Substance Use, Self-Harm and Suicide Risk: Investigating Professionals' Perspectives and the Role of Alcohol Factors

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Chapter 1

Attitudes, knowledge and experiences of professionals' working with individuals with substance use problems and suicide risk: A systematic review

Prepared in accordance with the author requirements for Biomed Central Psychiatry

Article Submission Guidance

Abstract

Introduction: Substance use problems (SUPs) are associated with suicide risk. The knowledge, attitudes and experiences of professionals working with those with SUPs and suicide risk is likely to influence their practice and how they manage this population. This systematic review synthesises existing evidence on the knowledge, attitudes and experiences of professionals working with those with SUPs and suicide risk.

Methods: A systematic search of peer-reviewed and grey literature was conducted. Qualitative, quantitative and mixed-methods studies examining professionals' knowledge, attitudes and experiences on suicide risk in individuals with SUPs were included. Studies were quality assessed and findings were narratively synthesised.

Results: Eight studies met the inclusion criteria. Professionals recognised the elevated suicide risk in individuals with SUPs but showed knowledge gaps in risk assessment and prevention. Many felt underprepared, citing insufficient training and low confidence. Stigmatising attitudes were common, particularly in settings with limited exposure to this population, contributing to disengagement from services. Systemic barriers, including fragmented services and poor integration between addiction and mental health care further impeded effective support. Emotional strain, burnout and frustration were widely reported, exacerbated by a lack of supervision and workplace support.

Conclusions: Findings highlight the need for enhanced training, stigma reduction initiatives and improved service integration to better support professionals managing suicide risk in individuals with SUPs. Addressing these challenges is critical to improving care quality and suicide prevention efforts. Future research should evaluate the impact of professional attitudes on patient outcomes and assess interventions to bridge knowledge gaps.

Keywords: Substance use, suicide, professionals, experience, knowledge, attitudes.

Introduction

Substance Use and Suicide Risk

Substance Use Disorder (SUD) is a complex and chronic condition characterised by inability to control the use of substances despite negative social, occupational and health-related consequences. The Global Burden of Disease studies have highlighted SUDs as one of the leading causes of disability globally, with deaths due to SUDs rising sharply over the past decade (Vos et al., 2020). Substances used encompass a range of licit and illicit drugs including, but not limited to, alcohol, stimulants, cannabis, opioids, as well as prescribed medications. It is defined by criteria such as craving, tolerance and withdrawal (Brady, Levin, Galanter, & Kleber, 2021).

Detecting substance use disorders, particularly with comorbid mental health or medical issues, is complex due to overlapping symptoms, the potential for individuals to minimise or conceal usage and the impact of medication side effects (Bahji, 2024). It is also important to acknowledge that individuals who use substances represent a highly heterogeneous population. Factors such as the type of substance used, co-occurring psychiatric diagnoses, history of trauma and the impact of social determinants of health, such as housing, poverty, education, employment and systemic discrimination, can vary significantly between individuals. Despite this, research and clinical service models tend to conceptualise this group as homogenous, which risks overlooking nuanced risk profiles and treatment needs. Given this complexity, individuals experiencing difficulties with substance use may access a range of treatment and support services provided through statutory care, third sector or community organisations, for a range of different clinical presentations and with or without a formal diagnosis of SUD. In light of these complexities, the term substance use problems (SUPs) will be utilised in this review and will include any diagnosed or self-identified difficulties with legal or illegal substances.

SUPs are a widespread and injurious public health concern in Scotland. A series of health crises have been associated with drug use in Scotland over several decades, including blood borne virus infection, ingestion or use of contaminated drugs or cutting agents and rate of drug related deaths exceeding those in England, Wales and most European countries (National Records of Scotland, 2019; van Amsterdam, van den Brink, & Pierce, 2021). Individuals with SUPs characteristically present with high levels of co-occurring mental health difficulties, including psychological distress (49%), depression (28%) and post-traumatic stress disorder (42%) (Ross et al., 2005).

Those with SUPs also present with suicidal risk, with over a third (37%) having attempted suicide (Ross et al., 2005). Suicide risk refer to a spectrum of actions ranging from suicidal ideation and planning to attempted suicide and death. Self-harm is a deliberate act of causing physical injury to oneself, often as a way to cope with emotional pain or distress. While not all self-harm involves suicidal intent, it is a significant risk factor for future suicide attempts (NICE, 2022; Kapur, Cooper, O'Connor, & Hawton, 2013). Self-harm, attempted suicide and death by suicide occur at significantly elevated rates among substance users (Wilcox, Conner, & Caine, 2004). In Scotland, between 48% and 56% of all suicides from 2008 to 2018 involved alcohol or drug use (Allik, Brown, Dundas, & Leyland, 2020).

Despite high prevalence of co-morbid psychiatric difficulties, individuals with SUPs encounter significant challenges in accessing effective mental health treatment, leaving their dual vulnerabilities insufficiently addressed (Schneier et al., 2010; Mundon, Anderson, & Najavits, 2015). Healthcare systems often operate in silos, with separate services for addiction and mental health care (Priester et al., 2016). This fragmentation impedes coordinated care, creating scenarios where individuals are referred between services that may lack capacity or expertise to address their full range of needs (McGovern, Xie, Segal, Siembab, & Drake, 2006). Mental health practitioners often report limited training in SUPs, while addiction specialists may lack resources or knowledge to manage psychiatric comorbidities (Schwartz, Frank, Welsh, Blankenship, & DeJong, 2018). This gap in service provision frequently leads to delayed or inadequate care.

Stigma, Substance Use and Suicide Risk

Stigma represents a complex array of attitudes, beliefs, behaviours and structures that manifest in prejudiced attitudes and discriminatory practices against people due to particular characteristics or attributes (Goffman, 2009). SUPs are among the most stigmatised mental health issues (Barry, McGinty, Pescosolido, & Goldman, 2014; El Hayek et al., 2024), where those with SUPs are exposed to moralistic views that they are perceived as lacking willpower or moral character (Crapanzano, Hammarlund, Ahmad, Hunsinger, & Kullar, 2018). Suicide is also highly stigmatised, with those engaging in suicidal behaviour at risk of being labelled as selfish, weak, or attention-seeking (Carpiniello & Pinna, 2017). These attitudes can lead to a lack of understanding, reduced willingness to engage with patients and moralistic judgments that further alienate those requiring care. Stigma can reinforce feelings of hopelessness and isolation, contributing to suicide risk (Ramberg, Di Lucca, & Hadlaczky, 2016). Stigma surrounding SUPs and suicide risk significantly compound the challenges individuals face, creating substantial barriers to care and perpetuating cycles of marginalisation and poor health outcomes.

Professionals' Attitudes Towards Substance Use and Suicide Risk

Health professionals' attitudes towards patients can impact service provision and delivery, with negative or stigmatising attitudes towards patients decreasing clinician's attentiveness to providing optimum care (Boukouvalas, El-Den, Murphy, Salvador-Carulla, & O'Reilly, 2019; Saunders, Hawton, Fortune, & Farrell, 2012). Negative attitudes, such as rejection and judgment, can reinforce suicidal patients' feelings of hopelessness and worthlessness (Ramberg et al., 2016). Stigmatising attitudes towards individuals with SUPs also contributes to poorer care delivery (Van Boekel, Brouwers, Van Weeghel, & Garretsen, 2013) and are a commonly cited barrier to accessing treatment in studies examining patient experience (Hammarlund, Crapanzano, Luce, Mulligan, & Ward, 2018). Insufficient resources and training appear to mediate clinicians' attitudes towards both the treatment of SUPs and prevention of suicide respectively, with lower levels of perceived knowledge leading to more negative appraisals (Boukouvalas et al., 2019).

Although professional's attitudes and knowledge towards those with SUPs or suicidal risk have been the examined in several systematic reviews (Saunders et al., 2012; Sinyor, Jackson, & Collier, 2025; Van Boekel et al., 2013), no high quality synthesis of existing evidence has examined the experiences of professionals managing both high risk behaviours. This represents an important gap in our understanding, given the substantial comorbidity in this population (Ross et al., 2005). Working with comorbid populations poses challenges for clinicians given the additional complexity of treating and managing multiple mental health problems alongside elevated risk profiles (Adams, 2008). It is also important to recognise that access to services and care may vary for those with SUPs and suicide risk, with professionals working in specialist addiction services holding different expertise and competencies to those cared for by mental health services (McGovern et al., 2006).

Rationale and Aims

Understanding the attitudes and experiences of professionals working with those with SUPs and suicide risk, as well as their perceived knowledge and capabilities, is important for several reasons. Knowledge gaps or misconceptions can hinder intervention efforts (Conner, Wood, Pisani, & Kemp, 2013;), while attitudes, including stigma, directly impact patient engagement and care quality (Schneider, Wilson, Dayton, Goodell, & Latkin, 2021). Professionals' experiences in working with this population may highlight systemic barriers and emotional challenges that negatively influence suicide risk assessment and intervention in this population. The overarching aim of this review is to identify and systematically examine the current evidence base on the attitudes, knowledge and experiences of professionals' working with individuals with SUPs and suicide risk. The review will also

appraise the quality of the existing evidence and may lead to the identification or future research priorities, as well as inform future training, policies and prevention strategies for professionals working with this population.

Method

Protocol registration and reporting standards

The review protocol was registered with the international prospective register of systematic reviews (PROSPERO; CRD42024523352). The review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021) (See appendix 1.1).

Search Strategy

Searches were carried out between July and August 2024. Searches of the peer reviewed empirical literature were undertaken via multiple databases based on their coverage of literature relevant to the review topic: MEDLINE, PsychINFO, Web of Science Core Collection, ASSIA and CINAHL. Additional searches were conducted through Google Scholar to identify grey literature, with the first 100 results reviewed, to reduce publication bias, increase comprehensiveness and offer a balanced picture of available evidence (Paez, 2017). Reference lists of identified papers were also searched to identify relevant articles. The search strategy for this review was developed via scoping exercise of the existing literature to identify terms used in related reviews (Boukouvalas et al., 2019; Stevens & Nies, 2018; Van Boekel et al., 2013) and subsequently refined with input from the College of MVLS librarian at the University of Glasgow (see appendix 1.2).

Search terms were utilised in a four-component strategy, utilising terms and synonyms for:

1. professionals

2. attitudes, knowledge and experience

3. substance use

4. suicide risk

See appendix 1.2 for full search strategy.

Inclusion and Exclusion Criteria

Qualitative, quantitative and mixed methods studies published up until 2024 were eligible for inclusion where they examined the self-reported attitudes, experiences or knowledge of professionals working with both SUPs and suicide risk across healthcare and third sector contexts. Professionals' attitudes, experience and knowledge included: perceived confidence, perceived understanding of difficulties, perceived competence or skills, as well

as perceived barriers to care, stigma, opinions or beliefs related to working with this population. Professionals' knowledge also encompassed perceptions of training to manage these difficulties. Studies which considered these phenomena for populations with either SUPs or suicide risk alone were excluded.

Suicide risk within the context of this review was defined as death by suicide, suicide attempts, disclosure of suicidal ideation and self-harm regardless of intent, as it is known to be a risk factor for future suicide attempts (Kapur et al., 2013). SUPs included any diagnosed or self-described difficulties with substances, including legal and illegal substances regardless of formal diagnosis. This decision was taken given challenges of determining SUD diagnoses (Bahji, 2024) and to allow studies of substance use difficulties taking place in nonclinical service contexts to be included. Studies included were written in English or had an English translation available. The inclusion and exclusion criteria are specified further below:

Inclusion Criteria

- Written in English or English translation available.
- Peer reviewed journal articles.
- Grey literature containing original data collection and analysis.
- Qualitative, quantitative or mixed methods design studies.
- Studies including individuals working professionally with individuals with diagnosed or self-reported SUPs and suicide risk in statutory health and third sector service contexts.
- Studies which examine self-reported knowledge, attitudes, experiences and stigma in relation to clients who present with both diagnosed or self-reported SUPs and suicide risk across healthcare and third sector contexts.

Exclusion Criteria

- Studies reporting on SUPs or suicide risk as standalone phenomena.
- Studies which do not report primary empirical research, conference abstracts, dissertations and case studies.
- Studies reporting on professionals who do not work with individuals with SUPs and suicide risk on a routine or planned basis but may encounter these difficulties as first or emergency responders e.g. police, ambulance services.
- Those providing or facilitating non-professional, peer-to-peer support, recovery groups or mutual help groups e.g. Alcoholics Anonymous or Narcotics Anonymous.
- Studies of patients' knowledge, attitudes or experiences.

Study Selection

Results from the electronic search were exported from databases to the reference management software EndNote 21. Following de-duplication, the primary researcher screened titles and abstracts for relevance. At this stage a random sample of 10% of the records were screened by an independent reviewer to assess reliability. Full text articles were then retrieved and the full inclusion and exclusion criteria were applied to assess eligibility for inclusion. At this full text assessment stage, the second reviewer assessed a random sample of 25% of articles. Disagreements or discrepancies between primary and secondary reviewers were discussed until consensus was reached.

Data Extraction

Data extraction took place using a structured form based on a similar form available from the Joanna Briggs Institute. The form was used to standardise extraction of information on the following items: title. authors, methodology, participants, analysis and conclusions (Nussbaumer-Streit et al., 2023).

