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**Exploring the nature of social relationships and self-  
injurious thoughts and behaviours**

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July 2022

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# Abstract

*Background:* Suicide is a major public health concern, with the World Health Organization estimating that approximately 703,000 people die by suicide every year worldwide. Interventions for mental health support and suicide prevention have shifted focus in recent years, to promote more community-based strategies in addition to individual interventions. Furthermore, the role of interpersonal factors (e.g., loneliness, perfectionism, trauma) on mental health and suicide risk has received increasing recognition by both government agencies and the general public in light of the restrictions that were introduced during the COVID-19 pandemic. These social restrictions have been shown to be associated with strained relationships and have highlighted the role loneliness, family support, social support and social connections can have on mental health.

*Aims:* The current series of studies, underpinned by theories including the Integrated Motivational-Volitional (IMV) model, aimed to explore the relationship between loneliness and self-injurious thoughts and/or behaviour within the context of other interpersonal factors and established drivers of suicide risk. To achieve this aim, the current thesis addressed three overarching research questions: 1) with a particular focus on loneliness, which interpersonal factors are associated with risk of self-injurious thoughts and behaviours?; 2) which interpersonal factors differentiate between those who have a history of self-injurious behaviours, history of self-injurious thoughts only, and no history of self-injurious thoughts or behaviours?; 3) what does an in-depth exploration reveal about the role of loneliness in relation to self-injurious thoughts and behaviour?

*Methods:* A range of research and analytical methods were employed to address the research questions. Firstly, a systematic review and meta-analysis (Chapter 2) was conducted to explore the association between loneliness and later self-injurious thoughts and behaviour (SIB). Socio-demographic characteristics (age, gender, geographic location) and depression were also investigated to identify what role, if any, they may have in the association between loneliness and SIB. The findings of the review informed the subsequent quantitative and qualitative studies. Using an anonymous cross-sectional online survey reported in Chapter 3, 400 participants were recruited to explore where loneliness might fit within the context of the IMV model. In Chapter 4, Interpretative Phenomenological Analysis was used to explore the role of interpersonal factors prior to a suicide attempt in ten participants with lived experience. The findings of these studies led

to the third and final study. This study quantitatively explored different forms of loneliness, as well as parental attachment, in the association with SIB (Chapter 5; n=582 participants). The final study also explored whether depression mediated between different forms of loneliness and suicidal ideation.

*Results:* The meta-analysis (n=33 studies) confirmed a significant, prospective relationship between loneliness and both self-injurious thoughts and self-injurious behaviours. Furthermore, it indicated that depression was a significant mediator between loneliness and later SIB (n=8 studies). Narratively (n=38 studies), there was evidence to suggest that a significant association between loneliness and later SIB was likely to be identified between ten weeks and five years after baseline in those aged 13-22 or  $\geq 54$  years old, or among those based in Europe. Empirical findings in Chapter 3 revealed that within the context of the IMV model, loneliness was likely to operate as a motivational moderator; moderating the association between entrapment and suicidal ideation. It also distinguished between those with no history of self-injurious thoughts and behaviours and those with any history of SIB. Loneliness was also found to significantly moderate between childhood emotional abuse and suicidal ideation, and partially mediate between all childhood traumas investigated and suicidal ideation and between socially prescribed perfectionism and suicidal ideation. Findings from Chapter 4 indicated that participants experienced different forms of loneliness prior to suicide attempt, specifically social isolation, lack of emotional connectedness and lack of feeling understood. Further superordinate themes included unique patterns of social support, emotional secrecy, personality traits and social transition. These qualitative findings guided the aims of the final study. To this end, in Chapter 5, four forms of loneliness (family, romantic, social and global) were explored in detail, with the analysis revealing that each operated as a motivational moderator (within the IMV model) when all other forms of loneliness were controlled for. Additionally, stress mediated between socially prescribed perfectionism and all forms of loneliness, with a full mediating effect evident between perfectionism and romantic loneliness. In turn, depression independently mediated between family, global and romantic loneliness in relation to suicidal ideation though this mediating effect of depression between romantic loneliness and suicidal ideation was significantly smaller than the other effects.

*Conclusion:* Three research questions were addressed in this thesis. Loneliness was a significant predictor of later SIB (addressing question 1) and distinguished those with a history of self-harm ideation from those with no history of self-harm ideation or behaviour

(question 2). Childhood emotional abuse, socially supported coping, socially prescribed perfectionism, depression and suicidal ideation were also found to be associated with SIB (questions 1 & 2). Loneliness was found to be a particular risk factor for later SIB in specific demographic populations, with further findings suggesting romantic loneliness may be the most pernicious of all forms of loneliness (question 3). These findings add to the body of evidence that loneliness is not synonymous with social isolation. Furthermore, loneliness must be recognised as a multi-dimensional risk factor for SIB. Romantic loneliness may pose a particular risk to wellbeing, especially for those with high traits of socially prescribed perfectionism. Strategies to reduce SIB may benefit from focusing on a range of interpersonal factors across the life-course (e.g., reducing the occurrence/effects of childhood trauma) and social support. This thesis offers evidence that loneliness, especially romantic loneliness, is a significant predictor of SIB which warrants further investigation of known at-risk groups.

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## Publications

**McClelland, H.**, Evans, J. J. and O'Connor, R. C. (2022) A qualitative exploration the experiences and perceptions of interpersonal relationships prior to attempting suicide in young adults. *International Journal of Environmental Research and Public Health*, 19(13), 7880. (doi: 10.3390/ijerph19137880)

**McClelland, H.**, Evans, J. J. and O'Connor, R. C. (2021) Exploring the role of loneliness in relation to self-injurious thoughts and behaviour in the context of the integrated motivational-volitional model. *Journal of Psychiatric Research*, 141, pp. 309-317. (doi: 10.1016/j.jpsychires.2021.07.020) (PMID:34304034)

**McClelland, H.**, Evans, J. J., Nowland, R., Ferguson, E. and O'Connor, R. C. (2020) Loneliness as a predictor of suicidal ideation and behaviour: a systematic review and meta-analysis of prospective studies. *Journal of Affective Disorders*, 274, pp. 880-896. (doi: 10.1016/j.jad.2020.05.004)

## Acknowledgements

First and foremost, thanks must go to my excellent PhD supervisors, Professors Rory O'Connor and Jon Evans. Across the four and a half years of completing this PhD, I never once attended any of our meetings with a feeling of trepidation and instead looked forward to our monthly meetings. Their unwavering support, patience, warmth and jovial positivity throughout this journey has been invaluable and I will be forever grateful to them.

