



Review Article

Psychological factors associated with suicide attempt and suicide death in Scotland: A systematic review

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ABSTRACT

Background: The identification of modifiable psychological factors associated with suicide attempt and suicide death is required for the development of effective preventive interventions. The aim of this systematic review was to identify studies which explored psychological factors in relation to suicidal behaviour in the Scottish population.

Methods: Search terms relating to (i) suicide, (ii) associated psychological factors, and (iii) Scotland were searched in five bibliographic databases. Of the 1,479 papers identified, eight were eligible for, and seven included in, this review.

Results: Fourteen psychological factors were found to be significantly associated with suicide attempt and suicide death, after controlling for possible confounders. These factors were grouped into the following headings: connectivity, mental health and internal factors. Limitations: Only a small number of papers were eligible for this review, of which only a subset used a prospective design.

Conclusions: Many of the factors associated with suicide attempt and death were consistent with key concepts highlighted in the Integrated Motivational-Volitional (IMV) Model, in particular all major drivers of suicide (defeat, entrapment and suicidal ideation) and several volitional factors, including connectivity with others. Further investigation of the psychological factors addressed in this review, using prospective designs and clarifying the intended outcome of self-injurious action, is encouraged.

1. Introduction

Suicide is a worldwide public health concern. The World Health Organisation (World Health Organization, 2023) estimates that about 703,000 people die by suicide each year. Scotland continues to have the highest reported rate of suicide in the UK. The causes of suicide are multifaceted and complex (Turecki et al., 2019). Although some risk and protective factors (e.g., age and gender) associated with suicide death and suicide attempt are not modifiable, the impact of other, psychological, factors may be mitigated via psychological interventions. The identification of these factors is crucial to the development of effective preventive interventions. In 2022, Scotland released a ten-year strategy (Scottish Government, 2022) to reduce suicide by focusing on societal issues associated with suicide. Therefore, this paper systematically summarises the findings of published literature to identify psychologically-based risk and protective factors associated with suicide

attempt and suicide death in the Scottish population.

Several theoretical models of suicidal behaviour have been developed. A leading theory is the Integrated Motivational-Volitional (IMV) model of Suicidal Behaviour (O'Connor, 2011; O'Connor et al., 2018) which adopts a biopsychosocial, life-course approach to modelling suicidal behaviour. The IMV model considers the individual's history and biological and psychological predispositions, in addition to the individual's current psychological state and context. Additionally, the IMV model, one of the few suicidal behaviour frameworks which distinguishes between suicidal ideation and suicide enactment, proposes that a set of 'volitional' factors, including impulsivity, fearlessness of death and mental imagery about death (O'Connor, 2011; O'Connor et al., 2018; Branley-Bell et al., 2019) govern the transition from suicidal ideation to suicide enactment.

Another prominent model is the Biopsychosocial Theory of Suicidal Risk (Turecki and Brent, 2016). This model presents that the social

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context may influence distal (predisposing) factors (e.g., family history, genetics), proximal (precipitating) factors (e.g., psychopathology, hopelessness, entrapment) and developmental (mediating) factors (e.g., personality traits, cognitive deficits) that can lead to suicidal thoughts and behaviours. Theories such as the IMV model and the Biopsychosocial model help to understand the relationships between risk factors and explain suicide risk in specific subgroups of the population.

As highlighted by the IMV model and the biopsychosocial theory, the global literature has identified a large number of candidate psychological factors associated with suicide. These are most commonly reported as risk factors, with a scarcity of research into factors which protect against suicidal behaviour (O'Connor and Nock, 2014; Franklin et al., 2017). The identification of modifiable factors associated with suicide is appropriate when considering national policy and individual-level intervention, since such factors can be directly targeted for change (Sinclair and Leach, 2017). Although many psychological factors are associated with suicide, very few of these have an independent association with suicide after controlling for other factors in statistical analysis (Richardson et al., 2023; Turecki et al., 2019).

Furthermore, a recent systematic review and meta-analysis of psychological autopsy studies by Faviel et al. (2022) illustrated some variation between these independent factors. For example, Faviel et al. (2022) reported that those who died by suicide, compared to those who died from other causes, were 10 times more likely to have a mental disorder, but less than five times more likely to have a history of adversity. Therefore, to inform clinical practice and national policy within Scotland, it is imperative to identify which psychological factors should be the focus of suicide interventions for the Scottish population.

Why Scotland?

Scotland has the highest incidence of suicide across all UK countries, with 14.0 deaths per 100,000 (National Records of Scotland, 2021) compared to 10.7 in England, 12.7 in Wales (Office Of National Statistics 2017; Suicides in the UK: 2017 Registrations, 2022) and 13.3 in Northern Ireland (Northern Ireland Statistics and Research Agency, 2022). Furthermore, many more people attempt suicide than die by suicide, although differences in the incidence of this behaviour between the nations of the UK are unknown. Suicide attempt and death can have a devastating impact on those close to, and caring for, a suicidal person, as well as the wider community and frontline health and social services. Over the past two decades, the Scottish Government has implemented national and local action to prevent suicide (most recently, Creating Hope Together 2022-2025-2032; Scottish Government, 2022). Up-to-date knowledge about psychological factors associated with suicidal behaviour in Scotland would support the development and implementation of population-specific suicide prevention strategies. The more person-centred these interventions can be – recognising the values, circumstances and needs of the individual – the more likely they are to be successful (Zortea et al., 2020).

1.1. Current study

This review is the first systematic review of psychological factors associated with suicide death and suicide attempt in the Scottish population. For the purposes of this review, we adopted the US Center for Disease Control and Prevention (CDC)'s definition of suicide death ("death caused by self-directed injurious behaviour with an intent to die as a result of the behaviour") and suicide attempt ("non-fatal, self-directed, potentially injurious behaviour with an intent to die as a result of the behaviour even if the behaviour does not result in injury"; Centers for Disease Control and Prevention, 2021; Crosby et al., 2011). The term "suicidal behaviour" covers both suicide death and suicide attempt. Studies of non-suicidal self-injury, suicidal thoughts, suicide planning behaviour or self-harm (where intention for death was not established or unclear in the analysis) have been excluded. This is to ensure that this review specifically addresses the aim of investigating suicide death (either intended or fulfilled) as the outcome in relation to

psychological factors. The findings of this research have the potential to provide insights into the psychological factors associated with suicidal behaviour in the Scottish population and to support the development of interventions targeted at those who are vulnerable to suicide, with a view to reducing the number of avoidable suicide-related deaths and injuries.

This review has the following aims:

1. To identify psychological factors independently associated with suicidal behaviour in the Scottish population
2. To assess the consistency of the association between psychological factors and suicidal behaviour

2. Methods

A search of five major databases (CINHAL, Medline, PsychArticles, PsychInfo and Web of Knowledge) was conducted on 16 August 2022. Search terms were developed using subject headings (e.g., MedLine Subject Headings 'MeSH' terms) and Boolean phrases (e.g., OR, AND). A full list of the search terms utilised is highlighted in Table 1. Prior to title screening, studies were (where possible) limited to academic journals, those written in the English language, reporting findings based on a Scottish sample, and published since 2011. This publication cut-off date covers the ten years prior to when this systematic review was originally developed in 2021, for the purposes of informing the Scottish Government National Suicide Prevention Leadership Group. The additional year aimed to capture any further research published during the development of this peer-reviewed article. As most data had already been collected and analysed, this review was not eligible for registration with Prospero. To be as inclusive of all potential studies as possible, search terms included references to non-suicidal self-harm, with the suitability of such papers being established during the screening process.

As illustrated by Fig. 1, a total of 1795 papers were initially identified, including one paper (O'Connor et al., 2018) identified via chaining of a paper already included in the review (Dhingra et al., 2019). After duplicates were removed, 1495 paper titles and abstracts were screened by one of the authors. One-fifth of abstracts (n = 37) were blindly checked by another study author, resulting in 89.2 % concordance rate prior to discussion and 100 % concordance following discussion. A total of 139 full-text of papers was screened for eligibility. A blind inter-rater check of 20 % of the full-text papers revealed 100 % concordance between two researchers, with no further discussion required.

Table 1
Search terms.