Quality Assessment

Eligible studies were assessed utilising the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018). The MMAT assesses methodological quality based on a range of key criteria for qualitative, quantitative and mixed methods studies. Indicative criteria include appropriateness of the study design, suitability of data collection methods, sample representativeness and design-specific risk of bias. The MMAT was chosen for this review because it enables the systematic assessment of methodological quality across different types of research (Hong et al., 2018). Its structured approach helps minimise bias and enhance reliability of review findings. The primary reviewer provided responses of ‘yes’, ‘no’, or ‘can’t tell’ across each criterion, with responses used to determine a subjective judgment of ‘high’ ‘moderate’ or ‘low quality’. A second reviewer independently assessed the quality of 25% of included articles using the MMAT, with any discrepancies in overall judgments discussed and resolved. Quality assessment ratings do not play a role in determining whether studies are included in the final synthesis but are used to aid interpretation of study findings.

Synthesis

This review reports a narrative synthesis of findings across the three following domains: knowledge of professionals, attitudes of professionals and experiences of professionals working with SUPs and suicide risk. Due to substantial heterogeneity of study types, design,

measurements and outcomes, a meta-analysis of quantitative data was not undertaken (Campbell et al., 2020).

The synthesis and narrative summary of quantitative and qualitative data utilised a convergent integrated approach as per the Joanna Briggs Institute Guidance for Mixed Method Systematic Reviews. This involves combining extracted data from qualitative, quantitative or mixed design studies and data transformation (Santos, Secoli, & Püschel, 2018). Quantitative results from studies regarding professionals' attitudes, knowledge and experience of working with SUPs and suicide risk were converted into textual descriptions for synthesis to allow for a narrative interpretation of results. For example, quantitative information such as "Psychiatrists had a significantly higher participation rate in suicide training (76%) than GPs (39%) and internists (15%) ($p < 0.001$)" would be transformed into a qualitative statement like "Psychiatrists were far more likely to have engaged in specialist training in suicide prevention, whereas general practitioners and internists had significantly lower participation rates". It is recommended that quantitative data is transformed to qualitative statements as opposed to attributing numerical values to qualitative statements, as this preserves contextual richness of qualitative data without oversimplifying and reducing complex themes (Stern et al., 2021). Descriptions of domains used by study authors have been retained throughout synthesis.

Results

Outcome of the Study Selection Process

A total of 3,344 records were identified from search of electronic databases. After removing duplicate records (n = 474), title and abstracts of 2,870 records were screened for relevance. A further 2,817 records were excluded following title and abstract screening, with 53 articles eligible for full text retrieval. Not all articles could be retrieved and 51 were assessed using the full eligibility criteria, resulting in the exclusion of 43 articles for the following reasons:

- Studies focused on SUPs without examining suicide risk e.g. (Back et al., 2009; Bitta, Kariuki, Gona, Abubakar, & Newton, 2019).
- Studies focused on suicide risk without inclusion of SUPs e.g. (Appleby, 1992; Arnold, Wärdig, & Hultsjö, 2022).
- Studies did not examine clinicians' knowledge, experience, attitudes, stigma or beliefs regarding SUPs and suicide risk e.g. (Brosinski & Riddell, 2015; Choflet et al., 2022).
- Studies examined experiences of professional roles which did not meet the inclusion criteria e.g. (Bergmans et al., 2009; Harris & Jeffery, 2010).
- Studies measured the efficacy and/or impact of training programmes rather than professional attitudes, knowledge and/or experiences e.g. (Madan, Henderson, Hashtroudi, Hope, & Harvey, 2013; Matthieu & Hensley, 2013).
- Studies considered both SUPs and suicide risk but did not present empirical data relating to both concurrently e.g. (Gillig, Hillard, Deddens, Bell, & Combs, 1990; Saini, Chantler, & Kapur, 2018).

No grey literature was identified from searches and no additional studies were identified from reference list searches. At title and abstract screening stage, reviewers initially agreed on 90% of records screened. At full text assessment, reviewers initially agreed on 90%. At both stages, full agreement was reached following discussion. In total, eight studies met the inclusion criteria and were included in the final synthesis (See figure 1).

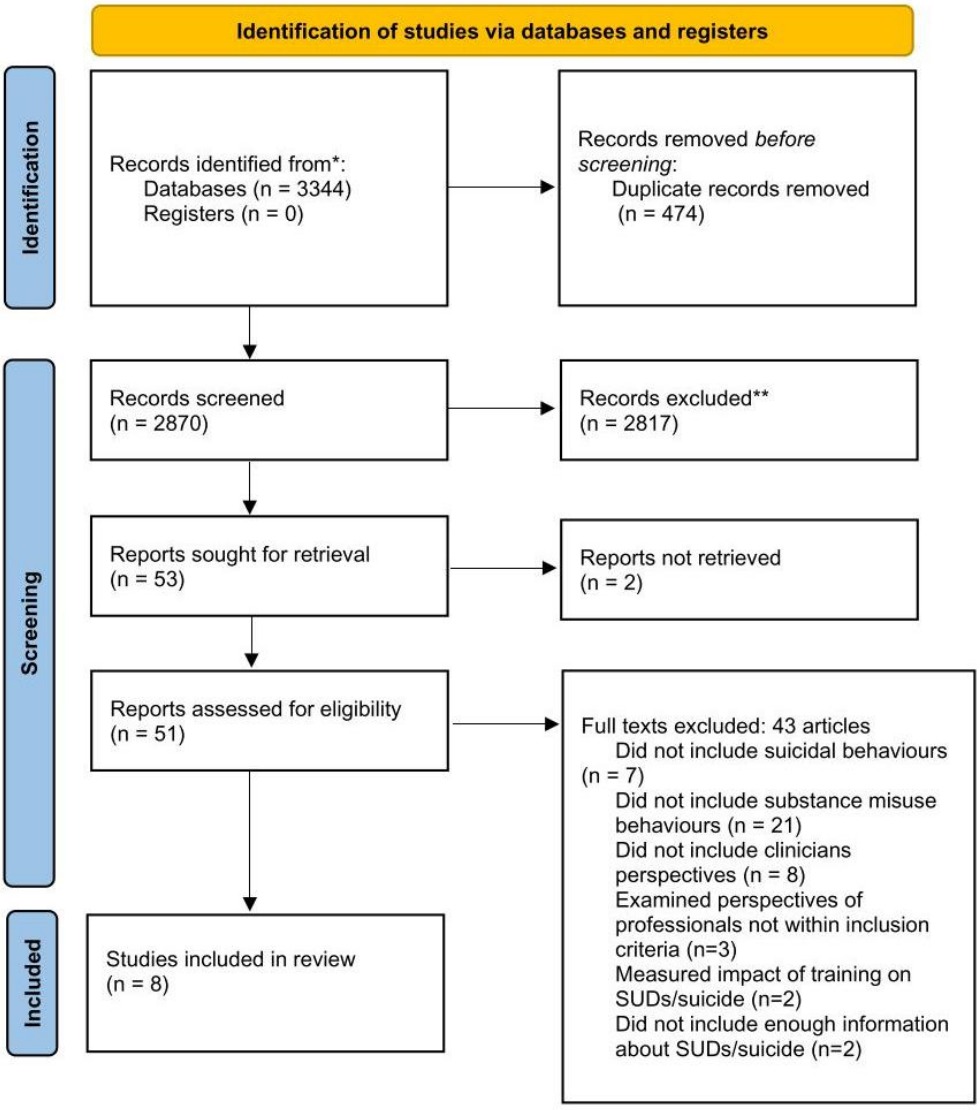

Figure1: Prisma Flow Diagram of Study Screening and Selection

Overview of Included Articles

The eight included studies were published between 2002 and 2024. Five studies were of quantitative design (Canapary, Bongar, & Cleary, 2002; Fruhbauerova & Comtois, 2019; Gallant & Harris, 2024; Grimholt, Haavet, Jacobsen, Sandvik, & Ekeberg, 2014; Ross, Darke, Kelly, & Hetherington, 2012) and the remainder were of qualitative design. A single research team was responsible for the three qualitative studies and similarities in the populations and sample indicate they are likely to be based on the same study sample (Goldstone & Bantjes, 2017, 2019; Goldstone, Bantjes, & Dannatt, 2018). Three studies were conducted in the USA (Canapary et al., 2002; Fruhbauerova & Comtois, 2019; Gallant & Harris, 2024) and South Africa (Goldstone & Bantjes, 2017, 2019; Goldstone et al., 2018) respectively. One study was conducted in Australia (Ross et al., 2012) and one in Norway (Grimholt et al., 2014). The linked qualitative studies all had 18 participants (Goldstone & Bantjes, 2017, 2019; Goldstone et al., 2018) and quantitative study samples ranged from 35 (Gallant & Harris, 2024) to 300 (Grimholt et al., 2014) participants. Professional roles reported on were mixed, including medical professionals (Grimholt et al., 2014; Ross et al., 2012), psychologists (Canapary et al., 2002), mental health care providers (Gallant & Harris, 2024; Goldstone & Bantjes, 2017, 2019; Goldstone et al., 2018) and addictions counsellors (Fruhbauerova & Comtois, 2019; Ross et al., 2012).

Studies varied in their relevant phenomena of interest. Five studies captured professionals' knowledge and experience of working with individuals with SUPs and suicide risk (Canapary et al., 2002; Fruhbauerova & Comtois, 2019; Gallant & Harris, 2024; Goldstone & Bantjes, 2017; Ross et al., 2012). Attitudes to and experience of working with SUPs and suicide risk were detailed in two studies (Goldstone et al., 2018; Grimholt et al., 2014). Goldstone and Bantjes (2019) focused solely on professionals' experience. Relevant study-level information for each included article can be found in Table 1.

Table 1: Summary Table of Study Characteristics and Findings

Study	Methods and Analysis	Participants	Patient Population	Relevant Findings
Canapary, Bongar & Cleary (2002)	Quantitative, Cross-sectional survey. Descriptive statistics.	Practicing psychologists (substance abuse specialists); USA (n=198)	Patients with a diagnosis of alcohol dependence and for whom suicide is an issue.	*Knowledge*: Clinicians identified key suicide risk factors, including past attempts, family history, depression, hopelessness, current drinking, illicit drug use, communication of suicide and impulsivity.
				Experience: Clinicians discussed challenges differentiating acute suicide risk from chronic suicide risk among alcohol-dependent individuals and emphasised the need for refined assessment strategies.
Fruhbauerova & Comtois (2019)	Quantitative, Cross-sectional survey. Multiple regression, correlations.	SUD counsellors with client relationships; USA (n=86)	Patients attending community substance abuse treatment agencies via public funding, private insurance, voluntary and required treatment (e.g. drug court or charges of driving under the influence).	*Knowledge*: SUD counsellors answered over half of a set of suicide knowledge questions correctly. 'Myths' about suicide were generally not endorsed, although a substantial minority (29%) feared that discussing suicide with clients might increase their risk. Level of education and years of experience did not predict greater knowledge.
				Experience: Confidence in treating suicidal clients varied widely and was unrelated to education or years of experience.
Gallant & Harris (2024)	Quantitative, Cross-sectional survey. Chi-square, MANOVA.	Local Mental Hygiene Directors; USA (n=35)	Individuals accessing services present with mental health difficulties, substance use and/or intellectual/ developmental disabilities.	*Knowledge:* Most participants recognised overlapping risk factors for suicide and substance use. The vast majority (85.7%) agreed that individuals with SUP are at greater risk for suicide and three quarters (74.3%) identified substance users as a priority for suicide prevention.
				Experience: Professionals reported structural separation of services hindered collaborative efforts in prevention. Barriers such as limited funding, scope of practice constraints and organisational silos restricted integrated prevention efforts

Goldstone & Bantjes (2017)*	Qualitative, Semi-structured interviews. Thematic analysis.	Mental health care providers working with SUDs; South Africa (n=18)	Individuals expressing suicidality with substance use disorders.	*Knowledge:* Mental health care providers identified systemic barriers to suicide prevention, including stigma and social determinants.
				Experience: Participants noted that resource shortages and fragmented services limited suicide prevention efforts. Professionals emphasised the need for suicide prevention strategies and professional development tailored to managing suicide risk in this demographic.
Goldstone & Bantjes (2018)*	Qualitative, Semi-structured interviews. Thematic analysis.	Mental health care providers working with SUDs; South Africa (n=18)	Individuals expressing suicidality with substance use disorders.	*Attitudes*: Professionals reported stigma surrounding SUDs and suicidality held by medical staff and the general public was a major barrier, contributing to the reluctance of both patients and providers to engage in discussions about suicide risk.
				Experience: Professionals described noticing gaps in knowledge across healthcare in working with SUDs and suicide risk. They identified stigma reduction and early intervention as essential components of suicide prevention. Professionals advocated for minimum norms and standards in suicide prevention training for mental health providers working with SUDs specifically. Participants called for expanded community-based interventions, early intervention programmes and better coordination between mental health and addiction services. The need for integrated care models was strongly emphasised by professionals and recommendations made regarding integrated healthcare and expanded service provision.
Goldstone & Bantjes (2019)*	Qualitative, Semi-structured interviews. Thematic analysis.	Mental health care providers working with SUDs; South Africa (n=18)	Individuals expressing suicidality with substance use disorders.	*Experience:* Providers reported emotional exhaustion and burnout. Some felt unsupported in their roles and described feeling helpless in high-risk situations. Clinicians struggled with assessing suicidality, particularly with patients who presented under the influence of substances. Called for better workplace support, including debriefing and supervision.