I must also thank my 'honorary supervisors', Dr's. Seonaid Cleare and Karen Wetherall, for their informal guidance. They provided a comforting ear, comic relief and understanding to the unique challenges brought about through working and studying full time, which helped me keep my sanity throughout this experience. Further thanks goes to the wider SBRL team both past and present: Jack, Tiago, Cara, Susanne, Yawen, Krystyna, Marianne and Gonca to name a few. SBRL-ers are some of the loveliest and most encouraging people I have had the pleasure of working with and I have the fortune of considering some of them friends for life.

On a personal note, I must thank my husband, Dougie, who told me to 'go for it' when I first started to consider a PhD. Since then he has helped me keep perspective by ensuring I maintained a life outside of academia and a connection with the outdoors. He has also patiently waited and put other adventures on hold these past four years so that I could achieve my goal. Equally I need to thank my sister, Fiona who has been immensely supportive throughout this journey, my late Aunt 'Dodo' and cousins Maureen and Billy, who each provided me the means, structure and discipline to achieve this milestone.

Final thanks must, not least of all, go to the participants who contributed to the research of this thesis. It has been a privilege to have been able to learn from peoples experiences of some of the darkest moments of their lives. I hope I have done their contributions justice in this thesis and that their insight might in some way help suicide prevention in the future.

Heather McClelland, July 2022.

## Author's declaration

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

Heather McClelland, July 2022.

## Definitions/abbreviations

CAS:	Continued Attachment Scale
CEA:	Childhood emotional abuse
CI:	Confidence intervals
df:	degrees of freedom
ESSI:	ENRICHD Social Support Inventory
IMV:	Integrated Motivational-Volitional (model)
IPT:	Interpersonal Theory of Suicidal Behaviour
N:	Total number in sample/ sample size
NH:	no history of self-injurious thoughts or behaviour group
OR:	Odds ratio
SB:	history of self-injurious behaviour (including suicide attempt), regardless of any history of self-injurious thoughts.
SI:	history of self-injurious thoughts only
SELSA:	Social and Emotional Loneliness Scale for Adults
SIB:	Self-injurious ideation and/ or behaviour
SPP:	Socially prescribed perfectionism
ST:	History of self-injurious thoughts but no history of self-injurious behaviour
UCLA-LS:	University of California Los Angeles – Loneliness Scale
WHO:	World Health Organization

# Chapter 1: An introduction to suicide behaviour research and interpersonal factors

## General overview

Suicide remains a major public health concern, with over 703,000 suicide deaths reported globally every year. This equates to approximately one death every 40 seconds (WHO, 2019). Although the prevalence of suicide varies as a function of demographic characteristics (e.g., more common in White, middle-aged men) and environment, suicide is never inevitable. It is also well established that the causes of suicide are many; spanning biological, psychological and social domains. In this thesis, the focus shall be on psychological factors, of which have received increasing research attention in recent years (O'Connor & Nock, 2014; Turecki *et al.*, 2019). More specifically, the impact of perceptions and experiences of interpersonal relationships on mental health has become an important focus within the clinical and health psychology literature. For example, factors including socially prescribed perfectionism and social isolation have each been linked to mental illness and/ or suicidal behaviours (Smith *et al.*, 2018). Both socially prescribed perfectionism and social support include an element of social disconnection, whether physically or psychologically. Another factor which also shares the characteristic of real or perceived social disconnection, is loneliness.

The role of loneliness as a risk factor for poor mental health has received significant recognition by health professionals and the public in recent years (MacPherson, 2021; Valtorta *et al.*, 2016). In a landmark prospective review, Valtorta *et al.* (2016) identified that loneliness was significantly associated with later coronary heart disease. This, in conjunction with other studies exploring loneliness in relation to physical and psychological health (Shankar *et al.*, 2011), have motivated numerous governing authorities to introduce national loneliness prevention strategies (Department for Digital, Culture, Media and Sport, 2018). However, the extent to which loneliness is associated to self-injury (including suicide death) remains under explored. Moreover, how loneliness compares to other established interpersonal factors (e.g., socially prescribed perfectionism and social support) linked with suicide, and other key drivers of suicide, warrants further exploration.

The development of theories of suicidal behaviour has helped to guide novel research in the understanding, and prediction, of suicidal thoughts and behaviour. For example, models such as the Cry of Pain model have highlighted the role of defeat and entrapment (Williams, 2001) in suicidal behaviour. In contrast, the Interpersonal Theory of Suicide (Joiner *et al.*, 2005; Van Orden *et al.*, 2010) posits that perceived burdensomeness and thwarted belongingness are key to understanding suicide risk. In the current thesis, we focus on the Integrated Motivational-Volitional Model of suicidal behaviour (O'Connor, 2011; O'Connor & Kirtley, 2018) due to its broad, biopsychosocial approach and incorporation of elements from pre-existing models. In doing so, the role of interpersonal experiences across the life-course are acknowledged, as well as the role of other key drivers of suicide risk.

In brief, within the context of the IMV model this thesis aims to explore the interplay between loneliness, social support and socially prescribed perfectionism in the aetiology of self-injurious thoughts and behaviours. Doing so it will extend our understanding of the role of interpersonal relationships in relation to self-injury.

## **1.2 Suicide terminology**

The World Health Organisation (WHO; 2014) defines suicide as ‘the act of deliberately killing oneself’. However, the WHO (2014), much like the UK NHS guidelines for self-harm (NICE, 2013), are less clear when defining suicide attempt, and fails to distinguish between fatal and non-fatal intent. Consequently, in the current chapter we utilise the term ‘self-injury’ to encapsulate all forms of intentional injury to oneself, regardless of the intended outcome (e.g., to cope with emotions, or to die by suicide). Finally, any thoughts of self-injury or suicide are referred to as self-injurious thoughts.

## **1.3 The scale of suicide worldwide**

### **1.3.1 Global epidemiology of suicide**

According to the latest data from the WHO (2021a), suicide death rates declined by 29% between 2000 and 2019. However, this still equated to approximately 703,000 global deaths in 2019 alone. In addition to deaths by suicide, millions of people attempt suicide, engage in non-suicidal self-injury or experience suicidal ideation (O'Connor *et al.*, 2018).



A nationally representative study of young adults (18-29 years) living in Scotland showed that 20% of the population had experienced suicidal ideation, while 6% had made a suicide attempt (O'Connor *et al.*, 2018). These prevalence's are cause for concern as research has shown that past self- injury, or exposure to self- injury, are key predictors of future suicide risk (Mars *et al.*, 2019). Indeed, a systematic review and meta-analysis by O'Carroll, Metcalfe and Gunnell (2014) of 177 papers found that one in 25 patients who present to hospital following self- injury, died by suicide in the subsequent five years after discharge. Equally, research shows that repeated self- injury was significantly associated with one's belief of their capability for suicide, as reflected by their increase in the medical severity of their self-injuries over time (Shahnaz *et al.*, 2020).