Construct	Search term
#1	"Risk Factors" OR "Protective Factors" OR "Socioeconomic Factors" OR "Geographic Factors" OR "Age Factors" OR "Risk for Self-Mutilation" OR "Risk for Poisoning" OR "Suicide Risk" OR "Self Mutilation Risk" OR "Risk" OR "Risk-Taking" OR "Economic Factors" OR "Socioeconomic Factors" OR "Sociological Factors" OR "Protective Factors" OR "Sex Factors" OR "Sexuality" OR "Sexual Orientation" OR "Epidemiologic Factors" OR "Age Factors" OR "Social Factors" AND;
#2	"Suicide" OR "suicide" OR "Suicide, Completed" OR "Self-Injurious Behavior" OR "Suicide, Attempted" OR "Suicidal Ideation" OR "Self Mutilation" OR "Risk Reduction Behavior" OR "Self-injurious Behaviour" OR "Risk Reduction Behaviour" OR "Non-suicidal self-harm" OR "deliberate self-harm" OR "suicide enaction" OR "suicide attempter" OR "suicide risk" OR "Suicidal attempts" OR "Suicidal" OR "self-harm" OR "Deliberate self-harm" AND;
#3	Scotland OR Scottish OR Scot* OR "Edinburgh" OR "West of Scotland" OR "Glasgow" OR "Aberdeen" OR "St Andrews" OR "Strathclyde" OR "Stirling" OR "Dundee" OR "Inverness" OR "Ayrshire" OR "Arran" OR "Borders" OR "Dumfries" OR "Galloway" OR "Fife" OR "Forth Valley" OR "Grampian" OR "Greater Glasgow" OR "Clyde" OR "Highland" OR "Lanarkshire" OR "Lanark" OR "Lothian" OR "Orkney" OR "Shetland" OR "Tayside" OR "Western Isles"

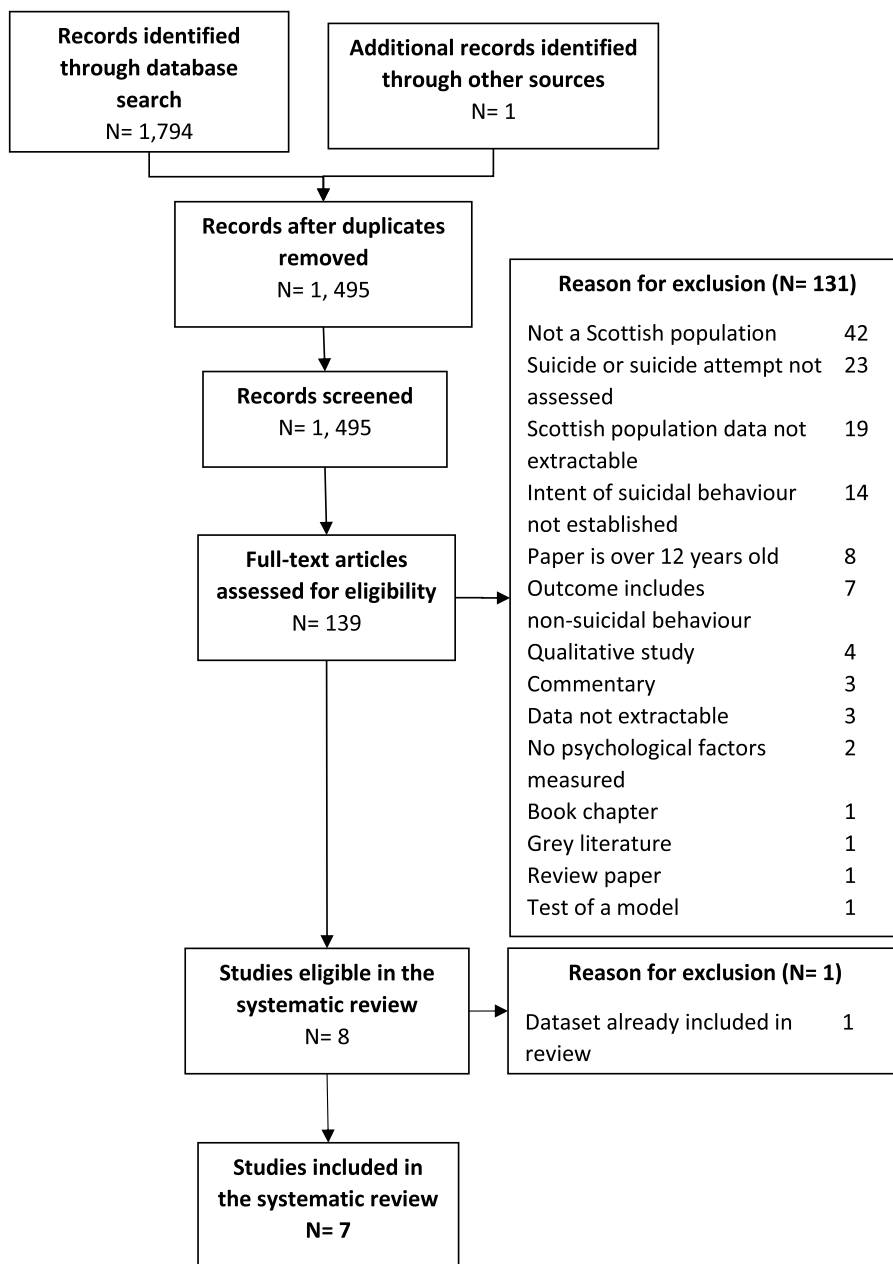


Fig. 1. Prisma statement.

2.1. Eligibility criteria

Inclusion criteria: Papers were included if they met the following criteria: (i) primary study; (ii) published in a peer-reviewed journal; (iii) published within the last 12 years; (iv) individual-level psychological factors (i.e., subjective, individual-level processes which impact mental states ‘through cognitive processing, appraisal and interpretation’, Linton and Shaw, 2011) were the independent variable; (v) suicide death or suicide attempt was the outcome variable, and (vi) a Scottish population was recruited.

Exclusion criteria: Papers were excluded if: (i) suicide intent was not established or was unclear; (ii) was not published in a peer-reviewed journal (e.g., book chapter, commentary, or review paper); (iii) used a case-control design, and (iv) described the validation of a measure. The main reasons for exclusion of studies during the full-text screening stage were: a Scottish population was not recruited (n = 42); and neither suicide death nor suicide attempt was assessed (n = 23; see Fig. 1 for more details).

2.2. Quality assessment

Quality assessment tools were selected after data extraction was complete. To accommodate the research designs (cross-sectional and cohort) implemented by the studies included in this review, two quality assessment tools were used (see Appendix 1). The eight-item Joanna Briggs Checklist for Analytical Cross-Sectional Studies (Appendix 1A; Moola et al., 2020) was used to assess the quality of the cross-sectional studies. Checklist items were assessed dichotomously (yes= 1, no/ not available= 0). The total study quality score using this tool could range between 0 and 8. Similarly, cohort studies were assessed using the JBI Critical Appraisal Checklist for Cohort Studies (Appendix 1B; Moola et al., 2017). Checklist items were assessed dichotomously (yes= 1, no/ not available= 0) with possible quality assessment scores ranging from 0 to 11.

Using the relevant assessment tool, a total quality assessment score was calculated for each study. Additionally, to allow for appropriate comparison of study quality between different study designs, quality

assessment scores were also calculated as percentages of the maximum possible.

3. Results

Eight studies met the eligibility criteria. However, the study by O'Connor et al. (2018), which used the same dataset as the study by Wetherall et al. (2018), was excluded to avoid over-representation of the data in the analysis. Subsequently, seven studies are discussed here and are summarised in Table 2. These findings are also summarised in Table 3.

3.1. Overview

Of the seven studies discussed in this review, six explored suicide attempt as an outcome variable and one measured suicide death. In total, 7129 participants are included in this review. Overall, 25 factors were investigated in relation to suicidal behaviour, of which 14 were found to have a significant association with the outcome variable after controlling for confounders. There were methodological variations between the studies: three used a cross-sectional design, three a prospective design and one a retrospective design while four assessed cohorts over time. Studies varied in sample types recruited: Dhingra et al. (2015) recruited a sample of university students, Gilchrist and Sadler (2019) utilised pathologist records of individuals who died by suicide in the general population, two studies recruited young people from the general population (Wetherall et al., 2018; Young et al., 2011) and three studies recruited inpatients admitted to hospital after a presentation of self-harm (Cleare et al., 2021) or suicide attempt (O'Connor et al., 2015; O'Connor et al., 2013). Comparison groups also varied between studies of this review, including: recruitment of non-suicidal self-harm participants (Cleare et al., 2021), death by other causes (Gilchrist and Sadler, 2019) hospital presentations of subsequent suicide attempt from baseline (O'Connor et al., 2013; O'Connor et al., 2015; Young et al., 2011), ideation without suicide attempt (Dhingra et al., 2015; Wetherall et al., 2018) and no history of suicide attempt or suicidal ideation (Dhingra et al., 2015; Wetherall et al., 2018). Two studies (Dhingra et al., 2015; Wetherall et al., 2018) used more than one comparison group. Results associated with each comparison group are reported within the text.