Ross, Darke, Kelly & Hetherington (2012)	Quantitative, Cross-sectional survey. Descriptive and comparative statistics.	Case workers, drug & alcohol counsellors, managers; Australia (n=142)	Individuals accessing residential drug and alcohol rehabilitation services.	*Knowledge:* Almost a quarter (23%) of staff had never received formal suicide risk assessment training and 15% were unaware of the link between substance dependence and risk of suicide. More than a quarter (29%) of staff incorrectly believed that discussing suicide with clients might increase their risk, indicating a misconception.
				Experience: Some staff expressed discomfort discussing suicide, fearing they lacked the skills to handle the topic sensitively. Almost a third (32%) of staff wanted more organisational support, including structured debriefing and access to counselling after the death of a client by suicide. Almost all (96%) staff expressed a need for further training.
Grimholt, Haavet, Jacobsen, Sandvik, & Ekeberg (2014)	Quantitative, Cross-sectional survey Chi-square, ANOVA, t-tests	GPs, Psychiatrists, Internists; Norway (n=300)	Patients presenting with SUPs and suicide risk.	*Attitudes:* Physicians reported lower commitment levels and greater frustration when working with SUP patients. These patients were perceived as difficult to treat due to co-occurring behavioural and psychological challenges.
				Experience: Managing suicidal SUP patients was viewed as challenging due to their unpredictability, treatment non-adherence and crisis-driven care demands. Participants stressed the need for additional training to improve confidence in managing high-risk patients.

Note: * indicates linked studies; SUD = substance use disorder; SUP= substance use problems; Knowledge = reported understanding of SUPs and suicide risk, performance on assessments of knowledge, awareness of myths and misconceptions; Attitudes = self-reported stigma, opinions or beliefs related to working with this population; Experience = experience and perceived competence or skills in working with SUP and suicide risk, as well as experience of systems and perceived barriers to care.

Quality Assessment

The MMAT (Hong et al., 2018) was used to evaluates study quality across key methodological criteria for each study design (Tables 2 and 3). Based on this appraisal, four of the eight studies were classified as high quality, meeting all MMAT criteria with appropriate methodological approaches and low risk of bias. These include Fruhbauerova and Comtois (2019) which included validated measures and a low risk of non-response bias (96% participation), as well as the linked studies of Goldstone and Bantjes (2017a, 2019); and Goldstone et al. (2018), which employed qualitative designs with strong coherence between data collection, analysis and interpretation. Three studies were categorised as moderate quality, meeting most MMAT criteria, though with some methodological limitations. These included Canapary et al. (2002), with a possible risk of non-response bias, Gallant and Harris (2024) where there were concerns regarding measurement validity and moderate response rate (60%), and Grimholt et al. (2014), where a 40% response rate introduced potential non-response bias. One study, Ross et al. (2012), was classified as moderate to low quality with unclear measurement validity and a low response rate (40%).

Table 2: Summary of Quality Assessment of Quantitative Studies

Quantitative Studies	Q1	Q2	Q3	Q4	Q5	Q6	Q7
Canapary & Bongar (2002)	Yes	Yes	Yes	Yes	Yes	No	Yes
Fruhbauerova & Comtois (2019)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gallant & Harris (2023)	Yes	Yes	Yes	Yes	Can't tell	No	Yes
Grimholt et al. (2014)	Yes	Yes	Yes	Yes	Yes	No	Yes
Ross et al. (2012)	Yes	Yes	Yes	Yes	Can't tell	No	Yes

Note:
Q1: Are there clear research questions?
Q2: Do the collected data allow addressing the research questions?
Q3: Is the sampling strategy relevant?
Q4: Is the sample representative of the target population?
Q5: Are the measurements appropriate?
Q6: Is the risk of non-response bias low?
Q7: Is the statistical analysis appropriate to answer the research question?

Table 3: Summary of Quality Assessment of Qualitative Studies

Qualitative Studies	Q1	Q2	Q3	Q4	Q5	Q6	Q7
Goldstone & Bantjes (2017)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Goldstone & Bantjes (2018)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Goldstone & Banjes (2019)	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note:
Q1: Are there clear research questions?
Q2: Do the collected data allow addressing the research questions?
Q3: Is the qualitative approach appropriate to answer the research question?
Q4: Are the data collection methods adequate?
Q5: Are the findings adequately derived from the data?
Q6: Is the interpretation of results sufficiently substantiated by data?
Q7: Is there coherence between qualitative data sources, collection, analysis and interpretation?

Knowledge of working with SUPs and Suicide Risk

Five studies (Canapary et al., 2002; Fruhbauerova & Comtois, 2019; Gallant & Harris, 2024; Goldstone & Bantjes, 2017; Ross et al., 2012) examined practitioners' knowledge of suicide risk in individuals with SUPs. These studies found that while professionals broadly recognised the heightened suicide risk among individuals with SUPs, gaps remained in knowledge of specific risk factors, the cumulative nature of risk and suicide prevention strategies.

Knowledge of Risk Factors

Two studies found that professionals were able to identify common suicide risk factors, including prior suicide attempts, family history, hopelessness and psychiatric disorders, such as depression and psychosis (Canapary et al., 2002; Ross et al., 2012). In three studies, some professionals also identified that suicide risk in this population is cumulative, involving a complex interplay of SUP severity, mental health conditions and social stressors (Canapary et al., 2002; Goldstone & Bantjes, 2017; Ross et al., 2012). However, some professionals, comprising drug and alcohol rehabilitation services staff were more uncertain regarding these relationships, indicating gaps in knowledge (Ross et al., 2012).

Awareness of 'Suicide Myths'

While most professionals displayed understanding of suicide-related issues, four studies reported that some still held misconceptions surrounding 'suicide myths'. For example, some believed that discussing suicide with clients might increase risk (Fruhbauerova & Comtois, 2019). Additionally, some professionals underestimated the role of SUPs in suicide risk (Fruhbauerova & Comtois, 2019; Gallant & Harris, 2024; Ross et al., 2012).

Views on Preparedness, Competency and Training

In three studies, many professionals reported feeling underprepared to work with suicidal clients (Fruhbauerova & Comtois, 2019; Gallant & Harris, 2024; Ross et al., 2012). Two studies described challenges differentiating between clients who were at imminent risk and those who were not, due to a lack of sensitive and specific predictive tools for suicide risk in substance-dependent clients (Canapary et al., 2002; Goldstone & Bantjes, 2017). Across four studies, professionals emphasized the importance of tailored training to increase confidence and competency in assessing and managing suicidality among individuals with SUPs (Canapary et al., 2002; Goldstone & Bantjes,

2017; Grimholt et al., 2014; Ross et al., 2012). Contrary to this, one study reported that confidence treating suicidal clients was unrelated to education or years of experience, and that current suicide prevention training appears insufficient to improve confidence and actionable skills (Fruhbauerova & Comtois, 2019). The same study found that perceived sufficiency of training, rather than actual years of experience or level of education, was a stronger predictor of confidence managing suicidal clients (Fruhbauerova & Comtois, 2019).

Attitudes of Professionals Toward SUPs and Suicide Risk

Two studies (Goldstone et al., 2018; Grimholt et al., 2014) explored professionals' attitudes toward individuals with SUPs and suicide risk, revealing variations in stigma, empathy and willingness to engage with them.

Stigma and Negative Attitudes

One study found that professionals expressed mixed attitudes, with some describing frustration and feelings of detachment when working with SUP patients who present with suicide risk (Grimholt et al., 2014). Perceived lack of progress or compliance with care were reported drivers of negative views of those with SUPs who expressed suicidality (Grimholt et al., 2014). Some healthcare providers perceived repeated suicide attempts as manipulative or resistant to help, which contributed to the professionals' disengagement with their care (Grimholt et al., 2014). Studies described that stigma was found to be more prevalent in settings where providers had limited exposure to working with those with SUPs and suicide risk (Goldstone et al., 2018; Grimholt et al., 2014) and was a barrier to engaging in discussions about suicide risk for both patients and providers (Goldstone et al., 2018).

Empathy, Commitment and Professional Role Differences

Studies found that professionals generally expressed that SUPs and suicide risk are conditions which are difficult to treat (Goldstone & Bantjes, 2018) and showed less commitment and empathy towards patients with SUPs compared to other mental health conditions (Grimholt et al., 2014). One study reported gender and profession-related differences. While psychiatrists and addiction specialists generally demonstrated more positive attitudes toward individuals with SUPs and suicide risk, general practitioners and internists were more likely to report irritation or frustration when treating these patients (Grimholt et al., 2014). Male professionals exhibited higher levels of stigma towards these patients compared to female providers, who

generally show more positive attitudes and greater willingness to help (Grimholt et al., 2014).

Experience of Working with SUPs and Suicide Risk

All eight studies included in the review explored professionals' experiences supporting individuals with SUPs and suicide risk.

Emotional Burden of Professionals

Two studies described that professionals frequently reported experiencing high emotional strain, with many describing feelings of burnout, helplessness and distress when supporting individuals at risk of suicide (Goldstone & Bantjes, 2019; Grimholt et al., 2014). Working with SUPs and suicide risk was also described as challenging due to patients' unpredictability and difficulties adhering to treatment (Grimholt et al., 2014). Repeated exposure to crises involving suicide risk was cited in three studies as emotionally exhausting and some professionals expressed frustration at their perceived inability to make a lasting difference (Goldstone & Bantjes, 2019; Grimholt et al., 2014; Ross et al., 2012). A lack of psychological support and supervision was commonly mentioned, contributing to emotional fatigue and detachment over time in two papers (Goldstone & Bantjes, 2019; Ross et al., 2012).

Workplace Challenges and Resource Limitations

Professionals reported working within overburdened systems, with providers struggling with high caseloads, insufficient emergency psychiatric services and a lack of specialised programs for individuals with co-occurring SUPs and suicide risk in four studies (Fruhbauerova & Comtois, 2019; Goldstone & Bantjes, 2017; Goldstone et al., 2018; Ross et al., 2012). One study reported that professionals working with individuals with SUPs and suicide risk expressed frustration at being unable to implement best practice due to limited time and resources. As a result, they described following rigid, standardised care models, leaving little room for tailored interventions, which limited the quality and duration of care offered (Goldstone & Bantjes, 2017). Two studies highlighted that some professionals felt they had to prioritise acute cases, meaning that clients with persistent but lower risk profiles were often deprioritised due to resource constraints (Fruhbauerova & Comtois, 2019; Gallant & Harris, 2024).

Organisational Difficulties and Systemic Barriers

Challenges in the coordination between addiction and mental health services were described across three studies. Professionals reported significant difficulty navigating fragmented and siloed healthcare systems, which often led to delays or failures in addressing the dual needs of suicidal individuals with SUPs (Gallant & Harris, 2024; Goldstone & Bantjes, 2017; Goldstone et al., 2018). Some reported difficulty making referrals, citing bureaucratic inefficiencies that slowed access to appropriate support (Gallant & Harris, 2024). The lack of integration between addiction services and suicide prevention frameworks was perceived as a major systemic flaw (Gallant & Harris, 2024; Goldstone & Bantjes, 2017; Goldstone et al., 2018). Professionals also expressed frustration with the inability to provide holistic care that can address social determinants of health (e.g., housing, employment) (Goldstone & Bantjes, 2017).

Discussion

The intersection of SUPs and suicide presents a critical challenge for healthcare professionals. This review aimed to identify and systematically examine current evidence on the attitudes, knowledge and experiences of professionals' working with individuals with SUPs and suicide risk. A carefully developed search strategy led to the identification of eight studies which met eligibility criteria and were included in the review. Structured assessment indicated that most of the included studies were of moderate or good methodological quality. A narrative synthesis of studies revealed several important findings, including gaps in professionals' knowledge, attitudinal biases and stigmatising beliefs, as well as systemic challenges faced by professionals in assessing and managing suicide risk among individuals with SUPs.

Knowledge and Competence

Most studies included in the review examined professionals' knowledge surrounding working with individuals with SUPs and suicide risk and their perceived competence in response and treatment of these issues. Although professionals appropriately recognise the heightened suicide risk in individuals with SUPs, gaps remain in understanding specific risk factors (e.g. hopelessness, gender differences in suicide risk) and effective prevention strategies. Limited and inconsistent training reduces professionals' confidence in assessing risk, with some holding misconceptions, such as the belief that discussing suicide increases risk (Zortea, Cleare, Wetherall, Melson, & O'Connor, 2021). These findings are consistent with research indicating that training gaps contribute to reduced confidence and preparedness in working with high-risk populations (Boukouvalas et al., 2019). The absence of tailored training for professionals working with individuals with co-occurring SUPs and suicidality further reinforces these challenges.

Attitudes and Stigma

Attitudes towards clients with SUPs and suicide risk were examined in just two of the eight studies. A recurring issue was frustration and perceived treatment resistance among clients. Stigmatising beliefs, particularly towards individuals with multiple suicide attempts, were commonly reported, contributing to reduced empathy and professional detachment. These findings are consistent with previous reviews demonstrating that stigma negatively impacts SUP patients' healthcare engagement and quality of care (Van Boekel et al., 2013). Furthermore, gender and professional

role influenced attitudes, with psychiatrists and female professionals demonstrating greater empathy and commitment to those with SUPs and suicide risk than general practitioners and male professionals (Grimholt et al., 2014). The finding that professional role may be influential could reflect the relatively greater experience and training of psychiatrists working with this population. However, the systematic review by Saunders et al. (2012) reported more negative attitudes in medical than nursing staff towards self-harm patients and concluded that strong gender-role association means it is unclear whether professional roles or gender might account for the differences in attitudes. Additional research to understand potential gender differences would help to clarify this phenomenon.