### 1.3.2 The burden of suicidal behaviour

Medical severity of self-injury has been indicated to increase through repetition over time (Berardelli *et al.*, 2020; Shahnaz *et al.*, 2020). This suggests that suicide attempts may become increasing more lethal. The physical health consequences for those who survive suicide attempts can be long-lasting or permanent, potentially leading to further life dissatisfaction through health complications and physical difficulties.

Suicide death can have a devastating impact on friends and family close to the deceased (Cerel, Jordan & Duberstein, 2008). Wetherall *et al.* (2018) found that compared to those who do not engage in self- injury, those who did were significantly more likely to know someone who had died by suicide. Further research has also shown that psychiatric illness (Pitman *et al.*, 2014; Maple & Sandford, 2019) and feelings of guilt (Levine, 2008) are commonly associated with individuals following suicide bereavement. Equally, suicide can further negatively impact the wider community (Young *et al.*, 2012). With these facts in mind, it is important to identify early determinants of self- injury so as to mitigate, or potentially prevent, future self- injury and suicide.

For many, suicide is the final means of escape from distress. It is therefore imperative to identify precursors and factors associated with self-injurious thoughts and behaviours. Doing so help to understand how suicide develops, and consequently how to equip individuals with the tools to cope with, or mitigate, such psychological distress. Known factors associated with self-injury include demographic characteristics, socioeconomic factors and geography. The nature of each of these factors in relation to self-injury are summarised below.

## 1.4 Demographic characteristics associated with self-injury and suicide

Many demographic characteristics have consistently been associated with an increased propensity for self-injury or self-injurious thoughts (Wetherall *et al.*, 2020). Here, we consider four such demographic factors; age, gender, socio-economic status and geography.

### 1.4.1 Age

Globally, 58% of suicide deaths occur before the age of 50 years old, with suicide being the fourth leading cause of death among 15–29-year-olds (WHO, 2021b). In contrast, self-injury is most likely to occur in young and middle-aged adults than any other age group (Vuagnat *et al.*, 2020). Overall, these findings suggest that medical severity of self-injury increases as a function of age.

### 1.4.2 Gender

Globally, suicide death is more common among men than women, however in recent years the gender ratio of suicide death has decreased from approximately 3:1 to 2:1 (WHO, 2021b). In contrast, women are more likely to report an episode of self-injury or suicide attempt than men (Fadum *et al.*, 2014), thereby creating a gender paradox between suicide attempt and suicide death (Cannetto & Schrijver, 2010). Indeed, Freeman *et al.* (2017) found that serious suicide intent (e.g., use of hanging) was significantly greater in men than women. Conversely, women were more likely to engage in self-injury where the potential for suicide was indicated, but not considered a serious attempt. It is important to note, however, how this data is captured. Females are commonly over-represented in suicide research studies, and they are more likely than males to be forthcoming about experiences self-injurious thoughts and behaviours (Lloyd *et al.*, 2018).

Suicide prevalence of non-binary gender populations remain grossly under-researched. Investigating the association between gender and suicide risk is overwhelmingly based on binary data. However, research by Thorne *et al.* (2018) found that self-injury prevalence did not significantly differ between binary and non-binary genders.

### 1.4.3 Socio-Economic Status and Unemployment

Differences in both physical and mental wellbeing are regularly observed as a function of socio-economic status (SES), the same is true for self-injury. Lower SES at both national- and local-level, has been significantly linked with poorer mental and physical wellbeing (O'Connor *et al.*, 2021), reduced access to affordable healthcare (Kim *et al.*, 2016; Lorant *et al.*, 2018; WHO, 2021a) and increased risk of suicide death (Lorant *et al.*, 2005).

Furthermore, on the individual level, unemployment and low education have been found to be associated with self-injurious thoughts, behaviour and suicide death (Lorant *et al.*, 2005).

### 1.4.4 Geography

Overall, there has been a global decline in suicide in recent years, however the prevalence of suicide death varies considerably between continents (WHO, 2021a). In the last 20 years, suicide deaths have increased by 28% in the Americas, while Europe continues to have the highest suicide rates of all continents (WHO, 2021a). Furthermore, over three-quarters of suicide deaths reportedly occur in low- and middle-income countries compared to high income countries, suggesting that challenges associated with resource provision (e.g., financial, nutritional, health) are likely to influence the prevalence of suicide. However, there are exceptions to this trend. For example, in 2019, Japan (a high-income country) reported 15.3 suicide deaths per 100,000 of the population, grossly exceeding the global average of 9.0 deaths per 100,000 (WHO, 2021b). Therefore, other factors influencing self-injury, such as cultural or individual differences, must also be considered.

## 1.5 Individual differences

To date, no single factor, or combination of factors in suicide research has been shown to reliably predict the occurrence of self-injury with sufficient sensitivity and specificity (Windfuhr & Kapur, 2011; Large *et al.*, 2011). Consequently, despite the consistency of the association between demographic characteristics and self-injury, other factors must be considered. Individual differences are traits or characteristics which distinguish individuals from one another. Such examples include sexuality, physical or mental illnesses and personality factors, some of which are summarised below in relation to self-injury.

### 1.5.1 Sexuality

A review of male-only nationally representative studies has shown that suicide is consistently more common in minority sexuality populations than non-minority sexuality populations (McDaniel *et al.*, 2001). This trend was also reflected across genders in self-injury prevalence in a New Zealand-based study (Skegg *et al.*, 2003). Skegg *et al.* (2003) found that those with experiences of same-sex attraction were significantly more likely to experience self-injury than those with no such sexual experiences (OR: men = 5.5, women = 1.9). Studies exploring suicide in female minority sexuality populations are less common. Despite this, preliminary data suggests that suicide is elevated in female minority sexuality populations when compared to straight female counterparts. However, this was to a lesser extent than male sexual minority populations (Lynch *et al.*, 2020).

### 1.5.2 Physical and Mental Illness

Many health diagnoses have consistently been linked to heightened suicide risk. Specifically, mental illnesses including depression and alcoholism (WHO, 2021b) and physical illnesses including brain injury, sleep disorders and AIDS or HIV (Ahmedani *et al.*, 2017). Suicide is approximately four times higher in psychiatric populations when compared to general populations (Brådvik, 2018; McDaniel *et al.*, 2001; Mortensen *et al.*, 2000). However, suicidal ideation and self-injury were not found to be significantly greater in populations with multimorbidity (physical and mental illness) when compared to populations with mental illness only (Kavalidou *et al.*, 2019). This would suggest that mental health may be a greater determinant of suicide risk than physical health. Despite the increased risk of self-injurious thoughts and behaviours in psychiatric populations, psychiatric populations only account for a fraction of the overall global prevalence of suicide death (Kessler *et al.*, 2009). This therefore suggests that further factors, beyond mental and physical illness need to be considered.