Due to the number of psychological factors explored in the included studies, only factors which were found to be significantly associated with suicidal behaviour after controlling for confounding variables are described in the main text. Factors explored in the included studies where no significant multivariate association was observed are summarised in Appendix 1. Factors significantly associated with suicidal behaviour are grouped and discussed under the following subheadings:

- Connectivity (including belongingness, burdensomeness, school connectedness)
- Mental health (including depression, suicidal ideation, drugs and alcohol, victimised bullying)
- Internal factors (including hopelessness, defeat, entrapment, fearlessness about death, impulsivity, mental imagery and acquired capability)

3.2. Social connectivity and engagement

Belongingness

Belongingness, defined as an unmet need to belong (Van Orden et al., 2012), was measured by three studies in this review, of which all used the Interpersonal Needs Questionnaire. Dhingra et al. (2015) found that belongingness was significantly greater among university students with no lifetime history of self-injurious thoughts and behaviours (control participants) than among students with a history of suicide attempt. However, Wetherall et al. (2018) found no such difference in a sample of young people aged 18–34 years. Furthermore, belongingness did not

significantly differ between those with a history of suicide attempt and those with a history of suicidal ideation (Dhingra et al., 2015; Wetherall et al., 2018) or self-harm (Cleare et al., 2021).

Burdensomeness

Three studies (Cleare et al., 2021; Dhingra et al., 2015; Wetherall et al., 2018) used the Interpersonal Needs Questionnaire to explore burdensomeness. The studies defined this construct as feeling like a burden on the people in their lives (Van Orden et al., 2012). Participants who had attempted suicide reported greater burdensomeness than those with no history of suicidal ideation or behaviour (control participants; Dhingra et al., 2015; Wetherall et al., 2018) or non-suicidal self-harm (Cleare et al., 2021). When compared to those with a history of self-injurious thoughts, Dhingra et al. (2015) found that those with a history of suicide attempt self-reported greater feelings of burdensomeness whereas, Wetherall et al. (2018) reported no such significant difference.

School disengagement

Those with a lifetime history of suicide attempt by 19 years of age were significantly more likely to report disengagement with school (e.g., 'school is a waste of time') at 11 years of age than those with no history of suicide attempt (Young et al., 2011).

4. Mental health

Depression

All seven studies investigated depression or depressive symptoms in relation to suicide attempt. The study by Gilchrist and Sadler (2019) was unique in investigating a diagnosis of depression and adopting suicide death as an outcome variable. Those who died by suicide were significantly more likely to have a diagnosis of depression than those who died by accident or undetermined death. Young et al. (2011) found that those with a lifetime history of suicide attempt at 19 years of age were more likely to have reported depressive symptoms at 11 years of age than those without a history of suicide attempt. However, four studies (seven results) reported that the prevalence of depressive symptoms did not significantly differ between those with a history of suicide attempt and those with no history of suicidal ideation or behaviour (control participants; Dhingra et al., 2015; Wetherall et al., 2018), suicidal ideation only (Dhingra et al., 2015; Wetherall et al., 2018), hospital re-attendance for suicide attempt (O'Connor et al., 2013; O'Connor et al., 2015) or non-suicidal self-harm (Cleare et al., 2021).

Suicidal ideation

Suicidal ideation was measured in three studies (Cleare et al., 2021; O'Connor et al., 2013; O'Connor et al., 2015), two of which identified a significant association with suicidal behaviour. Suicidal ideation scores were significantly greater in those presenting to hospital following a suicide attempt when compared to those presenting following an episode of non-suicidal self-harm (Cleare et al., 2021; O'Connor et al., 2015). O'Connor et al. (2015) found that suicidal ideation scores were significantly greater in those who re-presented to hospital following a subsequent suicide attempt after their index presentation at baseline, whereas, in a separate study, O'Connor et al. (2013) did not find the same association.

Drugs and alcohol

Gilchrist and Sadler (2019) found that those with a history of drugs and/or alcohol were significantly more likely to die by suicide than by accidental or undetermined death.

Victimised bullying

Experiences of being bullied was explored in one study. Weekly victimisation of bullying by 11 years of age was significantly associated with suicide attempt by 19 years of age (Young et al., 2011).

4.1. Internal factors

Hopelessness/ positive future thinking

Hopelessness and positive future thinking were explored by

Table 2
Study summaries.

Study (statistic used)	Design, sample; N (% female), age	Factor (measure)	Results (OR, 95 % CI)	
			Unadjusted	Adjusted
Cleare et al. (2021) (OR, 95 % CI)	Cross-sectional Hospital inpatient sample: NSSH (ref) vs. SA N = 500 (60.6 %) 37 ± 13.8 years old	Acquired capability (Van Orden et al., 2008)	1.07 (1.03–1.11)	1.0 (0.96–1.06)
		INQ (Van Orden et al., 2012)		
		Belongingness	1.07 (1.04–1.10)	0.98 (0.93–1.03)
		Burdensomeness	1.07 (1.05–1.09)	1.04 (1.01–1.07)
		Defeat (Gilbert and Allan, 1998)	1.05 (1.04–1.07)	1.04 (1.01–1.08)
		Depressive symptoms (BDI-II; Beck et al., 1996)	1.04 (1.03–1.06)	0.98 (0.96–1.01)
		Entrapment Scale (Gilbert and Allan, 1998)		
		External	1.08 (1.05–1.11)	1.01 (0.97–1.05)
		Internal	1.06 (1.04–1.08)	0.93 (0.87–0.99)
		Goals (GAS; Wrosch et al., 2003)		
		Goal disengagement	0.99 (0.95–1.04)	NA
		Goal re-engagement	0.96 (0.93–0.99)	1.02 (0.97–1.06)
		Impulsivity (BIS-11; Patton et al., 1995)	1.03 (1.02–1.05)	1.00 (0.98–1.02)
		Perfectionism (Social; Hewitt and Flett, 1991)	1.02 (1.01–1.03)	1.00 (0.98–1.01)
Dhingra et al. (2015) Cohens d/ OR, 95 % CI	Cross-sectional University sample: Control (ref) vs. attempt Ideation (ref) vs attempt N = 1288 (74.5 %); 24.29 ± 8.30 years	Social support (Mitchell et al., 2003)	0.94 (0.91–0.97)	1.01 (0.95–1.06)
		Suicidal ideation (SSI; Beck et al., 1979)	1.08 (1.06–1.10)	1.08 (1.06–1.11)
		Anxiety (HADS; Zigmond and Snaith, 1983)	Attempt vs. control: 1.12 Attempt vs. ideation: 0.40	Attempt vs. control: 0.98 (0.91–1.05) Attempt vs. ideation: 0.98 (0.92–1.04)
		INQ (Van Orden et al., 2012)		
		Belongingness	Control vs. attempt: 1.40 Attempt vs. ideation: 0.55	Attempt vs. control: 0.94 (0.90–0.98)
		Burdensomeness	Control vs. attempt: 1.44 Attempt vs. ideation: 0.43	Attempt vs. ideation: 0.99 (0.95–1.02) Control vs. attempt: 1.07 (1.03–1.10) Attempt vs. ideation: 1.03 (1.01–1.05)
		Defeat	Attempt vs. control: 1.54 Attempt vs. ideation: 0.57	Attempt vs. control: 1.04 (0.99–1.08) Attempt vs. ideation: 1.01 (0.98–1.04)
		Defeat scale (Gilbert and Allan, 1998)		Attempt vs. control: 1.02 (0.94–1.11) Attempt vs. ideation: 1.03 (0.96–1.10)
		Depressive symptoms (HADS; Zigmond and Snaith, 1983)	Attempt vs. control: 1.24 Attempt vs. ideation: 0.50	Attempt vs. control: 1.02 (0.94–1.11) Attempt vs. ideation: 1.03 (0.96–1.10)
		Discomfort tolerance (DIS; Schmidt et al., 2007)	Attempt vs. control: NS Attempt vs. ideation: NS	Attempt vs. control: 0.98 (0.93–1.03) Ideation vs. attempt: 0.99 (0.94–1.03)
		Entrapment	Attempt vs. control: 1.55 Attempt vs. ideation: 0.58	Attempt vs. control: 1.04 (1.01–1.07) Attempt vs. ideation: 1.02 (0.99–1.04)
		Entrapment Scale (Gilbert and Allan, 1998).		Attempt vs. control: 1.07 (1.03–1.10) Attempt vs. ideation: 1.05 (1.02–1.07)
		Fearlessness about death (ACSS; Van Orden, 2008)	Attempt vs. control: 0.40 Attempt vs. ideation: 0.56	Attempt vs. control: 1.07 (1.03–1.10) Attempt vs. ideation: 1.05 (1.02–1.07)
		Goals (GAS; Wrosch et al., 2003)		
Goal disengagement	Attempt vs. control: NS Attempt vs. ideation: NS	Attempt vs. control: 1.01 (0.94–1.08) Attempt vs. ideation: 0.97 (0.92–1.02)		
Goal re-engagement	Attempt vs. control: 0.52 Attempt vs. ideation: 0.39	Attempt vs. control: 1.00 (0.95–1.05) Attempt vs. ideation: 0.98 (0.95–1.02)		
Impulsivity (Two items; Impulsivity Scale (Plutchik et al., 1989)	Attempt vs. control: 0.24 Attempt vs. ideation: 0.24	Attempt vs. control: 1.11 (0.98–1.27) Attempt vs. ideation: 1.15 (1.04–1.28)		
Gilchrist and Sadler (2019)	Cohort Death certificate (accident vs. Unknown vs. suicide death) N = 26 (NA); NA	Depression (diagnosis)	X ² = 8.205, p = 0.017	NA
O'Connor et al. (2013) (B, β)	Cohort (48-month follow-up) Hospital records: No re-attempted suicide (ref) vs. re-attempted suicide	Defeat (Defeat Scale; Gilbert and Allan, 1998)	B = 0.14 p<0.01	β = 0.03, p = ns
		Depression (HADS; Zigmond and Snaith, 1983) Entrapment (Gilbert and Allan, 1998)	B = 0.26, p< 0.01 B = 0.22, p<0.01	β = 0.16, p = ns β = 0.23, p<0.05