Stigma in healthcare settings has well-documented consequences, including reduced patient disclosure, avoidance of healthcare services and poorer health outcomes (Carpiniello & Pinna, 2017). The current review highlighted that patients perceived as manipulative or non-compliant were at risk of receiving suboptimal care, with some clinicians reporting reluctance to engage with this population. This is of particular concern as the presence of stigmatising views within clinical interactions discourages individuals from accessing services and contributes to cycles of crisis-driven care rather than sustained support (Hammarlund et al., 2018; Ramberg et al., 2016).

Moreover, professionals working in high-pressure environments with resource constraints expressed greater difficulty maintaining compassion and patience when treating individuals with co-occurring SUPs and suicidality. Time pressures and clinical burnout further reinforced disengagement, with some clinicians describing emotional detachment as a coping strategy for managing the stress of working with high-risk populations. The absence of structured training to address stigma and implicit biases may contribute to these negative perceptions, as professionals often develop attitudes through experiential learning rather than structured education (Van Boekel et al., 2013). Addressing stigma reduction through targeted interventions is therefore crucial for improving engagement and the quality of care provided to individuals with SUPs and suicide risk (Bielenberg, Swisher, Lembke, & Haug, 2021; Wong, Chua, Chan, & Shorey, 2024).

Experience working with SUPs and Suicide Risk

All studies reported on professionals' experiences working with SUPs and suicide risk. Systemic and organisational barriers were viewed by professionals as central challenges in service provision. Fragmented healthcare systems and poor integration between addiction and mental health services were also cited as barriers to effective

care, similar to other existing reviews (Drake et al., 1998; Mundon et al., 2015). Working with SUPs clients with high suicide risk also exerted a significant emotional toll on professionals, with many clinicians experiencing burnout, helplessness and distress particularly in under-resourced environments. Some professionals struggled with self-blame following adverse client outcomes, which is consistent with a large body of evidence demonstrating that working with suicidal populations can contribute to secondary traumatic stress and professional dissatisfaction (Bride, Robinson, Yegidis, & Figley, 2004; O'Connor, Muller Neff, & Pitman, 2018). Professionals described a lack of structured supervision and debriefing mechanisms, which exacerbate the emotional burden of working with SUPs clients with high suicide risk and highlight the need for workplace support strategies.

Implications for Practice, Research and Policy

To address the challenges identified in this review, improvements in professional training, stigma reduction, staff support and systemic integration are essential. Enhanced training is a fundamental requirement, as many professionals report feeling underprepared to assess and manage suicide risk among individuals with SUPs (Fruhbauerova & Comtois, 2019; Grimholt et al., 2014). As perceived sufficiency of training appears to be a stronger predictor of confidence than years of experience, ongoing professional development should be prioritised. Future research should explore the feasibility, acceptability and outcomes of training programmes to ensure they effectively improve clinician confidence, enhance competence and support the delivery of safe and responsive care for individuals with co-occurring SUPs and suicide risk.

Alongside improved training, addressing stigma is crucial. Negative biases towards individuals with SUPs who present with suicide risk remain a significant barrier to effective care. Stigmatising attitudes among professionals can lead to disengagement, diminished therapeutic relationships and reluctance from patients to disclose their distress (Hammarlund et al., 2018). Educational interventions aimed at challenging misconceptions and promoting the use of non-stigmatising language have been shown by the National Institute on Drug Abuse (2021) to improve attitudes towards this patient group. Embedding such initiatives into routine training and professional guidelines could help mitigate bias and promote a more supportive clinical environment (Bielenberg et al., 2021; Kohrt et al., 2020; Wong et al., 2024). These interventions could be evaluated in clinical settings by assessing changes in

professionals' attitudes over time using validated stigma scales, as well as through patient-reported experiences of care.

Professionals working with individuals with SUPs and suicide risk described significant emotional distress, burnout and feelings of helplessness, particularly in the context of repeated exposure to crises and limited organisational support. Clinical responses could therefore include the implementation and evaluation of routine peer debriefing sessions, structured clinical supervision and access to psychological support or reflective practice groups. These interventions have the potential to support staff wellbeing, reduce professional isolation and enhance care quality in high-risk environments. Future research could explore feasibility, how helpful professionals find these approaches and the impact of these mechanisms on delivery of care.

A broader systemic change may be required to improve the coordination of addiction and mental health services. The findings of this review highlight the consequences of a fragmented system, where professionals struggle with high caseloads, inadequate referral pathways and limited access to integrated care (Goldstone & Bantjes, 2017b, 2019; Goldstone et al., 2018). The lack of cohesion between addiction services and mental health frameworks often results in gaps in suicide prevention efforts. Policy reforms that encourage closer collaboration between these sectors, including shared training, co-located services and streamlined referral processes, would support a more comprehensive and patient-centred approach. Initiatives like these could be piloted and evaluated through implementation studies, examining feasibility, practitioner experience, and patient outcomes to inform future service development. The Integrated Treatment for Co-Occurring Disorders (Mueser, 2003), an evidence-based approach developed in the United States, provides simultaneous care for individuals with mental health and SUPs. Implementation in various settings, including small residential programmes, has demonstrated success in addressing these complex needs (McKee, Harris, & Cormier, 2013).

Ultimately, a combination of enhanced training, stigma reduction and systemic reform is needed to ensure that professionals are adequately equipped to support individuals with SUPs who are at risk of suicide. Without these changes, gaps in knowledge, attitudinal barriers, the cumulative emotional toll on professionals and structural limitations will continue to undermine suicide prevention efforts in this population.

Limitations

Several limitations should be considered when interpreting the findings of this review. The overall small number of included studies, several of which utilised the same study sample, means a degree of caution should be exercised in generalising these review findings across healthcare settings, professional roles and geographic regions. Variability in healthcare systems, policies and training standards across different countries also make direct comparisons difficult, with most included studies conducted in high-income settings, limiting applicability to resource-constrained contexts.

A limitation of the studies included in this review and the current evidence base generally is the limited consideration given to the diversity and complexity of individuals with co-occurring SUPs and suicidality. Although this population is characterised by wide variation in substances used, comorbid mental health conditions, trauma histories and exposure to adverse social conditions, participants were often viewed as a single, undifferentiated clinical group. This approach does not reflect the diversity of lived experience and limits the ability to draw conclusions about how professional attitudes, knowledge or experiences may vary depending on these individual factors. Future research could adopt more intersectional approaches, exploring how characteristics such as substance type, psychiatric comorbidity and socioeconomic status may influence professional practice. Recognising this heterogeneity is essential to ensure that research, training and service delivery align with the real-world complexities of this population.

Furthermore, the included studies used a range of designs, methods and outcomes. This heterogeneity across a small number of primary studies presented challenges synthesising findings effectively and it is acknowledged that the categories used in the synthesis are likely to overlap to some degree. The reliance on self-reported data introduces the risk of social desirability bias, where professionals may have understated negative attitudes or overstated competencies. The exclusive focus on professional perspectives mean it is unclear how these attitudes and experiences impact patient outcomes.

Despite these limitations, this review highlights critical knowledge gaps and systemic barriers in suicide prevention for individuals with SUPs, offering direction for future research and policy improvements. The current evidence base is scarce and future research in this area is required. It would be advantageous to have greater understanding of professionals' attitudes on working with this population utilising standardised tools to facilitate a more robust evidence base. Studies should also look

to incorporate service-user perspectives and evaluate interventions aimed at improving training, reducing stigma and enhancing service integration.

Conclusion

This review highlights the significant challenges faced by professionals in assessing and managing suicide risk among individuals with SUPs. The findings reveal important knowledge gaps, attitudinal biases and stigmatising beliefs, as well as systemic barriers that hinder effective intervention. Many professionals feel underprepared to assess suicide risk, with existing training proving insufficient in developing confidence and competency. Stigma remains a major concern, influencing both clinician attitudes and patient engagement, while fragmented services create additional obstacles to integrated care. These challenges emphasise the need for targeted training, stigma reduction strategies and improved service coordination and integration.

Declarations

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Authors' contributions: NC developed the search terms, conducted the literature searches, screened articles, extracted data, synthesised the results and wrote the systematic review. JM provided supervision throughout the research process, reviewed the manuscript and offered feedback on revisions. All authors read and approved the final manuscript.

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Chapter 2

Exploring the relationship between alcohol related factors and non-suicidal self-harm

Prepared in accordance with the author requirements for Biomed Central Psychiatry

Article Submission Guidance

Plain Language Summary

Background: Non-suicidal self-harm (NSSH) is when a person deliberately harms themselves without intending to end their life. It is a growing concern and a known risk factor for future suicide attempts (Nock, Joiner, Gordon, Lloyd-Richardson & Prinstein, 2006). Research suggests a link between alcohol use and self-harm, but the reasons behind this connection are not fully understood. Some people use both alcohol and self-harm to cope with distress or reduce tension (Melson & O'Connor, 2019; Bresin & Mekawi, 2020), but more research is needed to understand why they often occur together. By improving our understanding, we can help guide better support and treatment for those affected.

Aims: This study explores the role of alcohol-related factors in NSSH. It looks at whether certain alcohol-related behaviours, such as acting impulsively while drinking or expecting alcohol to reduce emotional pain, increase the likelihood of engaging in self-harm. The research also investigates whether these factors influence self-harm risk over time and whether the relationship between alcohol and self-harm differs for men and women.

Methods: This study analysed previously collected data from a community sample of adults in Scotland. Participants completed surveys about their alcohol use, self-harm history and mental health over a two-year period. Researchers examined how alcohol-related expectations and impulsivity while drinking were linked to self-harm, both at the start of the study and over time.

Key findings: People who expected alcohol to increase risk-taking and aggression or reduce self-control were more likely to have a history of self-harm. Those who acted impulsively while drinking were also more likely to self-harm. . The link between alcohol expectancies and self-harm was not affected by gender, meaning these factors influence risk similarly for men and women.

Implications: This study suggests that alcohol-related thoughts and behaviours contribute to self-harm risk. It highlights the need for targeted interventions to help people understand and change their beliefs about alcohol's effects on self-harm. Screening for alcohol expectancies in clinical settings may help identify those at risk. Future research should explore how these alcohol-related factors influence self-harm in different populations.

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Abstract

Background: Non-suicidal self-harm (NSSH) is a growing public health concern linked to mental health issues and suicide risk. While alcohol use has been associated with NSSH, the underlying mechanisms remain unclear. This study examines the role of alcohol expectancies and negative urgency-A (acting rashly when distressed and intoxicated) in predicting NSSH.

Methods: This study used secondary analysis of a longitudinal dataset from Scotland (N=896). Logistic regression models assessed cross-sectional and longitudinal associations between alcohol expectancies, negative urgency-A and NSSH at baseline and 22-month follow-up. Gender differences in these relationships were also explored.

Results: Cross-sectional analyses showed that alcohol expectancies related to self-harm, impaired cognition, risk-taking, aggression and negative self-perceptions were significantly associated with a lifetime history of NSSH, independent of alcohol consumption levels. Negative urgency-A was also linked to NSSH. Longitudinal analyses found that alcohol expectancies for self-harm significantly predicted future NSSH, even after accounting for past self-harm and alcohol use. However, negative urgency-A did not independently predict NSSH at follow-up. Gender did not moderate these relationships, suggesting cognitive mechanisms operate similarly across genders.

Conclusions: Alcohol expectancies play a significant role in NSSH risk. While impulsivity during intoxication contributes to self-harm, the expectation that alcohol facilitates self-harm is a key predictor. Targeted interventions addressing alcohol-related cognitions could help prevent NSSH. Screening for alcohol expectancies and incorporating cognitive-behavioural strategies may improve self-harm prevention and treatment. Future research should explore these mechanisms in diverse populations to refine intervention strategies.

Keywords: Non-suicidal self-harm, alcohol expectancies, negative urgency.

Introduction

Suicide attempts and self-harm are considered global public health concerns and are among the strongest predictors of future death by suicide (Turecki & Brent, 2016). The National Institute for Health and Care Excellence defines self-harm as intentional self-poisoning or injury, irrespective of the apparent purpose (NICE, 2022), which can therefore include acts of self-injury with varying degrees of suicidal intent. While there is an overall lack of consensus concerning whether self-harm with suicidal intent and self-harm without suicidal intent should be managed or treated as distinct phenomena or behaviours (Kapur, Cooper, O'Connor, & Hawton, 2013), there is a need to better understand the factors and mechanisms that contribute to self-harm without suicidal intent (Mars et al., 2014a).

Self-harm without suicidal intent has been referred to both as Non-Suicidal Self Injury (NSSI) and Non-Suicidal Self Harm (NSSH) (Cipriano, Cella, & Cotrufo, 2017; McManus et al., 2019; O'Connor et al., 2018). Both describe intentional and deliberate self-injury without suicidal intent, although NSSI is limited to methods that involve destruction of bodily tissue (e.g., cutting, scratching, burning, hitting) and has been proposed as a disorder for inclusion in DSM 5, although further research is necessary to determine whether NSSI should be considered a disorder (Gratz, Dixon-Gordon, Chapman, & Tull, 2015). In contrast, NSSH may include a wider range of self-injurious acts, for example self-poisoning, and is used to describe the self-injurious behaviour rather assuming an underlying disorder. In this study, to provide as inclusive a definition of self-harm without suicidal intent as possible, non-suicidal self-harm (NSSH) will be used to describe the phenomenon of engaging in self-harm without suicidal intent.