## 1.6 Psychological factors and suicide risk

Despite the demographic and individual factors summarised above, these still do not account for all suicide deaths. It is imperative to identify better markers of risk so as to avoid unnecessary morbidity and self-inflicted mortality. It has been argued that suicide is first and foremost a behaviour, and consequently psychological determinants should be at

the epicentre of suicide behaviour research and prevention (O'Connor & Nock, 2014). In the present thesis, this focus has been narrowed down further to interpersonal perceptions or experiences, with the latter being a common feature of predominant models of suicidality. Moreover, recent research has shown that brief (e.g., physical assault; Nickerson *et al.*, 2017) or prolonged (parenting style; Carlo *et al.*, 2018) interpersonal experiences can influence how individuals interpret and respond to their environment in future. Therefore, by exploring interpersonal factors as potential antecedents of suicide, and understanding how they interact with established factors associated with self-injury, would offer the opportunity for specific or targeted suicide prevention strategies.

## 1.7 Interpersonal factors

Interpersonal factors encapsulate a variety of different facets. Beginning in-utero, the relationship between a mother and their unborn infant can influence foetal development and psychological wellbeing (Spry *et al.*, 2022). Experiences after birth and throughout the life course can also have potentially significant implications on one's physical and mental wellbeing and development (Dye, 2018; Fernando *et al.*, 2013). Indeed, the presence, absence and nature of social interactions during infancy can shape one's personality, social understanding, emotional needs and determine their expectations of social interactions in the future. Furthermore, social contact has also been found to have more immediate effects, with positive or rewarding interactions downregulating stress, pain response and improving one's immune system (p. 133, Gleason & Iida, 2015)

In recent years, the role of interpersonal relationships, both real and perceived, on mental wellbeing has received increasing recognition in psychology research. Factors such as socially prescribed perfectionism (the need to meet the real or perceived, unattainably high expectations one believes others have for them; Hewitt & Flett, 1991) and social support, have been identified as having distinct implications on mental illness, and other adverse outcomes such as self-injury and suicide. A similar element in the interpersonal domain, is loneliness. However, unlike socially prescribed perfectionism and social support, there is a dearth of research investigating loneliness relation to self-injury and suicide. Furthermore, if loneliness is associated with suicide risk, whether this operates independently of other interpersonal factors also remains to be established.

Understanding the extent to which interpersonal factors may influence one's propensity for suicide would aid the advancement of suicide behaviour research and suicide prevention strategies. Therefore, the current thesis shall explore loneliness, social support and socially prescribed perfectionism in relation to suicide risk. Each of these interpersonal factors are briefly summarised separately below.

### 1.7.1 Loneliness

Over 10% of the adult population are believed to experience loneliness at some point in their lives (Beutel *et al.*, 2017). As illustrated by Rosedale (2007), interpretations of loneliness vary considerably and can include 'voluntary and involuntary conditions', for example voluntarily choosing to be alone (i.e., self-isolation), versus being socially isolated against one's will. Overall, loneliness is the subjective experience of having insufficient social bonds, either quantitatively or qualitatively (Perlman & Peplau, 1981), resulting in a feeling that is ultimately a state devoid of any positive affect (D'Abo, 1972). Although loneliness often occurs in tandem with social isolation, they are distinct, with one not necessarily being contingent on the other (e.g., being lonely in a crowd; Boyd, *et al.*, 2020).

Early theory-driven explanations of loneliness, for example psychodynamic theory, suggest that loneliness echoes perceptions more commonly seen in children (Zilboorg, 1938), whereas more modern explanations use either a cognitive (Donbavand, 2021) or evolutionary approach (Baumeister & Leary, 1995). The cognitive approach, based on the work by Gregory Simmel (cited in Donbavand, 2021), suggests that loneliness is a result of social norms limiting the opportunities for interpersonal connections of those who may require more opportunities for such experiences. In contrast, the Evolutionary Theory of Loneliness by Cacioppo and Hawkley (2003) argues that loneliness occurs due to individual factors; operating as an internal warning to individuals that their social bonds are weak and that they are vulnerable to harm. This evolutionary perspective argues that sustained loneliness can lead to feelings of stress, anxiety and interpreting the world as a threatening place. This, therein, can cause the individual to withdraw and seek refuge – which further feeds into the feelings of loneliness. As summarised by Palmer (2019), this evolutionary model suggests that loneliness can have differing functions depending on duration. Short-term loneliness may be helpful, acting as an indicator for individuals to strengthen their existing bonds and incentivising them to return to their social group to

relieve their feeling of loneliness. However, long-term loneliness, where attempts to strengthen social bonds have been thwarted, has been shown to be significantly associated with later depression, anxiety (Domenech-Abella *et al.*, 2019) and poor physical health (Christiansen *et al.*, 2020; Cole, 2009). Furthermore, a systematic review exploring loneliness cross-sectionally, found a significant association between loneliness and suicidal ideation and suicide attempt (Calati *et al.*, 2019).

### 1.7.2 Social support

The definition of social support has evolved in recent decades to include both actual, and perceived social support. Although similarities between loneliness and lack of social support have been identified, they should not be mistaken for one-another. According to Berrera (1986), social support is ‘the actual occurrence of a socially supportive exchange’, for example someone helping to solve someone else’s problem. As such, social support can help one to adjust to stressful circumstances (Rook, 1985). In contrast, loneliness is more emotionally oriented and focuses on the need to have and maintain social ties to prevent emotional distress (see section 1.7.1).

Social support can be instrumental in preventing suicide through someone actively intervening in suicidal acts during a crisis, providing distractions from one’s negative affective state or easing daily hassles (Cross *et al.*, 2018). Indeed, this is reflected in safety planning interventions to prevent suicide, where social supports, in addition to professional interventions, are cited as effective instruments in reducing the likelihood of imminent self- injury (Stanley *et al.*, 2018). Overall, findings show that the presence of social supports is inversely associated with self-injurious thoughts and behaviours (Calati *et al.*, 2019; Kleiman & Liu, 2013).

How the role of social support interacts with other interpersonal factors, such as loneliness and socially prescribed perfectionism, in relation to self- injury remains less clear. For example, there is evidence to suggest that social support may not be as influential as loneliness when exploring their independent associations with self- injury (Shaw *et al.*, 2021). Whether this difference remains when controlling for perfectionism and other significant factors related to suicide, requires further investigation.

### 1.7.3 Socially Prescribed Perfectionism

Perfectionism, as with all personality traits, are shaped by childhood experiences (Frost *et al.*, 1990). Unlike other styles of perfectionism, socially prescribed perfectionism (SPP) manifests as high achievement and hyper-vigilance of negativity from others. Frost *et al.* (1993) proposes that SPP is the result of experiences of parental expectations, parental criticism and concern over mistakes in childhood. As outlined by the Social Disconnection Model (Hewitt *et al.*, 2006), individuals with strong SPP traits have heightened vulnerability to mental illness and suicide. This is because, unlike those with low SPP traits, they are less likely to turn to others for support (else, lose their outward appearance of perfection) and are more likely to interpret social interactions as negative. Therefore, those with high SPP traits are particularly more likely to experience depression than those with other forms of perfectionism (Frost *et al.*, 1993).