(continued on next page)

Table 2 (continued)

Study (statistic used)	Design, sample; N (% female), age	Factor (measure)	Results (OR, 95 % CI)	
			Unadjusted	Adjusted
O'Connor et al. (2015) OR, 95 % CI	Cohort (15-month follow-up) Hospital records: No re-attempted suicide (ref) vs. re-attempted suicide N = 388 (56.7 %); 35.3 (13.9) years old	Hopelessness (BHS; Beck et al., 1974)	B: 0.32 p<0.05	β= 0.15, p= ns
		Suicidal ideation (SPS; Cull and Gill, 1988)	B = 0.12 p= <0.03	β= -0.06, p= ns
		Depressive symptoms (BDI-II; Beck, Steet & Brown., 1996)	1.04 (1.02–1.06)	1.02 (0.98–1.05)
		Hopelessness (BHS; Beck et al., 1974)	1.07 (1.02–1.12)	1.0 (0.93–1.07)
		Positive future thinking (MacLeod et al., 1997)		
		Achievement	0.79 (0.63–1.00)	0.88 (0.68 - 1.13)
		Financial	0.67 (0.47–0.95)	0.77 (0.53–1.14)
		Intrapersonal future thinking	1.19 (1.04–1.36)	1.25 (1.07 - 1.44)
		Leisure/ pleasure	0.85 (0.70–1.02)	NA
		Other	1.04 (0.63–1.72)	NA
Wetherall et al. (2018) (OR, 95 % CI)	Cross-sectional General population: Control (ref.) vs attempt; ideation (ref.) vs. attempt N = 3508 (49.5 %); 18–34 years old	Suicidal ideation (SSI; Beck et al., 1988; Beck et al., 1996)	1.98 (0.55–7.17)	NA
		Acquired capability (ACSS; Van Orden et al., 2008)	0.93 0.81–1.06	NA
		INQ (Van Orden et al., 2012)	1.05 (1.03–1.08)	1.04 (1.00 – 1.07)
		Belongingness	Attempt vs. control (1.14) Ideation vs. attempt (1.09)	Control vs attempt: 1.13 (1.10 – 1.18) Ideation vs. attempt: 1.10 (1.06 - 1.14)
		Burdensomeness	Attempt vs. control: 1.00 (0.97 - 1.04) Attempt vs. ideation: 1.00 (0.96 - 1.03)	Attempt vs. control: 1.00 (0.97 – 1.04); Attempt vs ideation 1.00 (0.96 – 1.03);
		Defeat (Gilbert and Allan, 1998)	Attempt vs. control (1.19) Attempt vs. ideation (1.02)	Attempt vs. control: 1.07 (1.04 - 1.10) Attempt vs. ideation: 1.01 (0.99 - 1.03)
		Depressive symptoms (BDI-II; Beck et al., 1996)	Attempt vs. control (1.12); Attempt vs. ideation (1.02)	Attempt vs. control: 1.03 (1.01- 1.06) Attempt vs. ideation: 0.99 (0.97 - 1.02)
		Entrapment (Gilbert and Allan, 1998)	Attempt vs. control (1.14) Attempt vs. ideation (1.02)	Attempt vs. control: 1.01 (0.99- 1.03) Attempt vs. ideation: 1.01 (0.98 - 1.03)
		Goals (GAS; Wrosch et al., 2003)	Attempt vs. control (1.10); Attempt vs ideation (1.01)	Attempt vs. control: 0.98 (0.97 –1.00) Attempt vs. ideation: 0.99 (0.97 - 1.00)
		Goal disengagement	Attempt vs control: NS Attempt vs. ideation: NS	Attempt vs. control: 0.98 (0.93 – 1.02) Attempt vs. ideation: 0.96 (0.92 - 1.00)
Goal re-engagement	Attempt vs. control (1.10); Attempt vs. ideation (1.04)	Attempt vs. control: 1.00 (0.97 - 1.04) Attempt vs. ideation: 1.01 (0.97 - 1.04)		
Young et al. (2011)	Cohort (8-year follow-up) General population school attendees No suicide attempt (ref) vs. attempted suicide	Impulsivity (Patton et al., 1995)	Attempt vs. control (1.08); Attempt vs. ideation (1.03)	Attempt vs. control: 1.03 (1.02 - 1.05) Attempt vs. ideation: 1.02 (1.01 - 1.04)
		Mental images (8-items Holmes and Mathews, 2010).	Attempt vs. control (1.41) Attempt vs. ideation (1.07)	Attempt vs. control: 1.26 (1.22 – 1.31) Attempt vs. ideation: 1.07 (1.03 – 1.10)
		Resilience (Resilience Brief Resilience Scale; (Campbell-Sills and Stein, 2007)	Attempt vs. control (0.90) Attempt vs. ideation (0.97)	Attempt vs. control: 0.99 (0.97 - 1.02) Attempt vs. ideation: 0.98 (0.96 - 1.01)
		Social support (ESSI; Mitchell et al., 2003)	Attempt vs. control (0.87) Attempt vs. ideation (0.98)	Attempt vs. control: 1.02 (0.98 – 1.06) Attempt vs. ideation: 1.01 (0.97 – 1.05)
		Age 11-Depression Kandel and Davies	1.14 (1.09–1.21)	1.1 (1.04–1.17)
		Depression Scale (Kandel and Davies, 1982)		
		Age 11 victimised bullying (Sweeting et al., 2006)		

(continued on next page)

Table 2 (continued)

Study (statistic used)	Design, sample; N (% female), age	Factor (measure)	Results (OR, 95 % CI)	
			Unadjusted	Adjusted
	N = 1698 (50.4 %) 11 years old	Less than weekly	1.54 (0.98–2.43)	1.16 (0.71–1.90)
		Weekly	2.37 (1.40–4.01)	1.59 (0.87–2.91)
		Perception of local neighbourhood (Ellaway and Macintyre, 2010)	1.13 (1.08–1.58)	1.06 (0.86–1.30)
		Neighbourhood cohesion	1.31 (1.07–1.59)	1.07 (0.84–1.36)
		Neighbourhood safety/civility	1.12 (0.91–1.37)	0.94 (0.74–1.18)
		Neighbourhood facilities		

N= total number; OR = Odds Ratio; CI = confidence interval; NSSH= non-suicidal self-harm; Ref.= reference group; SA= suicide attempt; [†] unadjusted ORs were significant). Control = no history of suicidal ideation or behaviour. ACSS: Acquired Capability for Suicide Scale; BDI-II: Beck Depression Inventory-II; BHS: Beck Hopelessness Scale; BIS: Barratt Impulsiveness Scale; DIS: Discomfort Intolerance Scale; ESS: Enriched Social Support Instrument; GAS: Goal Adjustment Scale; HADS: Hospital Anxiety and Depression; INQ: Interpersonal Needs Questionnaire; PBI-BC: Brief Parental Bonding Instrument; RSQ: Response Styles Questionnaire; SPS: Suicide Probability Scale; SSI: Scale for Suicidal Ideation.

Table 3
Factor summary table.