Recent studies of UK populations indicate a sharp rise in NSSH in recent years. McManus et al. (2019) reported an increase in the prevalence of lifetime NSSH from 2.4% to 6.4% between 2000 and 2014 in the general population of England, particularly among young women and girls aged 16-24 years (6.5% in 2000 to 19.7% in 2014). O'Connor et al. (2018) reported markedly higher prevalences of NSSH in a nationally representative sample of young adults (16-34 years) in Scotland, including clear differences for males and females: 16.2% (20.9% females, 11.6% male) of their sample reported engaging in NSSH in their lifetime and 4.8% (6.2% female, 3.4% male) reported having done so within the past year. Rising levels of NSSH is a

particular concern given the association of NSSH with future self-injury and death by suicide (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006). NSSH is also associated with other adverse outcomes, such as development or worsening of mental health difficulties and substance misuse (Mars et al., 2014b). NSSH onset typically occurs during the adolescent period and most research on self-harm has focused on adolescent samples, (Brunner et al., 2007; Martin, Swannell, Harrison, Hazell, & Taylor, 2017), meaning that occurrence and aetiology of NSSH is less understood in adult populations.

NSSH is also relatively more common amongst individuals with psychiatric difficulties (Klonsky, Victor, & Saffer, 2014), particularly those who experience emotional distress, depression, anxiety, high levels of self-criticism, negative emotions about themselves and emotion dysregulation. Meta-analyses have also identified a range of factors associated with increased propensity for NSSH including past history of NSSI, feelings of hopelessness (Fox et al., 2015) and facets of self-reported impulsivity, such as negative urgency (i.e. the tendency to act impulsively or rashly when distressed) (Hamza, Willoughby, & Heffer, 2015). While these risk factors undoubtedly contribute to our understanding of NSSH, given recent increases in NSSH within the general population, additional research is warranted to identify more nuanced accounts of the factors associated with NSSH.

Alcohol and NSSH

Increasingly, alcohol use is thought to play an important role in NSSH (Andrews, Martin, & Hasking, 2012; Williams & Hasking, 2010). Ness et al. (2015) reported an increase in alcohol involvement and alcohol misuse in self-harm (including both suicidal and non-suicidal intent) patients between 2000 and 2009. Data from hospital presentations indicate that those who present with self-injury often have consumed alcohol alongside or prior to the incident and alcohol dependence is the second most common psychiatric diagnosis, after depression, amongst those who display self-harming behaviours (Haw, Hawton, Houston, & Townsend, 2001; Ness et al., 2015). A recent meta-analysis provides further evidence of a positive relationship between NSSH and alcohol use; across 57 study samples, the odds of reporting alcohol use were elevated among those with a history of NSSI relative to those without: OR = 1.78; 95% Confidence Interval = 1.53 - 2.07 (Bresin & Mekawi, 2020).

While a range of alcohol and NSSH associations have been reported (e.g., Bresin & Mekawi, 2020), our understanding of the potential alcohol related mechanisms of NSSH is limited. Several potential mechanisms have been proposed. For example, Bresin and Mekawi (2020) hypothesised the acute effects of intoxication can act as a facilitator of NSSH, citing the myopic effects of acute alcohol consumption that may lead to a disproportionate focus on the salient rather than peripheral aspects of a situation and may amplify an individual's likelihood of engaging in rash or impulsive actions (Smith & Cyders, 2016; Steele & Josephs, 1990). Other myopic effects of acute alcohol use include constricted cognition that may also impede use of adaptive coping strategies, resulting in increased risk of enaction of NSSH (Giancola, Duke, & Ritz, 2011; Melson & O'Connor, 2019).

Outcomes expectancies, describing the subjective anticipated outcomes of drinking, may provide a cognitive mechanism linking alcohol use and NSSH. Alcohol Expectancy Theory (Brown, Goldman, Inn, & Anderson, 1980) derived from Social Cognitive Theory (Bandura, 1986, 1997), proposes that prior learning of drinking consequences is stored in memory and plays a key role in determining future alcohol-related behaviours independent of the physiological or psychoactive effects of alcohol (Brown, Goldman, & Christiansen, 1985; Brown et al., 1980; Jones, Corbin, & Fromme, 2001). Alcohol expectancies may therefore increase the likelihood of engaging in NSSH where the expected outcome of drinking facilitates NSSH behaviour. For example, expecting that drinking will provide 'liquid courage' or facilitate risk-taking and aggressive behaviour may weaken biopsychosocial obstacles to enactment of NSSH, such as expected experience of pain and pain tolerance (Thompson, Oram, Correll, Tsermentseli, & Stubbs, 2017). This is consistent with findings reported by Jarvi and Swenson (2017) who found more frequent alcohol use was associated with NSSH-related alcohol expectancies such as expecting to feel less physical pain from cutting while intoxicated versus sober. Expecting alcohol to reduce tension, may also be associated with NSSH, as both alcohol use and NSSH may reflect dysfunctional coping (Andrews et al., 2012; Jarvi & Swenson, 2017).

Melson and O'Connor (2019) reported one of the few empirical investigations of potential alcohol-related mechanisms of self-harm in a community sample in Scotland. In their study they found alcohol-related negative urgency (negative urgency-A; a novel measure of the tendency to act rashly in response to negative emotions after consuming alcohol), heavy drinking frequency, and stronger drinking expectancies for

negative self-perceptions and self-harm differentiated those with a history of thinking about self-harm from those with a history of engaging in self-harm. In subsequent multivariate analyses, only negative urgency-A and heavy drinking frequency differentiated the groups. While Melson and O'Connor's (2019) study is an important step towards understanding the alcohol-related mechanisms of self-harm, there are several important questions that remain unanswered. The primary focus of Melson and O'Connor (2019) was to identify alcohol-related and other psychological factors which differentiated between groups based on their lifetime history of self-harm (self-harm behaviour vs. self-harm thoughts vs. no self-harm thoughts or behaviour). Whether negative urgency-A and different alcohol expectancies are associated with NSSH specifically (rather than self-harm that may include suicidal intent), and whether the associations contribute to our understanding of NSSH beyond a person's alcohol use (e.g. consumption) and experience of alcohol-related problems, requires further investigation. Furthermore, Melson and O'Connor (2019) reported cross-sectional relationships using data collected at a single point in time, and the assumed temporal relationship, in which alcohol factors increase the likelihood of subsequent self-harm, was not examined. Additionally, given consistent evidence of gender differences in the onset and lifetime prevalence of NSSH, the extent to which the relationship between alcohol factors and NSSH may also differ by gender warrants further investigation.

Aims and Research Questions

Research on the role of potential alcohol-related mechanisms in NSSH can enhance understanding of the causes of NSSH and may lead to improvements in management and treatment of self-harm. This present study aims to clarify the role of several potential alcohol related mechanisms of NSSH by addressing the following research questions:

1. Are specific alcohol factors (negative urgency-A and alcohol expectancies) associated, cross-sectionally, with a history of NSSH?
2. Are specific alcohol factors associated, longitudinally, with NSSH?
3. Does gender moderate longitudinal associations between specific alcohol factors and NSSH?

Consistent with previous research (Melson & O'Connor, 2019), we expected that the tendency to engage in rash acts during a negative affective state after consuming alcohol (i.e. alcohol related negative urgency) would be associated with a history of

NSSH. It was also anticipated that selected alcohol expectancies (namely ‘Liquid courage’, risk and aggression’, ‘tension reduction’ and ‘self-harm/suicide’ expectancies) would be associated with NSSH and that negative urgency-A and expectancies would predict later NSSH over time. Although differences in NSSH among males and females led us to ask whether gender acts as a moderator of any longitudinal associations between specific alcohol related factors and NSSH, this question is exploratory, and we offer no clear hypothesis.

Method

Design and Data Source

This study is a secondary analysis of an existing quantitative dataset with cross-sectional and longitudinal design. The data were collected between 2015 and 2018 by University of Glasgow researchers. The primary research was reviewed and approved by The College of Medical, Veterinary and Life Sciences Research Ethics Committee (MVLS REC; project number: 200140114). Following consultation with MVLS REC, the analyses planned as part of the current study were deemed within scope of the initial approval and the researcher gained access as an affiliate researcher without need for further ethics committee review (Appendix 2.1). The present study is reported in accordance with the STROBE checklist for cohort studies (Cuschieri, 2019) (See appendix 2.2).

Participants and Procedures

The dataset comprised a community sample of participants aged 18 and over, residing in Scotland. Individuals were recruited via large employers, commercial websites, community fora and social media to participate in a Health, Lifestyle and Wellbeing Study, a prospective online study addressing the interplay of lifestyle behaviours with physical and psychological health, morbidity and wellbeing. Participants provided informed consent (see appendix 2.3) and were incentivised to participate via entry into a prize draw.

Participants completed questionnaires at baseline (July to November 2015) and a first planned follow-up questionnaire six months later. Participants who completed the follow-up questionnaire were invited to provide additional ‘opt in’ consent to a second follow-up twelve months later. On average participants responded to the first follow-up a median of 8 months after baseline and the second follow-up a median of 22 months after baseline. From here on baseline and the two follow-ups are referred to as: ‘baseline’, ‘8-month follow-up’ and ‘22-month follow-up’.

The baseline dataset included responses of 1546 participants (e.g., Melson & O’Connor, 2019). A total of 1496 and 1050 participants responded at the 8-month and 22-month follow-ups respectively. Of these, the responses of 896 (58%) participants were successfully matched between baseline, 8-month and 22-month follow-ups. In addition to non-responders, and those who could not be matched based on a unique

identifier, attrition included 157 participants who did not opt in to the 22-month follow-up. The present study uses matched responses obtained from participants at the baseline and 22-month follow-up only. An overview of the responses obtained and matched across the study timepoints is provided in Appendix 2.4.

Measures

The Health, Lifestyle and Wellbeing study collected a range of measures of physical and psychological health, morbidity and wellbeing. Only measures relevant to the present study are referred to here.

Baseline: Sociodemographics

At baseline, sociodemographic information was collected, including age, gender, education, employment status and ethnicity.

Baseline: The Alcohol Use Disorders Identification Test (AUDIT)

The AUDIT (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993) is a 10-item self-report questionnaire used widely in clinical practice and research to screen and describe risk for alcohol misuse and problems. The AUDIT addresses three domains of alcohol use and problems: hazardous alcohol use (i.e. consuming quantities of alcohol that can increase the risk of harm to health, both physical and mental) as well as symptoms of alcohol dependency and harmful alcohol use (i.e. physical, social or mental health difficulties as a result of alcohol consumption). Item responses are summed to produce a total score, ranging 0 to 40. Scores of 1 to 7 suggest low-risk drinking, 8 to 14 suggest hazardous or harmful drinking and scores of 15 or more indicate a likelihood of alcohol dependence (moderate-severe alcohol use disorder) and further clinical assessment is recommended (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001; Saunders et al., 1993). The AUDIT has high internal consistency and test-retest reliability (Reinert & Allen, 2007).

Baseline: Negative Urgency-A

A modified version of the Whiteside and Lynam (2001) 12-item negative urgency subscale from the UPPS Impulsive Behaviour Scale was used to examine negative urgency-A. Meta -analysis has indicated that negative urgency (i.e. the tendency to act rashly when feeling distressed) is strongly associated with impulsive and risk taking behaviour when intoxicated, as well as difficulties with alcohol and alcohol dependence (Coskunpinar, Dir, & Cyders, 2013; Whiteside & Lynam, 2003). The negative urgency

subscale questions were modified to reflect tendencies towards rash actions during negative emotional states contingent on alcohol use (Melson & O'Connor, 2019). For example, items such as "when I feel rejected, I will often say things that I later regret" in the original scale were adapted to "when I feel rejected and I drink alcohol, I will often say things that I later regret". Higher mean scores indicate stronger negative urgency. Internal consistency of the adapted negative urgency scale in the study dataset was excellent (α = 0.94) (Melson & O'Connor, 2019) (See Appendix 2.5).

Baseline: Comprehensive Effects of Alcohol Scale (CEOA)

The CEOA (Fromme, Stroot, & Kaplan, 1993) is a 38-item self-report measure used to assess expected effects from drinking alcohol. The questionnaire comprises seven factor analytically derived subscales, four of which measure positive effects of alcohol and three which measure negative effects of alcohol. The seven subscales have a standard structure beginning with "When I drink alcohol, I expect that…" followed by different possible effects including: Sociability (e.g. it would be easier to be sociable), Tension Reduction (e.g. I would feel calm), Liquid Courage (e.g. I would feel brave and daring), Sexuality (e.g. I would be a better lover), Cognitive and Behavioural Impairment (e.g. I would have difficulty thinking), Risks and Aggression (e.g. I would take risks), and Self-Perception (e.g. I would feel self-critical). Subscale scores are determined by calculating the mean of all items in a given subscale. Research by Ham, Stewart, Norton, and Hope (2005) demonstrates the validity of the CEOA and reported internal consistencies for the expectancy factors which were adequate to good (α = 0.66 to 0.84).

Of the seven subscales comprising the CEOA, the 'sexuality' subscale was not included in the Health, Lifestyle and Wellbeing study due to limited relevance. However, a seventh novel subscale was included, comprising seven items targeting alcohol expectancies for specific markers of self-harm risk. This novel Self-Harm Alcohol Expectancy Scale asked participants to consider whether when they drink alcohol, they: "would feel disconnected", "feel alone", "feel defeated", "feel hopeless", "'feel trapped", "think about suicide" and "attempt suicide" (see Appendix 2.5). Internal consistency of the novel Self-Harm Alcohol Expectancy Scale was good (α = 0.82) (Melson & O'Connor, 2019).