Molnar *et al.* (2011) found that high levels of stress and low levels of perceived social support, each separately fully mediated the cross-sectional association between SPP and physical fitness. This not only illustrates the important role stress plays in the association between mental and physical health, but also that one's perceptions of their interpersonal relationships can directly affect their physical wellbeing. Indeed, meta-analysis of 45 cross-sectional studies found that compared to other forms of perfectionism, SPP was most associated with risk of suicide (Smith *et al.*, 2017). Specifically, SPP was significantly associated with self-injurious thoughts and suicide attempt.

## 1.8 Models of suicide

Research has acknowledged the role of psychological factors in the development of self-injurious behaviour. Most modern theories of self-injurious behaviour stem from a common understanding; suicide is a means of escape (Gunn II, 2014, p 9). This understanding of escape as a key driver for suicide was encapsulated by Baumeister (1990). Baumeister (1990) posited that suicide was the result of one's "escape from aversive self-awareness", that is, one's failures or inadequacies and the consequential psychological pain that these experiences invoke. Since then, several, psychological leading theories have emerged, with most but not all, focusing on escape. These theories include Shneidman's (1993) Theory of Psychache, Williams' (2001) Cry of Pain model, the Interpersonal Theory of Suicide (Joiner *et al.*, 2005; Van Orden *et al.*, 2010) and the



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

Although all four of these models acknowledge the influence of psychological and interpersonal factors on the development self-injury to some extent, the differences between these models afford differences in perspective and explanation of their manifestation (e.g., psychological perspective versus biopsychosocial perspective). Consideration of each model is advantageous in understanding how some risk and protective factors of self-injury may interact in the occurrence of suicide. Therefore, the current section briefly summarises Shneidman's (1993) Theory of Psychache, Arrested Flight (Dixon *et al.*, 1989), Williams (2001)'s Cry of Pain model and the Interpersonal Theory of Suicide (van Orden *et al.*, 2010; Joiner, 2005). Finally, the subsequent section (section 1.9) will concentrate exclusively on the Integrated Motivational-Volitional Model (IMV model; O'Connor, 2011; O'Connor & Kirtley, 2018) as this shall be used as the overarching framework for this thesis.

### 1.8.1 Shneidman's Theory of Psychache

Shneidman (1993) was the first to coin the term 'psychache' (p. 51) to define psychological pain, such as personal anguish, defeat and disappointment in the context of suicide risk. This phenomenon has consistently been found to be determining factor for suicide and self-injury (Verrocchio *et al.*, 2016), distinct from, and significantly more predictive than, hopelessness or depression (Patterson & Holden, 2012). Such psychological pain has been found to be rooted in a variety of factors including loneliness, social isolation (Shneidman 1998) and perfectionism (D'Agata & Holden, 2018).

As psychache is subjective in nature, Shneidman's model, therefore, takes an individualistic approach to self-injury; accounting for why suicide may occur in some people but not others. However, the model fails to consider external or pre-dispositional factors which have since been shown to be influential in the manifestation of self-injury and suicide. For example, research shows that one of the strongest predictors of future self-injury is already having a history of, or exposure to, self-injury (Wetherall *et al.*, 2018). Despite these shortcomings, the acknowledgement of psychache has helped guide the development of more recent models of suicidal behaviour.

## 1.8.2 Arrested flight

Arrested flight can occur as a result of being unable to overcome or adapt to a stressor. Stressors can be anything which the individual perceives as a potential threat (Oken, Chamine & Wakeland, 2015). Such stressors can lead to feelings of being ‘brought down’ or defeated in some way. Within the context of interpersonal factors, this might be the self-awareness of unsatisfactory relationships (i.e., loneliness), or failure to meet the real or perceived expectations of others (i.e., SPP). Broadly speaking, these interpersonal stressors can lead to feelings of social defeat (Gilbert & Allan, 1998).

When escape from extreme or prolonged distress is unattainable, arrested flight (Dixon *et al.*, 1989) can occur. That is, the absence of behaviours to diminish or resolve the problem, of which can ultimately result in death. This stress-entrapment-death transition is best illustrated by animal behaviour research by van Holst (1986). Following a fight between two tree shrews, van Holst observed that the losing or defeated bird either became i) subdominant: adapting their behaviour to be submissive to the victor while continuing their activities, or ii) submissive: becoming overwhelmed by the stress of the defeat and almost entirely demobilised. Tree shrews which became submissive commonly died within days of the altercation. In this example, despite surviving the potentially lethal interaction with another mammal, it was the psychological implications of this incident which ultimately led to their death. Therein, entrapment may be potentially more lethal than the stressor itself (Gilbert & Allan, 1998; O’Connor, 2003). The same may be observed in humans, such as the failure to create or maintain existing relationships, resigning the individual to believe they will always be lonely or lacking social acceptance.

## 1.8.3 Cry of Pain Model of Suicide

Williams’ (2001) Cry of Pain (CoP) model builds on Baumeister’s Escape Theory for Suicide (see section 1.8 paragraph one) in two crucial ways. First, Williams includes defeat as a precursor of entrapment in the development of self-injurious behaviour. Using the example of the tree shrews in section 1.8.2, social defeat would have been experienced immediately following the fight, which developed into entrapment as the ‘loser’ struggled to adjust to their fall in social standing. The second difference is that Williams argues that not only is there motivation to escape painful experiences, whether from the world or the self, but there is also a motivation to achieve positive experiences through closeness and

attachment with others (Williams, 2014). This latter difference illustrates that there is an innate need to have, and maintain, relationships and to avoid interpersonal conflict. The model argues that ‘rescue factors’ (e.g., social supports) can be protective following activation of a stress-response, thereby reducing the likelihood of self-injury occurring in response to entrapment.