Psychological factor	No. of studies	N of studies reporting the statistical association with the outcome variable (corresponding studies)		
		Significant positive association	Significant negative association	Null association
Acquired capability	2	2 ^(a, f)	–	–
Anxiety	1	–	–	1 ^(b)
Belongingness	3	–	1 ^(b*)	2 ^(a, f*)
Brooding rumination	1	–	–	1 ^(b)
Burdensomeness	3	3 ^(a, b, f*)	–	–
Defeat	4	2 ^(a, f*)	–	2 ^(b, d, f*)
Depression/ depressive symptoms	7	1 ⁽⁷⁾	–	6 ^(a-f)
Discomfort tolerance	1	–	–	1 ^(b)
Drugs and alcohol	1	1 ^(c)	–	–
Entrapment (cumulative)	4	3 ^(b*, d, f)	–	1 ^(a, b*)
(Internal)	1	–	1 ^(a)	–
(External)	1	–	–	1 ^(a)
Fearlessness about death	1	1 ⁽²⁾	–	–
Goal disengagement	2	–	–	2 ^(b, f)
Goal re-engagement	3	–	–	3 ^(a, b, f)
Hopelessness	2	–	–	2 ^(d, e)
Impulsivity	3	1 ^(b*, f)	–	2 ^(a, b*)
Mental images about death	1	1 ^(f)	–	–
Neighbourhood cohesion	1	–	–	1 ^(g)
Neighbourhood safety/ civility	1	–	–	1 ^(g)
Neighbourhood facilities	1	–	–	1 ^(g)
Parental behaviour	1	–	–	1 ^(g)
Perfectionism	1	–	–	1 ^(b)
Positive future thinking	1	–	–	1 ^(e**)
Psychiatric service user	1	–	–	1 ^(g)
Resilience	1	–	–	1 ^(f)
School disengagement	1	1 ^(g)	–	–
School environment	1	–	–	1 ^(g)
Social support	2	–	–	2 ^(a, f)
Suicidal ideation	3	2 ^(a, e)	–	1 ^(d)
Suicidal intent	1	–	–	1 ^(e)
Victimised bullying	1	1 ^(g)	–	–

Hyphens (-) denote no information is relevant to this cell of the table. [†] This study is mentioned twice regarding the same predictor variable. * a significant, positive association was reported between ‘suicide attempt or suicide death’ group versus ‘no suicide ideation or attempt (‘control’)’ participant groups, however no statistically significant association was identified between ‘suicide attempt or suicide death’ versus ‘suicidal ideation’ participant groups. ** O’Connor et al. (2015) Null association overall. Intrapersonal Future Thinking was the only subscale to have a statistically significant result (positive association). Reference key: a = Cleare et al. (2021), b = Dhingra et al. (2015), c = Gilchrist and Sadler (2019), d = O’Connor et al. (2013), e = O’Connor et al. (2015), f = Wetherall et al. (2018), g = Young et al. (2011).

O’Connor et al. (2013) in a sample of participants presenting to hospital following a suicide attempt. Future thinking and hopelessness were observed to be significantly greater among those who re-presented to hospital following a subsequent suicide attempt than among those who did not re-present to hospital following a suicide attempt. Future thinking about one’s achievements, finances, leisure opportunities, interpersonal factors, others’ health or ‘other’ future thinking domains did not significantly differ between these two groups.

Defeat

Four studies investigated defeat, defined as loss of social rank and perceptions of failed struggle, in relation to suicidal behaviour with mixed results. Hospital attendees presenting with suicide attempt reported significantly greater defeat than those presenting with non-suicidal self-harm (Cleare et al., 2021). Similarly, Wetherall et al. (2018) found that defeat was more often experienced among those with a history of suicide attempt compared to those with no history of either suicidal ideation or behaviour (control participants). However, defeat scores did not significantly differ between general populations reporting

suicide attempt compared to suicidal ideation only (Dhingra et al., 2015; Wetherall et al., 2018) or between those with a history of suicide attempt and those with no history of suicidal thoughts or behaviour (Dhingra et al., 2015). Additionally, baseline defeat did not differ between those who did and did not re-present to hospital following a subsequent suicide (O'Connor et al., 2013).

Entrapment

Four studies (seven results) explored entrapment, with varied results. O'Connor et al. (2013) found that baseline entrapment scores were significantly greater in those who re-presented to hospital following suicide attempt at follow-up than among those who did not re-present to hospital. Although Dhingra et al. (2015) reported that entrapment scores were significantly greater in those with a history of suicide attempt than in those with no history of suicidal ideation or behaviour (control participants), Wetherall et al. (2018) reported no such difference. As predicted, both Dhingra et al. (2015) and Wetherall et al. (2018) found no significant difference in entrapment scores between those with a history of suicide attempt and those with a history of suicidal ideation. Cleare et al. (2021), however, found that internal entrapment was significantly greater in those with a history of non-suicidal self-harm than in those with suicide attempt histories, whereas external entrapment did not significantly differ between groups.

Fearlessness about death

Dhingra et al. (2015) found that those with a history of suicide attempt reported significantly greater fearlessness about death than those with no history of suicidal ideation or behaviour (control participants), or suicidal ideation only. No other studies explored this factor on its own (however some studies investigated acquired capability which incorporates fearlessness).

Impulsivity

Four studies (five results) investigated differences in impulsivity between participant groups with mixed results. Both Dhingra et al. (2015) and Wetherall et al. (2018) found that impulsivity was significantly greater in those with a history of suicide attempt than in those with a history of suicidal ideation only. Additionally, both Dhingra et al. (2015) and Wetherall et al. (2018) found that impulsivity was significantly greater in those with a history of suicide attempt than among those with no history of suicidal behaviour or ideation (control participants). In contrast, Cleare et al. (2021) found that impulsivity scores did not significantly differ between participants who had a history of suicide attempt and those with a history of non-suicidal behaviour only.

Mental images about death

Wetherall et al. (2018) found that those with a history of suicide attempt were significantly more likely to report mental imagery about death than those with a history of suicidal ideation and those with no history of either suicidal behaviour or ideation.

Acquired capability

Acquired capability for suicide includes lower level of fear and higher threshold sensitivity to pain. Cleare et al. (2021) and Wetherall et al. (2018) measured acquired capability for suicide, with both reporting significant results. Cleare et al. (2021) found that acquired capability was significantly greater in those who presented to hospital following a suicide attempt than in those presenting to hospital following an episode of NSSH. Equally, Wetherall et al. (2018) found that acquired capability scores were significantly greater in those with a history of suicide attempt when compared to those with a history of self-harm thoughts only, or no history of self-harm behaviour or ideation (control participants).

4.2. Non-statistically significant factors

Five studies reported on 11 factors producing non-significant results. These factors were goal disengagement/re-engagement (three studies), social support (two studies), school environment (one study), anxiety (one study), psychiatric service user (one study), brooding rumination

(one study), discomfort tolerance (one study), suicidal intent (one study), resilience (one study), neighbourhood cohesion (one study) and parenting behaviour (one study). Further details of these findings are reported in Appendix 2.

4.3. Quality assessment

Quality assessment scores for each of the studies are provided in Appendix 3. Cross-sectional study quality assessment scores ranged from 5 to 8 and cohort quality assessment scores ranged from 2 to 9. Based on quality score percentages, quality assessment scores were on average 86.55 % across the seven studies. The only studies to attain a quality score below the sample average were by Gilchrist and Sadler (2019) and Young et al. (2011).

In cross-sectional studies, the lowest scoring domain was the validity of the outcome measure (Appendix 1A, item three), while maximum scores were attained for setting description, identification of confounders, responding to confounders, and appropriate analytic strategy (Appendix 1A, items 2,5,6 and 8 respectively). In contrast, in cohort studies, being free of the outcome measure at baseline (Appendix 1B, item six) was the lowest ranking domain, while the highest scoring domains were group assignment, validity of the outcome measure, follow-up time, explanations for loss to follow-up and strategies to address loss to follow-up (Appendix 1B, items 2,3,8,9 and 10 respectively).

5. Discussion

This review aimed to identify psychological factors associated with suicide attempt and suicide death in Scottish populations and to assess the consistency of these associations across different studies. Eight papers met the criteria for inclusion in this review. However, one paper which was a secondary analysis of another paper already included, was omitted. Based on seven included papers, 14 psychological factors were found to be significantly associated with suicide attempt and death after controlling for confounders.

It was anticipated that the majority of identified psychological factors would be risk rather than protective factors. This was confirmed, with 14 psychological factors significantly associated with suicidal behaviour framed as risk factors, and no identified protective factors. This finding is consistent with the published literature (Holman and Williams, 2020; Franklin et al., 2017; O'Connor and Portzky, 2018), where the presence of risk factors is associated with increased propensity for suicidal behaviour. It is unsurprising that this review identified a lack of protective factors against suicide, given that their investigation is insufficiently prioritised in the wider global literature (O'Connor and Nock, 2014; Franklin et al., 2017). It is, however, unexpected that factors such as social support and resilience emerged as not having a statistically significant association with suicidal behaviour, given that previous theoretical models (O'Connor and Kirtley, 2018; Turecki and Brent, 2016) have identified these as protective against suicide risk.