Baseline and 22-month follow-up: NSSH

Items from the Adult Psychiatric Morbidity Survey (APMS) (McManus, Meltzer, Brugha, Bebbington, & Jenkins, 2009) and Child and Adolescent Deliberate Self Harm in Europe Survey (Madge et al., 2008) were used to assess history of NSSH at baseline and 22 month follow-up. At baseline participants were asked "Have you ever deliberately harmed yourself in any way (but without wanting to kill yourself)?", with responses to this item ('Yes'/ 'No') indicating a lifetime history of NSSH. The same question was asked at 22-month follow-up, followed by a further question to establish recency of NSSH, "When was the last time you deliberately harmed yourself?'" with response options "The past week", "the past year", "longer ago".

Statistical Analysis

Analyses were conducted using SPSS (version 29). Missing data accounted for <2% per measurement item in the dataset. Little's Missing Completely at Random test (Little, 1988) indicated data were not missing completely at random. The AUDIT item 'typical quantity of units consumed' had a higher level of missingness (4.7%) than other measures, a pattern accounted for by 'never' responses to AUDIT item 'frequency of drinking'. Given low overall levels of missingness, and that missing data patterns can be predicted from other observed responses, Expectation Maximisation (Tsikriktsis, 2005) was used to replace missing data for multi-item scales. It is important to highlight that missing data for categorical and NSSH history items were not replaced.

Descriptive statistics for study participants and measures will be tabulated and presented, including means (or medians), standard deviations, counts and frequencies. To investigate the first research question, whether specific alcohol factors are associated, cross-sectionally, with a history of NSSH, a series of univariate logistic regression models will be used to determine whether each alcohol related factor measured at baseline (negative urgency-A and each alcohol expectancy subscale) is associated with a lifetime history of NSSH relative to a no NSSH group. To ensure the target alcohol factors adds to our understanding of past histories of NSSH beyond the effect of current alcohol use and experience of alcohol-related problems, each logistic regression model will also control for baseline AUDIT scores.

To investigate the second research question, whether alcohol factors measured at baseline predict NSSH measured at 22-month follow-up, alcohol factors associated

cross-sectionally with lifetime history of NSSH will be examined further. First a binary outcome variable ‘past 12-month NSSH’ was created from NSSH responses obtained at 22-month follow-up. Whether NSSH had taken place in the immediate 12 months preceding follow-up was indicated by “past week’ or “past year” responses for those who reported “Yes” to “Have you ever deliberately harmed yourself in any way (but without wanting to kill yourself)?”. Those who reported they had never deliberately harmed themselves or had harmed themselves longer than 12 months ago formed the other group. Binary logistic regression models were then used to examine whether each target alcohol factors measured at baseline predicted past 12-month NSSH at follow-up. To clarify whether each target alcohol factors adds to our understanding of future NSSH beyond effects of prior NSSH histories, alcohol use and problems, each logistic regression model will control for baseline AUDIT scores and NSSH history.

To investigate the final research question, whether gender moderates prospective associations between baseline alcohol factors and past 12 month NSSH at follow-up, the Hayes (2017) PROCESS macro for SPSS will be used. Regression-based moderation analysis using Model 1 will include gender as a potential moderator of any of the prospective associations observed between target alcohol factors and NSSH at follow-up. The moderation analysis will be Bootstrapped using 10,000 resamples to ensure analyses are robust to violations of normality (Hayes, 2017) (see appendix 2.6 for data analysis plan).

Results

Descriptive information

Table 1 presents sociodemographic information for the 896 study participants, who were predominantly female (69.9%) and white (93.5%), with an average age of 36.2 (SD= 13.31, range 17-69 years). The majority of participants were employed (69.9%), held degree or post graduate qualification (59.9%), identified as heterosexual (88.1%) and half were unmarried (50.3%).

Table 1: Demographic Characteristics

Characteristic			
Continuous Variables		**M**	**SD**
Age		36.2	13.3
Categorical Variables		**N**	**%**
Gender	Female	626	69.9
	Male	267	29.8
Ethnicity	White	838	93.5
	Other	57	6.4
Marital/Relationship Status	Married	308	34.4
	Common-law Marriage	30	3.3
	Divorced	53	5.9
	Never Married	451	50.3
	Separated	28	3.1
	Widowed	6	0.7
	Civil Partnership	3	0.3
	In a relationship	15	1.7
Education Level	School/HNC/NHD/NQ/SVQ	356	39.7
	Degree or PG Degree	537	59.9
Employment Status	Employed	626	69.9
	Student	239	26.7
	Unemployed and seeking work	15	1.7
	Retired	8	0.9
	Unemployed due to disability/ incapacity	4	0.4
	Stay at home parent	3	0.3
	Unknown	1	0.1

M: Mean, *SD:* Standard Deviation

Table 2 presents descriptive statistics for those who reported ever having engaged in NSSH and those who had not, including mean and standard deviations for each alcohol factor at baseline. At baseline, of the 896 participants in the study sample, 184 (20.5%) reported ever having engaged in NSSH. The majority of those participants were female (78.26%) and tended to be younger (Mean = 29.50, SD = 9.93) than those who reported no history of NSSH (Mean = 38.00, SD = 13.52). Those in the NSSH group reported relatively higher mean scores for all alcohol factors with the exception of AE tension reduction.

Table 2: Descriptive statistics for those with and without NSSH history at baseline

	NSSH History		**No NSSH history**	
	N or Mean	**% or SD**	**N or Mean**	**% or SD**
Total	184	20.50	711	79.4
Female	144	23.0	482	77.0
Male	40	16.0	226	84.0
Age	29.50	9.93	38.00	13.52
Alcohol Factors				
Negative Urgency-A	1.78	0.68	2.26	0.85
AE Sociability	2.85	0.68	3.0	0.59
AE Tension Reduction	2.58	0.67	2.58	0.66
AE Liquid Courage	2.11	0.74	2.37	0.68
AE Cognitive and Behavioural Impairment	2.51	0.66	2.73	0.61
AE Expected Risk and Aggression	1.84	0.64	2.13	0.66
AE Self Perception	1.69	0.59	1.98	0.65
AE Self-Harm	1.39	0.41	1.68	0.57
AUDIT Score	6.34	4.36	8.67	5.49

M: Mean, *SD:* Standard Deviation, *AE*: Alcohol Expectancy.

Baseline univariate associations: alcohol factors and lifetime history of NSSH

Table 3 displays univariate logistic regression results for each alcohol factor and reported history of NSSH, controlling for AUDIT score at baseline. As expected the majority of alcohol related factors were significantly associated with greater odds of reporting a lifetime history of NSSH relative to those without a history of NSSH. Relatively greater odds of reporting engagement in NSSH were found for those who expected drinking to lead to self-harm risk (AE Self-Harm) (ORs > 3). Other types of expectancies and AUDIT scores were more modestly associated with a history of NSSH (ORs range: 1-2). In contrast, and counter to expectations, expectancies that drinking will reduce tension (AE Tension Reduction) were not significantly associated with NSSH.

Table 3: Univariate logistic regression analyses of the association between alcohol factors and lifetime history of NSSH at baseline.

Alcohol Factors	**B**	**S.E.**	**Wald**	**df**	**OR**	**95% C.I. for OR**		***p***
Negative Urgency-A	0.67	0.12	29.51	1	**1.05**	**1.01**	**1.09**	**<.001**
AE Sociability	0.25	0.15	3.01	1	1.29	9.68	1.71	.083
AE Tension Reduction	-0.20	0.13	2.24	1	.82	.64	1.06	.134
AE Liquid Courage	0.36	0.12	8.27	1	**1.43**	**1.12**	**1.82**	**.004**
AE Cognitive and Behavioural Impairment	0.47	0.14	11.60	1	**1.61**	**1.22**	**2.11**	**<.001**
AE Expected Risk and Aggression	0.53	0.13	15.84	1	**1.70**	**1.31**	**2.20**	**<.001**
AE Self Perception	0.62	0.14	20.23	1	**1.86**	**1.42**	**2.44**	**<.001**
AE Self-Harm	1.14	0.18	40.60	1	**3.11**	**2.20**	**4.42**	**<.001**
AUDIT Score	0.10	0.02	32.66	1	**1.10**	**1.07**	**1.14**	**<.001**

AE: Alcohol Expectancy, *CI*: Confidence Interval, *OR*: Odds Ratio, bold= significant at p<.05; all models control for baseline AUDIT Score except where AUDIT Score is the dependent variable.

22-month follow-up: longitudinal associations of alcohol factors with past 12 month NSSH

The next part of the analysis sought to determine whether alcohol factors, measured at baseline, predicted recent 12-month NSSH at 22-month follow-up. At 22 month follow-up, all those who reported NSSH within the past 12 months were included in a 'past 12 month NSSH' group, with another group comprising those who had never engaged in NSSH or had engaged in NSSH more than 12 months prior. In total 53 (5.92%) of the 896 study participants had engaged in NSSH within the past 12 months at the 22-month follow-up point and were grouped accordingly. Those who engaged in past 12-month NSSH at follow-up were most commonly female (77%) and tended to be younger, with a mean age of 25.9 years (SD = 8.00), compared to those who reported no NSSH history or no recent NSSH (Mean= 37.1, SD= 13.29).

Table 4 presents a series of binary logistic regression models, with past 12-month NSSH at 22-month follow-up as the dependent variable and each alcohol factor as predictor. To ensure each target alcohol factor adds to our understanding of the prediction of future NSSH beyond a past history of NSSH and alcohol use problems, each logistic regression model controlled for baseline AUDIT score and NSSH history. Only those alcohol factors significantly associated with a lifetime history of NSSH at baseline were tested longitudinally.

As can be seen from Table 4, each model was significant overall. However, for negative urgency-A and the majority of the alcohol expectancies (AE Liquid Courage AE Cognitive and Behavioural Impairment, AE Expected Risk and Aggression, AE Self Perception) the only significant predictor of recent NSSH at 22-month follow-up was having a history of past NSSH reported at baseline. In contrast, in the final model, alcohol expectancies for self-harm were significant independent predictors of NSSH at follow-up. An increase of one point in AE self-harm scores was associated with approximately a twofold increase in the odds of engaging in NSSH at follow-up (OR = 2.17, CI = 1.26-3.71).

Table 4: Multivariate logistic regression analyses of the longitudinal association between alcohol factors and past 12-month NSSH at 22-month follow-up.

	B	S.E.	Wald	df	OR	95% C.I. for OR		*p*
Negative Urgency-A								
Baseline NSSH	2.641	0.34	58.77	1	**14.03**	**7.14**	**27.56**	**<.001**
Baseline AUDIT Score	-0.01	0.03	0.07	1	0.99	0.93	1.06	0.788
Baseline Negative Urgency-A	0.17	0.21	0.67	1	1.19	0.76	1.80	0.414
X^2 (3) = 80.606, p < 0.001: Nagelkerke R^2 =.238								
AE Liquid Courage								
Baseline NSSH	2.65	0.34	60.57	1	**14.08**	**7.23**	**27.41**	**<.001**
Baseline AUDIT Score	-0.00	0.03	0.00	1	0.10	0.94	1.06	0.958
Baseline AE Liquid Courage	0.27	0.22	1.45	1	1.31	0.84	2.03	0.228
X^2 (3) = 81.42, p < 0.001: Nagelkerke R^2 =.240								
AE Cognitive and Behavioural Impairment								
Baseline NSSH	2.64	0.34	59.92	1	**13.97**	**7.17**	**27.25**	**<.001**
Baseline AUDIT Score	0.00	0.03	0.00	1	1.00	0.95	1.06	0.985
Baseline AE Cognitive and Behavioural Impairment	0.35	0.25	1.90	1	1.41	0.87	2.31	0.168
X^2 (3) = 81.890, p < 0.001: Nagelkerke R^2 =241.								
AE Expected Risk and Aggression								
Baseline NSSH	2.65	.034	59.92	1	**14.14**	**7.23**	**27.66**	**<.001**
Baseline AUDITl Score	0.00	0.03	0.00	1	1.00	0.95	1.06	0.967
Baseline Risk and Aggression	0.18	0.23	0.62	1	1.20	0.76	1.89	0.433
X^2 (3) = 80.562, p < 0.001: Nagelkerke R^2 =.238								
AE Self Perception								
Baseline NSSH	2.70	0.35	58.30	1	**14.84**	**7.43**	**29.66**	**<.001**
Baseline AUDIT Score	0.00	0.03	0.00	1	1.00	0.95	1.06	0.957
Baseline AE Self Perception	0.22	0.24	0.80	1	1.24	0.77	1.99	0.37

X^2 (3) =80.639, p < 0.001: Nagelkerke R^2 =.244								
AE Self-Harm								
Baseline NSSH	2.51	0.35	52.26	1	**12.26**	**6.21**	**24.18**	**<.001**
Baseline AUDITl Score	-0.01	0.03	0.12	1	0.99	0.94	1.05	0.734
Baseline AE Self-Harm	0.77	0.28	7.90	1	**2.17**	**1.26**	**3.71**	**0.005**
X^2 (3) = 87.759, p < 0.001: Nagelkerke R^2 =.258								

AE: Alcohol Expectancy, *CI*: Confidence Interval, *OR*: Odds Ratio, bold= alcohol factor significant at p<.05

Gender as a moderator of Alcohol Factors and NSSH

To examine the final research question, Hayes' PROCESS macro (Version 4.2; Hayes, 2022), utilising Model 1, tested whether gender acted as a moderator of the relationship between baseline AE Self Harm and past 12-month NSSH at 22-month follow up. Consistent with preceding analyses, the model controlled for lifetime history of NSSH at baseline and AUDIT score at baseline.