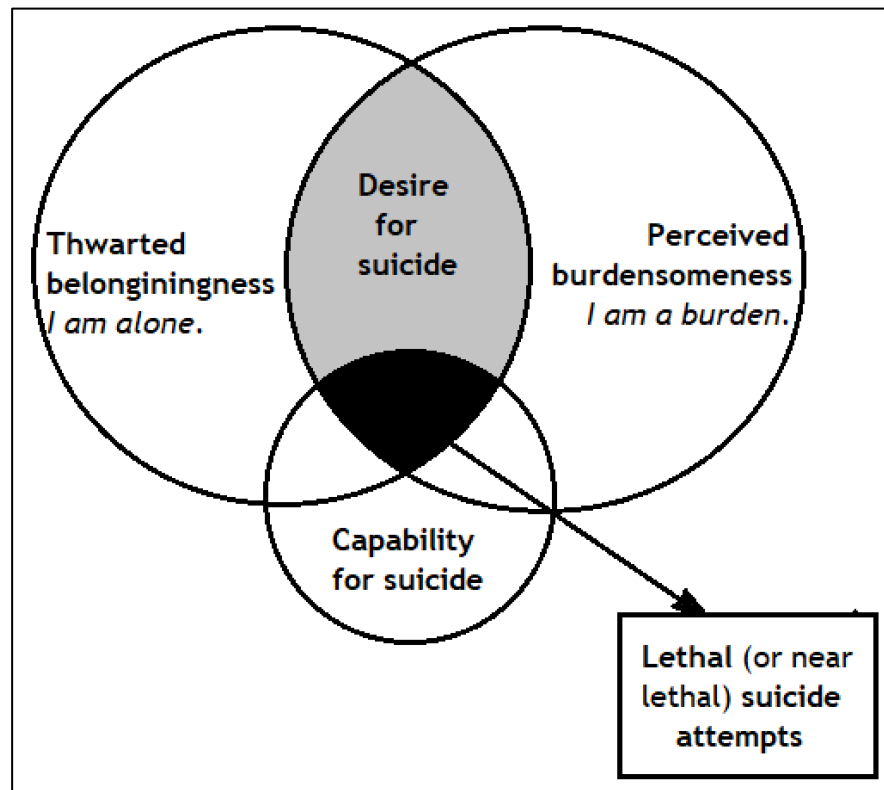
Furthermore, the CoP model argues that those who would be expected to rescue the individual are often the instigators of the stress. For example, parents expecting their offspring to be high achieving at school, which adds to the child’s sense of academic stress, rather than relieving it. Consequently, if attempts to escape this psychache prove futile, and rescue factors prove insufficient, entrapment can manifest as self-injurious behaviours as an outlet for psychological pain (Clark *et al.*, 2016).

This model of suicide has several advantages, most notably of all, it considers biological and social factors as triggers of stress, thereby overcoming some of the limitations of Shneidman’s model. However, as the model is founded on animal behaviour research, it fails to account of human (such as personality traits) and contextual (e.g., access to means) factors in relation to stress response and self-injury.

#### 1.8.4 Interpersonal Theory of Suicide

The Interpersonal Theory of Suicide (IPT; Joiner, 2005; van Orden *et al.*, 2010) offers a psychosocial explanation for self-injury; focusing on the ‘unmet need to belong’. As illustrated in figure 1.1, the IPT argues that self-injurious thoughts arise through the presence of both thwarted belongingness (emerging from feelings of loneliness and lack of reciprocal relationships) and perceived burdensomeness (including self-hate and belief of expendability) leading to the desire to die (self-injurious thoughts). In doing so, the IPT acknowledges the role of numerous interpersonal constructs addressed in this chapter (social support, section 1.7.2; socially prescribed perfectionism, section 1.7.3), and notably, is the only model of suicide to expressly include loneliness as a key risk factor. Furthermore, the IPT was first model to introduce an ideation-to-enaction framework; distinguishing between factors associated with the emergence of self-injurious thoughts from factors associated with self-injurious behaviour. The IPT does this by including the ‘capability for suicide’ paradigm (Christensen *et al.*, 2013). Although this model includes all interpersonal factors explored in the current thesis, it overlooks some key drivers of suicide (defeat, entrapment) which were included in the CoP model. Furthermore, much

Figure 1.1. Interpersonal Theory of Suicide (taken from Van Orden *et al.*, 2010)

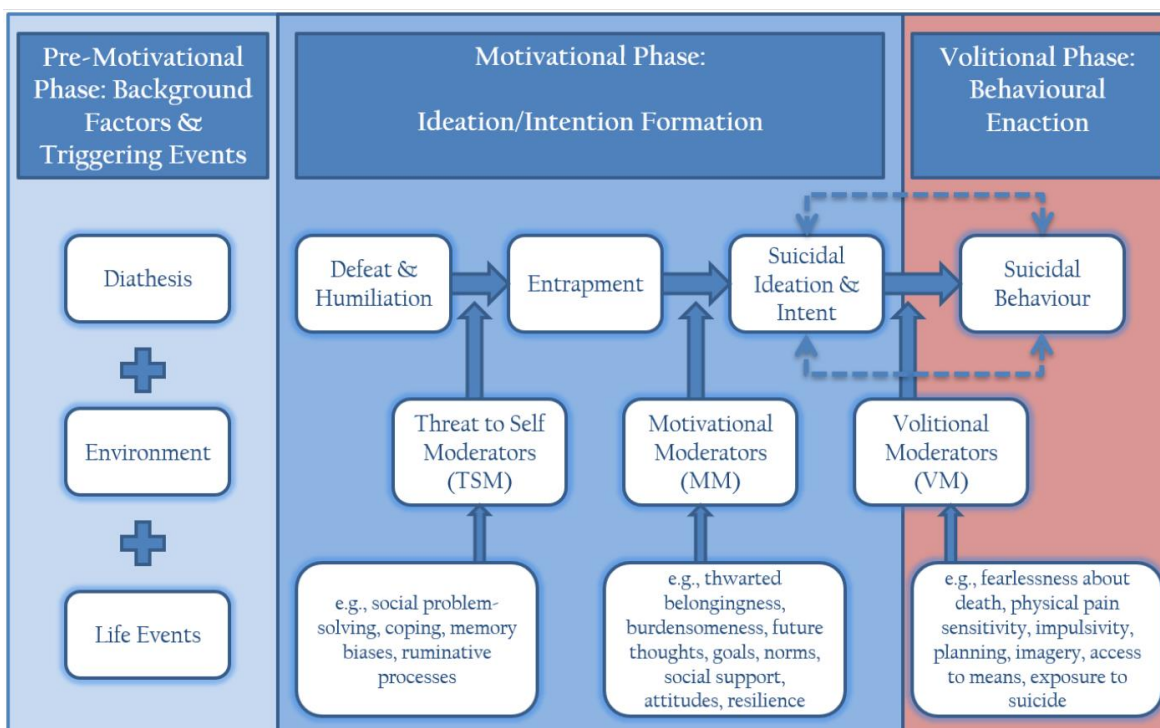


like the CoP model, the IPT fails to address wider interpersonal factors such as cultural norms.

## 1.9 Integrated Motivational-Volitional Model

The Integrated Motivational-Volitional (IMV) model (O'Connor, 2011; O'Connor & Kirtley, 2018) was an amalgamation of the extant knowledge at the time of development and includes elements derived from the IPT and CoP to form a theoretical framework for predicting self-injurious thoughts and behaviour (figure 1.2). The model also draws upon further theoretical constructs by including a stress-diathesis framework for the initiation of defeat, as well as incorporating the Theory of Planned Behaviour (TPB; Ajzen, 1991) to distinguish self-injurious thoughts from self-injurious behaviour. The resultant IMV model takes a biopsychosocial approach which acknowledges the multi-faceted nature of the development of self-injurious thoughts and behaviour, by including experiences and exposures from across the life-course. These factors are grouped into phases to form a tripartite structure, each of which are summarised below.