Within the context of the IMV model, it was expected that most psychological factors associated with suicidal behaviour (as distinct from suicidal ideation) would be defined as volitional factors. This was not confirmed. Of the eight volitional factors of the IMV model (O'Connor and Kirtley, 2018; O'Connor, 2011), only five were identified in this review. This may be because this review aimed to explore modifiable psychological factors associated with suicidal behaviour. However, not all volitional factors of the IMV model are modifiable or psychological in nature (e.g., access to means, past suicidal behaviour). Additionally, in this review a further nine psychological factors were also significantly associated with suicidal behaviour.

Nevertheless, many of the factors significantly associated with suicidal behaviour identified in this review are consistent with key concepts highlighted in the IMV Model, in particular all major drivers of

suicide (defeat, entrapment and suicidal ideation) and several volitional factors. The associations between these variables and outcomes, however, were not consistent. This inconsistency may be due to differences in the comparison groups between studies. For example, compared to those who have not engaged in suicidal ideation or behaviour, those who engage in suicidal behaviour are expected to have greater defeat and entrapment (Cleare et al., 2021; Wetherall et al., 2018). Alternatively, such differences might not be expected between suicidal behaviour participant groups compared to suicide ideation groups (Dhingra et al., 2015). This could similarly explain the non-significant results for factors such as goal disengagement or goal re-engagement, which would typically be expected to emerge as a significant risk factor among those who engaged in suicidal behaviour.

The Biopsychosocial Theory of Suicidal Risk emphasises the high predictability psychopathology (a proximal factor) on suicide risk. The current review only identified two factors relating to psychopathology: depression and anxiety. Surprisingly, anxiety showed no significant associations and results on depression were mixed. One explanation for these findings is that the identification of significant independent associations between a psychological factor and suicidal behaviour may have been contingent on the selection and inclusion of confounding factors, with some reducing the association to non-significance and others having no such effect. This was particularly prominent for depression, with many of the unadjusted analyses reporting significant results, while the independent associations were at times non-significant.

The findings of this review have been used to support the development of a new suicide prevention strategy in Scotland (Creating Hope Together 2022-2025-2032; Scottish Government, 2022). Indeed, the latest Scottish suicide prevention strategy takes a whole of Government and society approach and includes extensive public and stakeholder involvement. This review identified 14 risk factors for suicide in Scottish residents which can be targeted for change. Targeting of such risk factors, for example through both universal and specific psychotherapeutic interventions, may reduce the incidence of suicide and attempted suicide. In Scotland, national level interventions for suicide prevention draw upon the psychological factors identified to be significant in this review. Such interventions include a social movement ('United to Prevent Suicide') and a peer-led website ('Surviving Suicidal Thoughts'), both of which aim to improve feelings of social support and reduce suicidal thoughts through addressing feelings of entrapment in individuals experiencing suicidal thoughts or crisis.

Furthermore, these findings may provide a benchmark for comparison of risk and protective factors in other countries. Indeed, although risk and protective factors have been extensively investigated in specific sub-populations (e.g., American Indian and Alaska Native populations, Borrowsky et al., 1999; military populations, Nock et al., 2013), with numerous nationally representative studies of suicide research available, there is a lack of systematic review of these findings across different geographic locations and cultural settings.

5.1. Limitations

Certain methodological limitations of this review should be acknowledged. Firstly, case-control studies were excluded from this review. Although no case-control studies were otherwise eligible for this review, this is a methodological shortcoming. The bibliographic database searches were limited to the period 2011–2022 in order to maximise the relevance of findings to the current context in Scotland. Including publications from earlier years would have likely resulted in a greater number of eligible studies, providing a greater opportunity to test consistency of findings between studies. Indeed, seven of the 14 psychological factors significantly associated with suicidal behaviour were investigated in a single study, limiting the possibility of assessing inter-study consistency or undertaking a meta-analysis. Additionally, the heterogeneity between the studies was substantial. Most notably,

there was considerable variability with regard to which confounding variables were controlled within the statistical analysis, as well as the comparison group used.

Definitions of psychological factors are inconsistent, which may have influenced the identification or selection of factors summarised in this review. For example, some researchers may describe some of the factors in this review as social factors (e.g., victimisation). Fourteen studies were excluded during the screening phase due to uncertainty regarding whether the intended outcome of the behaviour was suicide. Additionally, although the associations between psychological factors and suicidal behaviour were examined in this review, the mechanisms which may influence these associations were not investigated. For example, not everyone who thinks about suicide makes a suicide attempt. Another limitation is that only one of the studies included in this review explored suicide death as an outcome (Gilchrist and Sadler, 2019), with a limited number of psychological factors under investigation. It is possible that psychological factors associated with suicide death may differ from those who make and survive a suicide attempt. Only four of the studies included in this review used a prospective design. Greater use of prospective research designs is needed to explore the causal direction of statistical associations.

The studies included in the review recruited participants who were typically of young-mid adult age, with most being below 37 years of age. We therefore do not know whether the findings reported here are applicable across the lifespan. Moreover, some of the studies recruited a sample of people presenting to hospital after a suicide attempt rather than from the general population. Given that most people who make (and survive) a suicide attempt do not receive treatment (Bruffaerts et al., 2011), the relevance and generalisability of findings from hospital-based studies are likely to be limited. Future studies would benefit from stating more clearly how self-harm has been defined, as well as establishing whether suicidal intent was present.

6. Conclusion

Several psychological risk and protective factors have been shown to be associated with suicide attempt and suicide death within the Scottish population, even after controlling for potential socio-demographic and psychological confounders. These factors typically pertain to connectivity to loved ones and the community around the individual, mental health, and internal states such as (low) affect or distress. This review offers important contributions to the understanding of suicidal behaviour in Scotland. Specifically, our findings emphasise which psychological factors should be considered when developing suicide prevention strategies for the Scottish population. Additionally, this review has highlighted the dearth of recently published literature exploring risk and protective factors of suicidal behaviour within the Scottish population. The need for studies to be explicit in establishing, and reporting, the intended outcome of self-injurious acts is highlighted as well as the need for further prospective research to establish causal direction.

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CRedit authorship contribution statement

Heather McClelland: Conceptualization, Data curation, Formal

analysis, Investigation, Methodology, Project administration, Supervision, Validation, Writing – original draft, Writing – review & editing. **Krystyna J Loney:** Methodology, Data curation, Formal analysis, Writing – review & editing. **Steve Platt:** Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing.

Declaration of competing interest

None.

Appendix 1. Quality assessment tools

A. JBI critical appraisal checklist for analytical cross-sectional studies

Criteria	Score= 1	Score= 0
1. Were the criteria for inclusion in the sample clearly defined?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
2. Were the study subjects and the setting described in detail?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
3. Was the exposure measured in a valid and reliable way?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
4. Were objective, standard criteria used for measurement of the condition?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
5. Were confounding factors identified?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
6. Were strategies to deal with confounding factors stated?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7. Were the outcomes measured in a valid and reliable way?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
8. Was appropriate statistical analysis used?	Yes <input type="checkbox"/>	No <input type="checkbox"/>

B. JBI Critical Appraisal Checklist for Cohort Studies

Criteria	Score= 1	Score= 0
1. Were the two groups similar and recruited from the same population?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Unclear/ not applicable <input type="checkbox"/>
2. Were the exposures measured similarly to assign people to both exposed and unexposed groups?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Unclear/ not applicable <input type="checkbox"/>
3. Was the exposure measured in a valid and reliable way?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Unclear/ not applicable <input type="checkbox"/>
4. Were confounding factors identified?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Unclear/ not applicable <input type="checkbox"/>
5. Were strategies to deal with confounding factors stated?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Unclear/ not applicable <input type="checkbox"/>
6. Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Unclear/ not applicable <input type="checkbox"/>
7. Were the outcomes measured in a valid and reliable way?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Unclear/ not applicable <input type="checkbox"/>
8. Was the follow up time reported and sufficient to be long enough for outcomes to occur?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Unclear/ not applicable <input type="checkbox"/>
9. Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Unclear/ not applicable <input type="checkbox"/>
10. Were strategies to address incomplete follow up utilized?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Unclear/ not applicable <input type="checkbox"/>
11. Was appropriate statistical analysis used?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Unclear/ not applicable <input type="checkbox"/>

Appendix 2. Non-statistically significant factors

Anxiety

Using the HADS, [Dhingra et al. \(2015\)](#) measured self-reported symptoms of anxiety. Anxiety was not found to significantly differentiate between lifetime histories of those with no history of self-injurious thoughts and behaviours from those with suicide attempt history, and those with a history of self-injurious thoughts from those with a history of suicide attempt.

