____
3. Place: _____
4. Place: _____

Step 4:

People who I can ask for help to navigate a crisis

1. Name:_____Relationship:_____Phone: _____
2. Name:_____Relationship:_____Phone: _____
3. Name:_____Relationship:_____Phone: _____

Step 5

Mental health professionals or agencies I can contact during a crisis

1. GP Practice:_____Phone:_____
   GP Name: _____
2. Local out of Hours service: NHS 24: 111 (The helpline is open 24 hours a day, 7 days a week)
3. Samaritans: 116 123 (The helpline is open 24 hours a day, 7 days a week)
4. Go to the nearest A& E department or call 999 (112, 911 etc.)

Step 6

Making the environment safe:

1. _____
2. _____

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APPENDIX R- Debrief Sheet- Experimental Study

You have participated in a study conducted by Gonca Kose, a PhD researcher in the Institute of Health & Wellbeing (IHW) at the University of Glasgow.

The general aim of this study is to build a better understanding of the factors associated with suicidal thinking and behaviour in adults aged 18 years and older. Herein, the main purpose of this study is to investigate to what extent positive future thinking - which refers to thinking about possible positive future events - is related to suicidal thoughts and behaviours. More specifically, the study will experimentally investigate the relationship between positive future thinking and suicidal thoughts and behaviours following minor fluctuations in mood. We are interested in how people think about positive things that might happen to them over four different time periods (next week/month/year/5 -10 years), what the relative influence of positive future thinking on suicide risk is, and how that might relate to their mental health.

As in all research that asks about mood, the future and well-being, there is a possibility that some questions may lead you to think about certain experiences in your life that you have found any part of this experience to be upsetting. Therefore, there are also a list of organizations in the Support Sheet.

I would like to thank you for taking your time to take part in this project. We hope that you have found it interesting. Please feel free to share your comments, and to provide feedback concerning any aspects of the study. If you have any further questions or concerns about the study, or you wish to talk to me to have further information about the study, please do not hesitate to get in touch me via email, xxxxxxxx@student.gla.ac.uk.