Figure 1.2. The Integrated Motivational-Volitional Model (O'Connor, 2011; O'Connor & Kirtley, 2018)



### 1.9.1 Pre-motivational Phase

The pre-motivational phase of the IMV model outlines factors which may convey a predisposition for self-injurious thoughts and behaviour by heightening one's sensitivity to stress (O'Connor & Kirtley, 2018). These factors can develop before birth, have an organic (e.g., genetic) origin, or can occur later in life through environmental or psychological experiences or exposures (O'Connor & Kirtley, 2018). An example of an interpersonal factor within the pre-motivational phase is socially prescribed perfectionism (SPP).

The manifestation of SPP is described earlier in section 1.7.3. Due to SPP being characterised by an innate need to attain unrealistically high standards that one believes others hold for them, this can lead the individual to experience higher levels of daily stress when compared to those with low SPP traits. In two longitudinal studies, Childs and Stoeber (2012) found that SPP was positively associated with later stress, burnout, workplace inefficiency, and cynicism. Although based on small participant samples (n=69 and 195 respectively), these findings, demonstrate that personality traits are associated with risk to stress, and therein, greater risk of experiencing defeat and suicide.

Furthermore, as SPP develops in childhood, the findings of a meta-analysis by Limburg *et*

*al.* (2016) demonstrate how early life experiences, such as parental attitude, can have a reverberating effect across the life-course. Early life experiences can influence stress sensitivity in adulthood, the ability to cope with daily hassles (Hewitt *et al.*, 2006) and consequentially, a vulnerability to self-injury (O'Connor *et al.*, 2020).

## 1.9.2 Motivational Phase

Similar to the CoP model, the motivational phase comprises three key drivers of suicide: defeat, entrapment and suicidal ideation. However, the transition between these key drivers are neither unidirectional nor inevitable. The presence or absence of risk and/ or protective factors can moderate the transition between these drivers. The nature and role of these moderating factors are described briefly below.

### 1.9.2.1 Threat to self-moderators

Threat to self-moderators temper the transition between defeat and entrapment. These moderators are predominantly cognitive factors, including autobiographical memory biases, social problem solving, rumination and coping styles. For example, the IMV model argues that adaptive coping styles (e.g., problem-solving, planning) are protective in the transition from defeat to entrapment. In contrast, maladaptive coping styles (e.g., avoidant behaviour, substance abuse), though often helpful in the short-term, are ultimately unhelpful in the long-term and can eventually add to stress by making the situation worse, therein leading to entrapment (McMahon *et al.*, 2013).

### 1.9.2.2 Motivational moderators

Much like the function of threat to self-moderators, there are several factors which can buffer or catalyse the transition from entrapment to self-injurious thoughts. Motivational moderators, however, are more affectively and socially aligned (e.g., belongingness, social support and resilience). The presence or absence of these motivational moderators have been shown to differentiate between those who feel entrapment from those who experience self-injurious thoughts (O'Connor & Kirtley, 2018). Within this section, thwarted belongingness, social support and other interpersonal constructs are included as motivational moderators of self-injurious thoughts, thereby reflecting the motivational factors outlined by the IPT.

### 1.9.2.3 Stress Diathesis Model

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

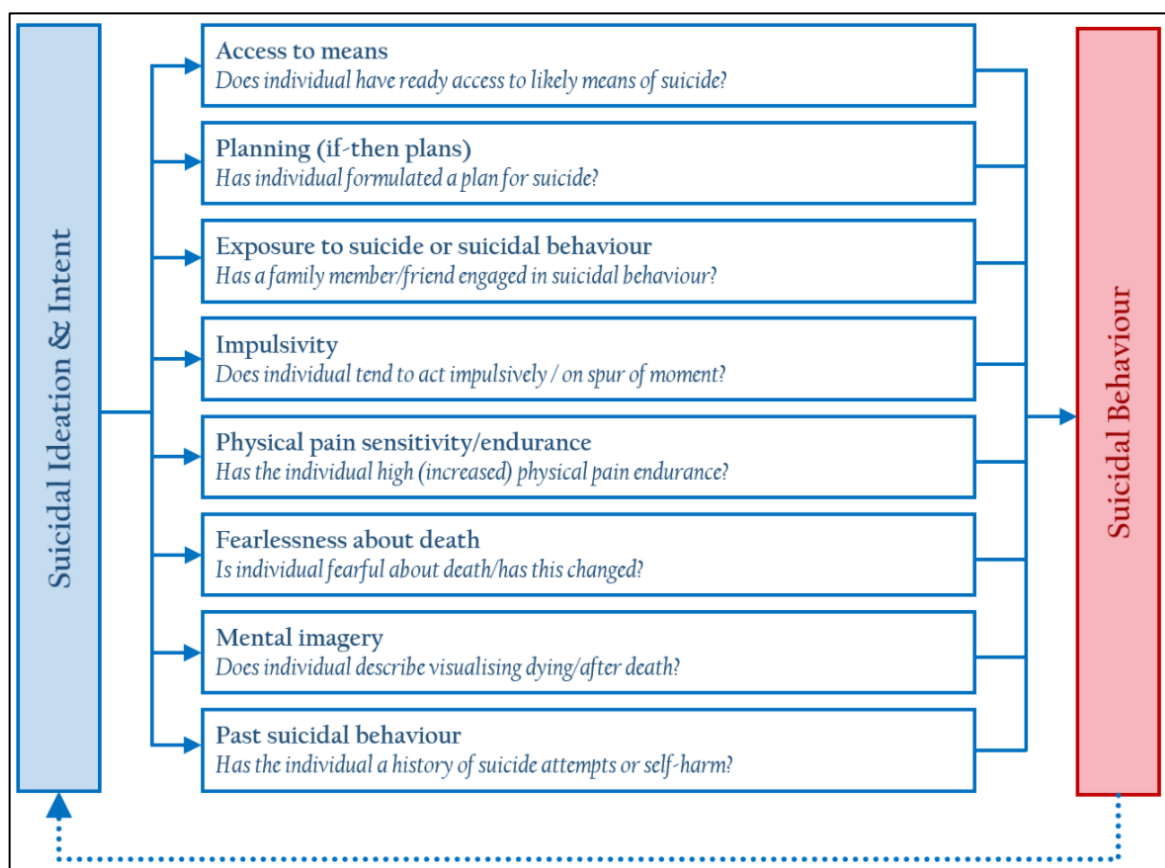
### 1.9.3 Volitional Phase

The final part of the IMV model, the volitional phase, focuses exclusively on the transition to self-injury. Much like Joiner's IPT, the IMV model highlights the ideation-into-action framework (Klonsky & May, 2015). The factors which distinguish self-injurious thoughts from self-injurious behaviour are termed 'volitional factors'. O'Connor and Kirtley (2018) identified eight volitional factors within the context of the IMV model which uniquely differentiate the transition from self-injurious thoughts to self-injurious behaviours (see figure 1.3). A number of these factors align with the Theory of Planned Behaviour, with the most robust predictor of future self-injury being that of similar behaviours in the past (O'Carroll, Metcalfe & Gunnell, 2014). Equally, behavioural intent (i.e., planning) and exposure to suicide or self-injury by others, have also been shown to significantly distinguish between those with a history of self-injurious thoughts, compared to those with a history of self-injurious behaviours (Wetherall *et al.*, 2018).