The analysis revealed that the main effect of the predictor, AE Self Harm, on past 12-month NSSH was statistically significant (b = 0.79, SE = 2.77, Z =2.86, p = 0.004, 95% CI [.25, 1.34]). However, the moderator, gender, did not significantly predict past 12-month NSSH (b = -.26, SE = .61, Z = -.61, p = 541, 95% CI [-1.08, .57]) and there was no interaction between AE Self Harm and gender (b =.32, SE = .62, Z = .51, p = .61, 95% CI [-.89, 1.52]), indicating that gender did not moderate the relationship between AE Self Harm and past 12 month NSSH at follow-up .

Discussion

The overarching aim of the present study was to advance understanding of the role of specific alcohol factors, namely negative urgency- A (i.e. the tendency to act rashly in response to negative emotions after consuming alcohol) and different domains of alcohol expectancy (i.e. expected effects from drinking alcohol) in Non-Suicidal Self Harm (NSSH). Cross-sectional analyses revealed significant associations between specific alcohol factors and NSSH in a community sample of the Scottish population. Higher scores on the widely used AUDIT, a reported tendency to engage in rash actions in response to negative affect whilst drinking (i.e. negative urgency-A) and multiple drinking expectancy domains were associated with a lifetime history of having engaged in NSSH. The expected effects of drinking associated with NSSH included the beliefs that alcohol will provide 'liquid courage', impair cognition and behaviour, increase risk and aggression, as well as experience negative self-perceptions and specific markers of self-harm risk.

The cross-sectional associations between alcohol expectancies, negative urgency-A and NSSH were observed independently of participants' AUDIT scores, suggesting that these alcohol factors may offer more nuanced accounts of the role of alcohol in NSSH than the established emphasis on consumption and underlying alcohol use disorders in the current evidence base (Bresin & Mekawi, 2022). Empirical investigation of the role of alcohol expectancies builds upon theoretical assumptions concerning their role in suicidal risk (Conner & Bagge, 2019; Hufford, 2001) and incorporating expectancies which cover multiple domains of effect provides stronger evidence for the role of specific alcohol expectancies in the aetiology of NSSH.

The alcohol factors investigated in the present study allowed us to examine a range of potential pathways to engaging in NSSH. For example, the cross-sectional association of negative urgency-A with lifetime history of NSSH is consistent with an account that a greater tendency to engage in rash actions in response to negative affect when drinking will increase risk of engaging in NSSH, and is also consistent with existing empirical evidence of heightened impulsivity, risky behaviour, and self-harm under emotional distress, particularly in contexts involving alcohol (Hamza et al., 2015). The cross-sectional associations between specific alcohol expectancies and lifetime history of NSSH also offer a number of specific accounts of the relationship between drinking and NSSH. For example, cognitive and behavioural impairment, as well as increased risk and aggression, might facilitate NSSH by lowering inhibition and restricting ability

to utilise adaptive coping strategies. The role of self-perception may be interpreted as the expectancy that alcohol will lead to negative thinking and evaluations of the self. The novel self-harm expectancy subscale was derived from contemporary psychological theory (O'Connor & Kirtley, 2018; Van Orden et al., 2010) and may therefore provide a particularly sensitive form of expectancy for markers of self-harm risk. Following expectancy theory, individuals' expectations for their behaviour when drinking may lead them to behave in ways that fit these mental models, in turn reinforcing maladaptive coping mechanisms, behaviours and increasing the likelihood of NSSH behaviours.

Counter to our expectations, tension reduction expectancies were not associated with NSSH, contrasting with some prior research where NSSH and alcohol consumption co-occur as methods of tension regulation (Williams & Hasking, 2010). Within our sample it is noteworthy that, unlike the other expectancy domains, tension reductions expectancy scores were similarly high in those with a history of NSSH and those without. One possible explanation then is that this form of expectancy is widely endorsed in the Scottish adult population and consequently is not a specific marker of emotion regulation strategies used by those with a history of NSSH. Overall, while cross-sectional analysis precludes causal inferences, these findings provide valuable insight into a range of potential alcohol mechanisms associated with lifetime history of NSSH.

Importantly, to the best of the author's knowledge, this is the first study to also investigate whether these specific alcohol factors predict NSSH engagement over time, allowing stronger inferences about the alcohol-related causal mechanisms of NSSH. Whereas a range of alcohol factors were associated cross-sectionally with ever having engaged in NSSH, only the expectancies focused on self-harm risk predicted engagement in NSSH during the past 12 months at 22-month follow-up. These longitudinal analyses controlled for baseline AUDIT scores and a lifetime history of NSSH, meaning the two fold increase in the odds of engaging in NSSH at follow-up among those with stronger self-harm expectancies is unlikely to accounted for by a person's prior alcohol use and problems or NSSH.

The longitudinal association between alcohol expectancies for self-harm and NSSH extends initial work carried out by Melson and O'Connor (2019), which was limited to cross-sectional analyses and operationalised self-harm differently and demonstrates that this particular alcohol expectancy domain predicts future behaviour. It may be the case that this form of alcohol expectancy facilitates the activation of self-harm related

thoughts, beliefs and behaviours which may persist over time, leading to continuation and reinforcement of maladaptive coping mechanisms like NSSH. These results suggest that specific alcohol expectancies are likely to have lasting effects on behaviour, consistent with expectancy theory (Brown et al., 1980), which suggests that these cognitive schemas persist over time.

The present study also demonstrated that, although there are established gender differences in the onset and prevalence of NSSH, gender did not moderate the longitudinal association of self-harm expectancies on NSSH at follow-up. One possible interpretation is that these expectancies function as a robust mechanism underlying NSSH, irrespective of gender. However, it is important to consider the role of statistical power in interpreting the absence of a statistically significant moderation effect. The number of participants reporting NSSH at follow-up was relatively small (n = 53), and fewer still were male, which may have limited the statistical power of the present analyses to detect any gender differences. Nonetheless, it is worth noting that the effect size for the was modest and with wide confidence intervals (b = .32, 95% CI [-.89, 1.52]), suggesting that if a moderating effect of gender exists, it is likely to be small and may not represent a robust effect in this sample population. Future studies with larger, gender-balanced samples, would be better positioned to robustly test for interaction effects and explore the potentially complex role of gender in the relationship between alcohol factors and NSSH.

Implications

It is understood from Scottish Health Survey (2022) that there is high prevalence of NSSH and alcohol use among adults in Scotland (O'Connor et al., 2018), therefore the study of alcohol specific factors and their role in NSSH may contribute to future research and the assessment and clinical understanding of NSSH.

Research implications

These findings contribute to a limited evidence base on the cognitive processes and state-based propensities for risky behaviour that may help to explain relationships between alcohol use and NSSH. The findings suggest that research relying on reports of alcohol consumption levels, the presence of alcohol use disorders, or behavioural patterns alone may fail to capture the underlying processes associated with NSSH. This research supports prior work suggesting self-harm is not only impulsive but also

shaped by cognitive frameworks that influence risk-taking behaviour (Brown et al., 1980; Jones et al., 2001; Melson & O'Connor, 2019). It challenges the notion that alcohol's role in NSSH is purely pharmacological by highlighting how beliefs alone can be predictive of harmful behaviours. Researchers should seek to develop models of NSSH and alcohol use that integrate drinking expectancies as cognitive representations rather than relying on measures of alcohol use and harm. Alcohol expectancies, as cognitive representations, are potentially modifiable and improved models of the role of alcohol in NSSH could serve as the basis for future research developing and testing novel interventions to manage NSSH.

Implications for practitioners

The cross-sectional and longitudinal findings reveal potential opportunities for intervention by identifying key alcohol-related factors associated with NSSH. Routine assessment which goes beyond standard questions on quantity and frequency of alcohol use and investigates alcohol expectancies in cases of NSSH could enable early identification of high-risk individuals. Interventions targeting impulsivity (e.g., negative urgency-A) may be effective as short-term strategies to manage NSSH risk, enacted in practice by delivery of strategies to improve emotion regulation. By identifying elevated alcohol expectancies, practitioners could also hope to provide intervention to address alcohol-related cognitive processes, incorporate discussions around alcohol-related cognitions into treatment plans for those at risk of self-harm and address possible maladaptive beliefs about alcohol's role in self-injury.

Limitations

Although there are multiple strengths of the present study, these should be considered in light of several important limitations. Firstly, this study utilised secondary data, limiting control over the study design and the included measures. Although most of the measures used were psychometrically robust, the negative urgency-A and Self-harm expectancy measures were novel measures and have not been psychometrically developed and evaluated. Additionally, while the longitudinal design, controlling for prior history of NSSH and alcohol use and problems, strengthens causal inferences about the role of alcohol expectancies in NSSH, the observational nature of the study precludes definitive conclusions about causality. There may be other confounders, including mental health conditions and substance misuse problems, that influence observed relationships. Future research, building on this work, may wish to incorporate these factors to provide more robust conclusions.

The predominantly female (69.9%) and white (93.5%) community sample used in the present study may limit the generalisability of the findings reported here to more diverse populations and those accessing clinical services. Moreover, ethnicity was described in binary terms as ‘White’ or ’Other’, which constrained the ability to consider and explore differences between ethnic groups or understand the intersection of ethnicity with other risk factors. This lack of variegated demographic data is a limitation, given known differences in the prevalence, expression and treatment of self-harm and alcohol use across cultural and ethnic groups. Future research should prioritise sample diversity and ensure this is reflected in analyses to support more inclusive and generalisable findings.

Only 58% of the initial sample were retained through to 22-month follow-up, reducing statistical power of our analyses to detect longitudinal associations associated with recent NSSH, and potentially introducing bias if those lost differed systematically from those retained. Strengthening retention strategies and reducing attrition in future studies will be important for improving data quality and enabling more robust investigation of the mechanisms underlying these associations.

Conclusion

This study examined the cross-sectional and longitudinal associations of specific alcohol factors in NSSH as well as gender as a potential moderator. The findings indicate that multiple domains of alcohol expectancy and a tendency to engage in rash acts when distressed and drinking (negative urgency-A) are associated with a lifetime history of NSSH. Furthermore, the finding that alcohol expectancies for self-harm predict future engagement in NSSH emphasises the importance of considering alcohol-related cognitions in the aetiology of self-harm and as potential targets for intervention. Gender did not moderate this longitudinal relationship, cautiously implying these alcohol-related cognitions operate similarly across genders. Following additional research to confirm these findings, based on robust research designs and incorporating diverse populations, integrating alcohol expectancy assessments into mental health screenings could help identify individuals at future risk of NSSH and lead to targeted interventions, such as cognitive-behavioural and emotion regulation strategies. Ultimately, recognising the role of alcohol-related mechanisms in self-harm can inform prevention strategies and improve outcomes for at-risk individuals.

Declarations

Ethics approval and consent to participate: see appendix 2.1 and 2.3.

Consent for publication: see appendix 2.3.

Availability of data and materials: see appendix 2.9.

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Authors' contributions: JM collected the data. NC analysed the data and wrote the manuscript. JM provided supervision, reviewed the manuscript and offered feedback on revisions. All authors read and approved the final manuscript.