Brooding rumination

[Dhingra et al. \(2015\)](#) explored brooding rumination in university students. Ruminative style was not found to significantly differ between those with a lifetime history of suicide attempt and; those with a history of suicidal ideation, or a history of no suicidal ideation or behaviour.

Discomfort tolerance

[Dhingra et al. \(2015\)](#) measured discomfort tolerance in university students with no significant difference in scores observed between those with a history of suicide attempt compared to those with a history of suicidal ideation only, or no history of suicidal ideation or behaviour.

Goal disengagement/ re-engagement

Three studies ([Cleare et al., 2021](#); [Dhingra et al., 2015](#); [Wetherall et al., 2018](#)) compared both goal disengagement and goal re-engagement between those with a history, or presentation, or suicide attempt, and those with no history of suicidal ideation or behaviour, suicidal ideation only or hospital presentation of non-suicidal self-harm with no pairwise differences observed.

Neighbourhood cohesion

Compared to those with no history of suicide attempt, by 15 years of age, [Young et al. \(2011\)](#) found those with a history of suicide attempt did not significantly differentiate on neighbourhood cohesion, neighbourhood facilities or level of neighbourhood safety and/or civility at 11 years of age.

Parenting behaviours

[Young et al. \(2011\)](#) reported that parental care and parental control did not significantly differentiate between those who reported a suicide attempt by 19 years of age.

Psychiatric service user

Only [Young et al. \(2011\)](#) explored mental health service use and found lifetime suicide attempt by 19 years old was not associated with a history of service use by 11 years of age.

Resilience

[Wetherall et al. \(2018\)](#) was the only study to measure resilience with no significant difference in scores observed between those with a history of

suicide attempt, compared to those with a history of ideation or those with no history of suicidal behaviour or ideation.

School environment

School roll, rating and ethos were not significantly associated with lifetime history of suicide attempt at 19 years old (Young et al., 2011).

Social support

Cleare et al. (2021) and Wetherall et al. (2018) both reported no significant difference between participants with a lifetime history of suicide attempt when compared to those with a history of non-suicidal self-harm (Cleare et al., 2021) or history of self-harm thoughts, or no history of self-harm thoughts or behaviours (Wetherall et al., 2018).

Suicidal intent

Suicidal intent was explored by Only O'Connor et al. (2015). In a sample of 94 patients presenting to hospital following a suicide attempt, suicide attempt at baseline was not significantly associated with likelihood of subsequent hospital representation of suicide attempt at follow-up.

Appendix 3. Quality Assessment Scores

Author, year	Study design	Quality assessment score	Quality assessment score (as percentage,%)
Cleare et al. (2021)	Cross-sectional	8	100.0 %
Dhingra et al. (2015)	Cross-sectional	7	87.5 %
Gilchrist and Sadler (2019)	Cohort	2	63.6 %
O'Connor et al. (2013)	Cohort	9	90.9 %
O'Connor et al. (2015)	Cohort	9	90.9 %
Wetherall et al. (2018)	Cross-sectional	8	100.0 %
Young et al. (2011)	Cross-sectional	5	50.0 %

References

- Beck, A.T., Kovacs, M., Weissman, A., 1979. Assessment of suicidal intention: the scale for suicide ideation. *J. Consult. Clin. Psychol.* 47, 2.
- Beck, A.T., Steer, R.A., Brown, G.K., 1996. Manual for the beck depression inventory-II. *Psychol. Corp.* 1 (82), 10–1037.
- Beck, A.T., Steer, R.A., Ranieri, W.F., 1988. Scale for suicide ideation: psychometric properties of a self-report version. *J. Clin. Psychol.* 44 (4), 499–505.
- Beck, A.T., Weissman, A., Lester, D., Trexler, L., 1974. The measurement of pessimism: the hopelessness scale. *J. Consult. Clin. Psychol.* 42 (6), 861.
- Branley-Bell, D., O'Connor, D.B., Green, J.A., Ferguson, E., O'Carroll, R.E., O'Connor, R. C., 2019. Distinguishing suicide ideation from suicide attempts: further test of the integrated motivational-volitional model of suicidal behaviour. *J. Psychiatr. Res.* 117, 100–107.
- Bruffaerts, R., Demyttenaere, K., Hwang, I., Chiu, W.T., Sampson, N., Kessler, R.C., Nock, M.K., 2011. Treatment of suicidal people around the world. *Br. J. Psychiatry* 199 (1), 64–70.
- Borowsky, I.W., Resnick, M.D., Ireland, M., Blum, R.W., 1999. Suicide attempts among American Indian and Alaska Native youth: risk and protective factors. *Arch. Pediatr. Adolesc. Med.* 153 (6), 573–580.
- Campbell-Sills, L., Stein, M.B., 2007. Psychometric analysis and refinement of the Connor-Davidson Resilience Scale (CD-RISC): Validation of a 10-item measure of resilience. *J. Trauma. Stress: Official Publication of The International Society for Traumatic Stress Studies* 20 (6), 1019–1028.
- Cleare, S., Wetherall, K., Eschle, S., Forrester, R., Drummond, J., O'Connor, R.C., 2021. Using the integrated motivational-volitional (IMV) model of suicidal behaviour to differentiate those with and without suicidal intent in hospital treated self-harm. *Prev. Med.* 152, 106592.
- Centers for Disease Control and Prevention. Fast Facts [Internet]. www.cdc.gov. 2021. Available from: <https://www.cdc.gov/suicide/facts/>.
- Creating Hope Together: suicide prevention action plan 2022 to 2025 [Internet]. www.gov.scot. Available from: <https://www.gov.scot/publications/creating-hope-together-scotlands-suicide-prevention-action-plan-2022-2025/>.
- Crosby, A., Ortega, L., Melanson, C., 2011. Self-Directed Violence Surveillance: Uniform Definitions and Recommended Data Elements 1.0. Centers for Disease Control and Prevention. National Center for Injury Prevention and Control.
- Cull, J.G., Gill, W.S., 1988. Suicide probability scale. *J. Consult. Clin. Psychol.*
- Dhingra, K., Boduszek, D., O'Connor, R.C., 2015. Differentiating suicide attempters from suicide ideators using the integrated motivational-volitional model of suicidal behaviour. *J. Affect. Disord.* 186, 211–218.
- Dhingra, K., Klonsky, E.D., Tapola, V., 2019. An empirical test of the three-step theory of suicide in UK university students. *Suicide and Life-Threat. Behav.* 49 (2), 478–487.
- Ellaway, A., Macintyre, S. Neighborhoods and health. A companion to health and medical geography. 2010:399–417.
- Favril, L., Yu, R., Uyar, A., Sharpe, M., Fazel, S., 2022. Risk factors for suicide in adults: systematic review and meta-analysis of psychological autopsy studies. *BMJ Ment Health* 25 (4), 148–155.
- Franklin, J.C., Ribeiro, J.D., Fox, K.R., Bentley, K.H., Kleiman, E.M., Huang, X., Musacchio, K.M., Jaroszewski, A.C., Chang, B.P., Nock, M.K., 2017. Risk factors for suicidal thoughts and behaviors: a meta-analysis of 50 years of research. *Psychol. Bull.* 143 (2), 187–232. <https://doi.org/10.1037/bul0000084>.
- Gilbert, P., Allan, S., 1998. The role of defeat and entrapment (arrested flight) in depression: an exploration of an evolutionary view. *Psychol. Med.* 28 (3), 585–598.
- Gilchrist, E.E., Sadler, D.W., 2019. The role of depression in unnatural death: a case-based retrospective study. *J. Affect. Disord.* 259, 7–14.
- Hewitt, P.L., Flett, G.L., 1991. Perfectionism in the self and social contexts: conceptualization, assessment, and association with psychopathology. *J. Pers. Soc. Psychol.* 60 (3), 456.
- Holmes, E.A., Mathews, A., 2010. Mental imagery in emotion and emotional disorders. *Clin. Psychol. Rev.* 30 (3), 349–362.
- Holman, M.S., Williams, M.N., 2020. Suicide risk and protective factors: a network approach. *Arch. Suicide Res.* 1–18. <https://doi.org/10.1080/13811118.2020.1774454>.
- Kandel, D.B., Davies, M., 1982. Epidemiology of depressive mood in adolescents -an empirical study. *Arch. Gen. Psychiatry* 39 (10), 1205–1212.
- Linton, S.J., Shaw, W.S., 2011. Impact of psychological factors in the experience of pain. *Phys. Ther.* 91 (5), 700–711.
- MacLeod, A.K., Pankhania, B., Lee, M., Mitchell, D., 1997. Brief communication parasuicide, depression and the anticipation of positive and negative future experiences. *Psychol. Med.* 27 (4), 973–977.
- Mitchell, P.H., Powell, L., Blumenthal, J., Norten, J., Ironson, G., Pitula, C.R., Froelicher, E.S., Czajkowski, S., Youngblood, M., Huber, M., Berkman, L.F., 2003. A short social support measure for patients recovering from myocardial infarction: the ENRICH social support inventory. *J. Cardiopulm Rehabil.* 23, 398–403.
- Moola, S., Munn, Z., Tufanaru, C., Aromataris, E., Sears, K., Sfetcu, R., Currie, M., Qureshi, R., Mattis, P., Lisy, K., Mu, P.F., 2020. Chapter 7: systematic reviews of etiology and risk. Aromataris E, Munn Z (Eds.). *JBI Manual for Evidence Synthesis*. JBI. Available from: <https://synthesismanual.jbi.global>.
- Moola, S., Munn, Z., Tufanaru, C., Aromataris, E., Sears, K., Sfetcu, R., Currie, M., Qureshi, R., Mattis, P., Lisy, K., Mu, P.F., 2017. Chapter 7: systematic reviews of etiology and risk. Aromataris E, Munn Z (Eds.). Joanna Briggs Institute Reviewer's Manual. The Joanna Briggs Institute, 2017 Available from: <https://reviewersmanual.joannabriggs.org/>. Date accessed 11th December 2023.
- National Records of Scotland (2021) Probable suicides. Date created: 2nd August 2022. URL: Probable Suicides | National Records of Scotland (nrsotland.gov.uk).
- Nock, M.K., Deming, C.A., Fullerton, C.S., Gilman, S.E., Goldenberg, M., Kessler, R.C., McCarroll, J.E., McLaughlin, K.A., Peterson, C., Schoenbaum, M., Stanley, B., 2013. Suicide among soldiers: a review of psychosocial risk and protective factors. *Psychiatry* 76 (2), 97–125.
- Northern Ireland Statistics and Research Agency (2022) Review of Suicide Statistics in Northern Ireland, 2015 - 2020. Published: 26 May 2022. Belfast.
- O'Connor, R.C., 2011. Towards an integrated motivational-volitional model of suicidal behaviour. *International handbook of suicide prevention. Res. Policy Practice* 1, 181–198.
- O'Connor, R.C., Nock, M.K., 2014. The psychology of suicidal behaviour. *The Lancet Psychiatry*. Elsevier Ltd. [https://doi.org/10.1016/S2215-0366\(14\)70222-6](https://doi.org/10.1016/S2215-0366(14)70222-6). Vol. 1, Issue 1, pp. 73–85.
- O'Connor, R.C., Smyth, R., Ferguson, E., Ryan, C., Williams, J.M.G., 2013. Psychological processes and repeat suicidal behavior: a four-year prospective study. *J. Consult. Clin. Psychol.* 81 (6), 1137–1143.