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Appendices

Appendix 1.1: PRISMA Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	7
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	8
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	11
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	12
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	13-14
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	13
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	13 and appendix 1.2
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	15
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	15
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	13,14
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	13,14
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	15
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	n/a

Section and Topic	Item #	Checklist item	Location where item is reported
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	15
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	16
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	16
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	16
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	n/a
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	n/a
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	n/a
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	n/a
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	18
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	17
Study characteristics	17	Cite each included study and present its characteristics.	19-23
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	23,24
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	n/a
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	19-28
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	n/a
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	n/a
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	n/a
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	23/24

Section and Topic	Item #	Checklist item	Location where item is reported
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	n/a
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	29-32
	23b	Discuss any limitations of the evidence included in the review.	33-34
	23c	Discuss any limitations of the review processes used.	33-34
	23d	Discuss implications of the results for practice, policy, and future research.	31-32
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	13
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	13
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	n/a
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	n/a
Competing interests	26	Declare any competing interests of review authors.	n/a
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	n/a

Appendix 1.2: Systematic Review electronic search strategy and results

Database	Search terms/fields	Results
ASSIA	(Professional* OR Clinician* OR Nurs* OR Psychiatr* OR Counsell* OR Psycholog* OR "Medic" OR "Doctor" OR Social Work* OR Allied Health* OR "Practitioner" OR "Health Personnel" OR GP OR Physician OR Intern* OR "Provider" OR "Medical Personnel" OR "Therapist" OR Advoca* OR Support Work* OR Recovery Work* OR Early Intervention Work* OR Outreach Work* OR Project Work* OR Recovery* OR Addictions Work*) AND (Attitude* OR "opinion" OR "Belief" OR Perspective* OR "Experience" OR "Knowledge" OR "Perception" OR Skill* OR "confidence" OR competenc* OR abilit* OR "Training" OR "Self-efficacy" OR "Practice" OR Stigma* OR Discriminat* OR Inequ* OR Prejudic*) AND ("Substance use disorder*" OR "SUDs" OR Substanc* OR Drug* OR "Substance Misuse" OR Alcohol* OR "Alcohol Misuse" OR "Alcohol Abuse" OR "Alcohol Dependence" OR "Alcohol Use" OR "Alcoholism" OR "Substance Dependence" OR "Substance Abuse" OR "Substance Use*" OR "Drug Dependence" OR "Drug Abuse" OR "Drug misuse" OR "Drug Use" OR Depend* OR Addict* OR "Drug use*") AND (Suicid* OR Parasuicid* OR "Self Inflict*" OR "Selfinflict*" OR "Self Destruct*" OR "Selfdestruct" OR "Selfharm*" OR "Self-harm*" OR "Self-injur*" OR "Selfinjur*" OR "Self Injur*" OR "Self Poison*" OR "Selfpoison*" OR "Selfmutilat*" OR "Self Mutilat*" OR "NSSI" OR Nonsuici* OR Non-Suicid* OR "Overdose" OR Overdos*)	140
APA PsychInfo	(Professional* OR Clinician* OR Nurs* OR Psychiatr* OR Counsell* OR Psycholog* OR "Medical Personnel" OR "Mental Health Personnel" OR "Health Personnel" OR "Doctor" OR "General Practitioner" OR "GP" OR Physician* OR Intern* OR "Healthcare Provider*" OR "Therapist*" OR "Social Work*" OR "Allied Health*" OR "Support Work*" OR "Recovery Work*" OR "Early Intervention Work*" OR "Outreach Work*" OR "Project Work*" OR "Addictions Work*") AND (Attitude* OR "Belief*" OR "Perspective*" OR "Experience*" OR "Knowledge*" OR "Perception*" OR "Skill*" OR "Confidence*" OR Competenc* OR Abilit* OR "Training*" OR "Self-efficacy" OR "Practice*" OR "Professional Role" OR "Professional Training" OR "Stigma*" OR "Discriminat*" OR "Prejudic*" OR "Bias*") AND ("Substance Use Disorder*" OR "SUDs" OR "Substance-Related Disorders" OR "Drug Dependence" OR "Alcohol Dependence" OR "Substance Abuse" OR "Drug Abuse" OR "Alcohol Abuse" OR "Substance Misuse" OR "Alcohol Misuse" OR "Drug Misuse" OR "Drug Use Disorder*" OR "Alcoholism" OR Addict* OR Depend*) AND (Suicid* OR "Parasuicide*" OR "Self-Harm" OR "Self Injurious Behavior" OR "Self Poison*" OR "Self Mutilation" OR "Self-Destruct*" OR "Non-Suicidal Self Injury" OR "NSSI" OR "Suicidal Ideation" OR "Suicide Attempt*" OR Overdose OR "Self-Inflicted Injury*" OR "Self-Injury")	1223
MEDLINE	(Professional* OR Clinician* OR Nurs* OR Psychiatr* OR Counsell* OR Psycholog* OR "Medical Personnel" OR "Mental Health Personnel" OR "Health Personnel" OR "Doctor" OR "General Practitioner" OR "GP" OR Physician* OR Intern* OR "Healthcare Provider*" OR "Therapist*" OR "Social Work*" OR "Allied Health*"	1076

	OR "Support Work*" OR "Recovery Work*" OR "Early Intervention Work*" OR "Outreach Work*" OR "Project Work*" OR "Addictions Work*") OR exp Health Personnel/ (MeSH term for healthcare professionals) AND (Attitude* OR "Belief*" OR "Perspective*" OR "Experience*" OR "Knowledge*" OR "Perception*" OR "Skill*" OR "Confidence*" OR Competenc* OR Abilit* OR "Training*" OR "Self-efficacy" OR "Practice*" OR "Professional Role" OR "Professional Training" OR "Stigma*" OR "Discriminat*" OR "Prejudic*" OR "Bias*") OR exp Attitude of Health Personnel/ (MeSH term for attitudes of healthcare professionals) OR exp Professional Competence/ (MeSH term for professional knowledge and skills) AND ("Substance Use Disorder*" OR "SUDs" OR "Substance-Related Disorders" OR "Drug Dependence" OR "Alcohol Dependence" OR "Substance Abuse" OR "Drug Abuse" OR "Alcohol Abuse" OR "Substance Misuse" OR "Alcohol Misuse" OR "Drug Misuse" OR "Drug Use Disorder*" OR "Alcoholism" OR Addict* OR Depend*) OR exp Substance-Related Disorders/ (MeSH term for substance use disorders) AND (Suicid* OR "Parasuicide*" OR "Self-Harm" OR "Self Injurious Behavior" OR "Self Poison*" OR "Self Mutilation" OR "Self-Destruct*" OR "Non-Suicidal Self Injury" OR "NSSI" OR "Suicidal Ideation" OR "Suicide Attempt*" OR Overdose OR "Self-Inflicted Injury*" OR "Self-Injury") OR exp Suicide/ (MeSH term for suicide) OR exp Self-Injurious Behavior/ (MeSH term for self-harm)	
CINAHL	**S1 – Population / Professionals:** (MH "Health Personnel+" OR MH "Physicians+" OR MH "Nurses+" OR MH "Psychologists+" OR MH "Social Workers+" OR MH "Mental Health Personnel+" OR MH "Allied Health Personnel+" OR MH "Primary Health Care+" OR clinician* OR nurs* OR psychiatr* OR counsell* OR psycholog* OR medic OR doctor OR social work* OR allied health* OR practitioner OR GP OR physician OR intern* OR provider OR medical personnel OR therapist OR advoca* OR support work* OR recovery work* OR early intervention work* OR outreach work* OR project work* OR recovery OR addictions work*) **S2 – Attitudes / Experiences / Training / Knowledge:** (MH "Attitude of Health Personnel+" OR MH "Knowledge, Attitudes, Practice+" OR MH "Professional-Patient Relations+" OR MH "Training+" OR MH "Competency+" OR MH "Self Efficacy+" OR MH "Stigma+" OR MH "Health Personnel Attitudes+" OR attitude* OR opinion OR belief OR perspective* OR experience OR knowledge OR perception OR skill* OR confidence OR competenc* OR abilit* OR training OR self-efficacy OR practice OR stigma* OR discriminat* OR inequ* OR prejudic*) **S3 – Substance Use / Addiction:** (MH "Substance-Related Disorders+" OR MH "Drug Abuse+" OR MH "Alcoholism+" OR MH "Substance Abuse, Intravenous+" OR MH "Substance Abuse Treatment Centers+" OR substance use disorder* OR SUD* OR substanc* OR drug* OR substance misuse OR alcohol* OR alcohol misuse OR alcohol abuse OR alcohol dependence OR alcohol use OR alcoholism OR substance	607

	dependence OR substance abuse OR drug dependence OR drug abuse OR drug misuse OR drug use OR addict* OR depend*) **S4 – Suicidality / Self-Harm:** (MH "Suicide+" OR MH "Suicide, Attempted+" OR MH "Self-Injurious Behavior+" OR MH "Self Mutilation+" OR MH "Drug Overdose+" OR suicid* OR parasuicid* OR self inflict* OR selfinflict* OR self destruct* OR selfdestruct* OR selfharm* OR self-harm* OR self-injur* OR selfinjur* OR self injur* OR self poison* OR selfpoison* OR selfmutilat* OR self mutilat* OR NSSI OR nonsuici* OR non-suicid* OR overdose OR overdos*) **S5 – Final Search Combination:** S1 AND S2 AND S3 AND S4	
Web of Science Core Collection	TS=(Professional* OR Clinician* OR Nurs* OR Psychiatr* OR Counsell* OR Psycholog* OR "Medical Personnel" OR "Mental Health Personnel" OR "Health Personnel" OR "Doctor" OR "General Practitioner" OR GP OR Physician* OR Intern* OR "Healthcare Provider*" OR "Therapist*" OR "Social Work*" OR "Allied Health*" OR "Support Work*" OR "Recovery Work*" OR "Early Intervention Work*" OR "Outreach Work*" OR "Project Work*" OR "Addictions Work*") AND TS=(Attitude* OR "Belief*" OR "Perspective*" OR "Experience*" OR "Knowledge*" OR "Perception*" OR "Skill*" OR "Confidence*" OR Competenc* OR Abilit* OR "Training*" OR "Self-efficacy" OR "Practice*" OR "Professional Role" OR "Professional Training" OR "Stigma*" OR "Discriminat*" OR "Prejudic*" OR "Bias*") AND TS=("Substance Use Disorder*" OR "SUDs" OR "Substance-Related Disorders" OR "Drug Dependence" OR "Alcohol Dependence" OR "Substance Abuse" OR "Drug Abuse" OR "Alcohol Abuse" OR "Substance Misuse" OR "Alcohol Misuse" OR "Drug Misuse" OR "Drug Use Disorder*" OR "Alcoholism" OR Addict* OR Depend*) AND TS=(Suicid* OR "Parasuicide*" OR "Self-Harm" OR "Self Injurious Behavior" OR "Self Poison*" OR "Self Mutilation" OR "Self-Destruct*" OR "Non-Suicidal Self Injury" OR "NSSI" OR "Suicidal Ideation" OR "Suicide Attempt*" OR Overdose OR "Self-Inflicted Injury*" OR "Self-Injury")	198
Google Scholar	("healthcare professionals" OR "clinicians" OR "mental health practitioners" OR "social workers" OR "addiction specialists") AND ("attitudes" OR "knowledge" OR "experience" OR "competence" OR "training" OR "confidence" OR "stigma") AND ("substance use disorder" OR "alcohol dependence" OR "drug addiction" OR "substance misuse") AND ("suicide risk" OR "self-harm" OR "suicidal ideation" OR "suicide prevention") filetype:pdf OR site:.edu OR site:.ac.uk OR site:.gov	100

Appendix 2.1 Ethical Approval

Content on pages 84-87 removed due to confidentiality issues

Appendix 2.2 STROBE checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page number
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	47
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	47
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	48-52
Objectives	3	State specific objectives, including any prespecified hypotheses	51-52
Methods			
Study design	4	Present key elements of study design early in the paper	53
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	53-54
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	53-54
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	53-54
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	54-56
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	54-56

Bias	9	Describe any efforts to address potential sources of bias	n/a
Study size	10	Explain how the study size was arrived at	53-54
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	56-57
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	56-57
		(*b*) Describe any methods used to examine subgroups and interactions	56-57
		(*c*) Explain how missing data were addressed	56
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	56
		(*e*) Describe any sensitivity analyses	n/a

Results			**Page number**
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	59
		(b) Give reasons for non-participation at each stage	54
		(c) Consider use of a flow diagram	Appendix 2.4
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	59-60
		(b) Indicate number of participants with missing data for each variable of interest	n/a
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	57
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	*62*
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	*61*
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	61-65
		(*b*) Report category boundaries when continuous variables were categorized	n/a
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	65
Discussion			
Key results	18	Summarise key results with reference to study objectives	66-68
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	69-70

Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	66-70
Generalisability	21	Discuss the generalisability (external validity) of the study results	68-69
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	n/a

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

Appendix 2.3 Participant Information Sheet and Consent Form

Open Science Framework: Participant Information Sheet and Consent Form

Appendix 2.4 Flow diagram merging BASELINE, 8-month and 22-month datasets

Open Science Framework: Flow Diagram Merging BASELINE, 8-month and 22 month datasets

Appendix 2.5 Research Measures

Open Science Framework: Research Measures

Appendix 2.6 Data Analysis Plan

Open Science Framework: Project Registration

Note: The data analysis plan of the original MRP proposal was updated with a revised analysis plan following consultation with associate researchers at the University of Glasgow. Both plans are documented in the project registration, with the changes recorded as an update to the registration.

Appendix 2.7 Data Analysis Syntax and Output

Open Science Framework: Syntax and Output

Appendix 2.8 Research Proposal

Open Science Framework: MRP Proposal

Appendix 2.9 Data Availability Statement

The dataset used and/or analysed during the current study are available from the trainee's supervisor upon reasonable notice request.

Appendix 2.10 Author Contribution Statement

The author contribution to this project is outlined below using the Contributor Roles Taxonomy (CRediT; https://credit.niso.org/):

- Conceptualization: Dr Jack Melson (JM) and Professor Rory O'Connor (ROC) were responsible the ideas and overarching aims of the project on the role of alcohol in suicide risk. Nadia Cook (NC) was responsible for developing the current study-specific aims, questions, outcomes and analytic design.

- Methodology: NC developed the study's analytic approach, selection of relevant study and time-based variables and measures.

- Formal Analysis: NC designed and conducted all statistical analyses.

- Investigation: JM and ROC led the collection and overall research process for the data used in the present study. NC led the literature review and interpretation of findings in the present study.

- Data Curation: NC selected relevant measures and variables from the dataset for use in the present study. NC prepared the data for analysis, including coding and computing outcome measures. JM is responsible for other curation and data management activities including storage and retention of the dataset.

- Resources: JM and ROC developed the novel measures (negative urgency A and AE self-harm expectancies) and selected the measures used in the original dataset.

- Writing – Original Draft: NC drafted the thesis.

- Writing – Review & Editing: NC revised the thesis in response to supervisory and examiner feedback. JM provided critical review and comment throughout.

- Supervision: JM provided academic supervision and guidance throughout the project.

- Project Administration: NC managed timelines, planning and all aspects of the project administration.