- O'Connor, R.C., Kirtley, O.J., 2018. The integrated motivational–volitional model of suicidal behaviour. *Philos. Trans. R. Soc. Lond. B Biol. Sci.* 373 (1754), 20170268.
- O'Connor, R.C., Portzky, G., 2018. Looking to the future: a synthesis of new developments and challenges in suicide research and prevention. *Front. Psychol.* 9, 2139.
- O'Connor, R.C., Wetherall, K., Cleare, S., Eschle, S., Drummond, J., Ferguson, E., O'Connor, D.B., O'Carroll, R.E., 2018a. Suicide attempts and non-suicidal self-harm: national prevalence study of young adults. *BJPsych Open* 4 (3), 142–148. <https://doi.org/10.1192/bjo.2018.14>.
- O'Connor, R.C., Smyth, R., Williams, J.M.G., 2015. Intrapersonal positive future thinking predicts repeat suicide attempts in hospital treated suicide attempters. *J. Consult. Clin. Psychol.* 83, 169–176.
- O'Connor, R.C., Wetherall, K., Cleare, S., Eschle, S., Drummond, J., Ferguson, E., O'Connor, D.B., O'Carroll, R., 2018b. Suicide attempts and non-suicidal self-harm: a national prevalence study of young adults. *Br. J. Psychiatry Open* 4, 142–148.
- Office of National Statistics (2017) Suicides in the UK: 2017 Registrations. 2022. Office for National Statistics URL: Suicides in the –K - Office for National Statistics ons.gov.uk. Date accessed: 14th November 2022.
- Patton, J.H., Stanford, M.S., Barratt, E.S., 1995. Factor structure of the Barratt impulsiveness scale. *J. Clin. Psychol.* 51 (6), 768–774.
- Plutchik, R., Van Praag, H.M., Conte, H.R., Picard, S., 1989. Correlates of suicide and violence risk 1: the suicide risk measure. *Compr. Psychiatry* 30 (4), 296–302.
- Richardson, C., Robb, K.A., McManus, S., O'Connor, R.C., 2023. Psychosocial factors that distinguish between men and women who have suicidal thoughts and attempt suicide: findings from a national probability sample of adults. *Psychol. Med.* 53, 3133–3141. <https://doi.org/10.1017/S0033291721005195>.
- Schmidt, N.B., Richey, J.A., Cromer, K.R., Buckner, J.D., 2007. Discomfort intolerance: evaluation of a potential risk factor for anxiety psychopathology. *Behav. Ther.* 38 (3), 247–255.
- Scottish Government. (2022). Creating Hope Together: suicide prevention action plan 2022 to 2025 <https://www.gov.scot/publications/creating-hope-together-scotlands-suicide-prevention-action-plan-2022-2025/> Date accessed: 5th January 2024.
- Sinclair, L., Leach, R., 2017. Exploring thoughts of suicide. *BMJ* 356. <https://doi.org/10.1136/bmj.j1128>.
- Sweeting, H., Young, R., West, P., Der, G., 2006. Peer victimization and depression in early-mid adolescence: a longitudinal study. *Br. J. Educ. Psychol.* 76 (Pt 3), 577–594.
- Turecki, G., Brent, D.A., 2016. Suicide and suicidal behaviour. *Lancet North Am. Ed.* 387 (10024), 1227–1239.
- Turecki, G., Brent, D.A., Gunnell, D., O'Connor, R.C., Oquendo, M.A., Pirakis, J., Stanley, B.H., 2019. Suicide and suicide risk. *Nature Reviews Disease Primers.* Nature Publishing Group. <https://doi.org/10.1038/s41572-019-0121-0>. Vol. 5, Issue 1.
- Van Orden, K.A., Cukrowicz, K.C., Witte, T.K., Joiner Jr, T.E., 2012. Thwarted belongingness and perceived burdensomeness: construct validity and psychometric properties of the interpersonal needs questionnaire. *Psychol. Assess.* 24 (1), 197.
- Van Orden, K.A., Witte, T.K., Gordon, K.H., Bender, T.W., Joiner Jr, T.E., 2008. Suicidal desire and the capability for suicide: tests of the interpersonal-psychological theory of suicidal behavior among adults. *J. Consult. Clin. Psychol.* 76 (1), 72.
- Wetherall, K., Cleare, S., Eschle, S., Ferguson, E., O'Connor, D.B., O'Carroll, R.E., O'Connor, R.C., 2018. From ideation to action: differentiating between those who think about suicide and those who attempt suicide in a national study of young adults. *J. Affect. Disord.* 241, 475–483.
- World Health Organization (2023) Suicide. URL: <https://www.who.int/news-room/fact-sheets/detail/suicide>. Date accessed: 5th January 2024.
- Wrosch, C., Scheier, M.F., Miller, G.E., Schulz, R., Carver, C.S., 2003. Adaptive self-regulation of unattainable goals: goal disengagement, goal reengagement, and subjective well-being. *Personal. Soc. Psychol. Bull.* 29 (12), 1494–1508.
- Young, R., Sweeting, H., Ellaway, A., 2011. The influence of school and neighbourhood on attempted suicide, suicidal ideation and self-harm among secondary school pupils. *BMC Public Health* 11 (1), 1–15.
- Zigmond, A.S., Snaith, R.P., 1983. The hospital anxiety and depression scale. *Acta Psychiatr. Scand.* 67 (6), 361–370.
- Zortea, T.C., Cleare, S., Melson, A.J., Wetherall, K., O'Connor, R.C., 2020. Understanding and managing suicide risk. *Br. Med. Bull.*