### 1.9.4 The cyclical nature of suicidal ideation and behaviour

The IMV model acknowledges the cyclical nature between self-injurious thoughts and behaviour. It is argued that those with a history of any self-injurious thoughts or behaviours experience greater distress than those who do not have such histories (O'Connor & Kirtley, 2018). Equally, over time, the cycles between injurious thoughts and behaviours can become more rapid due to the cognitive availability of these thoughts becoming more established through repeated recall (Kirtley, Melson & O'Connor, 2018).

Figure 1.3. Volitional factors of the Integrated Motivational-Volitional Model



Equally, the medical severity of self-inflicted injury can become more extreme through repetition (Shahnaz *et al.*, 2020). Due to the potential for escalation of behaviour over time, it is therefore vital to identify warning signs as early as possible to protect individuals from harm.

## 1.10 Gaps in the current literature

Although interpersonal factors are recognised by several models of suicidal behaviour, there is a comparative dearth of research exploring loneliness and other interpersonal factors within a biopsychosocial life-course model of self-injury. The models discussed here illustrate how interpersonal factors, such as conflict and perfectionism can increase the propensity for suicide, while other interpersonal factors, such as social support, can be protective. However, understanding the way these protective and risk factors may interact with one another in human populations, as well as key drivers for suicide risk, would help to understand the extent, if any, to which they influence one's suicide risk. Furthermore, exploring factors associated with mental health within the context of evidence-based



models of self-injury, can help to understand why suicide risk is much higher in clinical populations when compared to the general population (Bachmann, 2018). In this case, the novel factor of focus is loneliness.

The research presented here has established that the absence of social support is associated with an increased risk of suicide. Given that loneliness is the subjective experience of aloneness, while social support is more objective, the extent to whether loneliness is a risk factor for suicide independently of social support and other interpersonal constructs, has yet to be established. Indeed, given that loneliness is fundamentally a cognitive factor, though heavily socially oriented, establishing where loneliness acts between the defeat-entrapment-suicide model also requires investigation. Such findings would help to guide future theory-driven research to understand the association between interpersonal factors and self-injurious thoughts and behaviours, if any association indeed exists. Furthermore, given the extensive literature on demographics and individual differences, in relation to self-injury, it is also advantageous to identify which populations or individual profiles these associations most pertain to, as well as the nature and weight of these associations.

## **1.11 Current thesis and aims**

The present chapter has highlighted the global scale of suicide, as well as its implications on the community and personal level. The evidence presented here demonstrates that there are specific demographic characteristics and individual differences which can increase one's risk of suicide, however these factors do not fully account for all suicide deaths. This, therein, highlights that factors - in the present case, psychological - may further determine who will and will not go on to engage in self-injurious acts, suicide attempt or die by suicide.

Literature indicates that loneliness, the absence of social supports, and socially prescribed perfectionism, are each associated with negative mental health outcomes. However, the extent to which loneliness might predict self-injurious thoughts and behaviours, and the nature of this association, has yet to be fully established. Several models which attempt to predict self-injury have been summarised here, with some offering some indication as to how various risk and protective factors might interact to influence the likelihood of suicide. Most notably of which is the IMV model, due to its broad and inclusive approach to predisposing and perpetuating factors in the prediction of suicide risk.

Given these observations, this thesis adopted the IMV model as an overarching framework to explore to what extent, if any, loneliness is associated with self-injurious thoughts behaviour, and how this compares to other interpersonal factors. Furthermore, if an association between loneliness and self-injury is identified, an exploration of how loneliness is influenced by other interpersonal (e.g., socially prescribed perfectionism, social support) and established psychological (e.g., defeat, entrapment) factors associated with self-injury, will be conducted. To this end, three overarching research questions are addressed in this thesis, as summarised below.

## **1.12 Research Questions**

The current thesis aims to address the following research questions:

1. With a particular focus on loneliness, which interpersonal factors are associated with risk of self-injurious thoughts and behaviours?
2. Which interpersonal factors differentiate between those who have a history of self-injurious behaviours, history of self-injurious thoughts only, and no history of self-injurious thoughts or behaviours?
3. What does an in-depth exploration reveal about the role of loneliness in relation to self-injurious thoughts or behaviours?

## **1.13 Thesis structure**

Chapter two addresses all three research questions by describing a systematic review and meta-analysis of existing literature exploring all measures of loneliness as a predictor of later self-injurious thoughts and behaviour. Within this chapter, demographic characteristics, individual differences and other variables which may be associated with loneliness as a predictor of self-injurious thoughts and/ or behaviour are also explored. Therein, Chapter two addresses research questions one and three. Chapter three summarises an online cross-sectional survey which investigated how interpersonal factors are associated with other known risk factors of self-injurious thoughts and behaviours in the context of the IMV model. Chapter three therefore addresses research questions one and two. Chapter four focuses on research questions one and three by documenting the methods and findings of a qualitative study investigating the possible presence and consequential role of interpersonal factors prior to suicide attempts. Chapter five uses a

similar design to Chapter three and builds on the findings of Chapters two, three and four by including a selection of more nuanced interpersonal considerations in the association of self-injury histories. In doing so, all three research questions are addressed in Chapter five. Chapter six synthesises the general findings of the research conducted here and critically discusses these findings in relation to the research questions above. This final chapter concludes by addressing the limitations of the research and findings, as well as posing possible avenues of future work in the field of interpersonal factors and suicide research.

# Chapter 2: Loneliness as a predictor of suicidal ideation and behaviour: a systematic review and meta-analysis of prospective studies

## 2.1 Abstract

*Background:* Suicide and suicidal behaviour are global health concerns with complex aetiologies. Given the recent research and policy focus on loneliness, this systematic review aimed to determine the extent to which loneliness predicts suicidal ideation thoughts and/or behaviour (SIB) over time.

*Methods:* A keyword search of five major databases (CINHAL, Medline, PsychArticles, PsychInfo and Web of Knowledge) was conducted on 18<sup>th</sup> of December 2019 and updated on the 30<sup>th</sup> of January 2022. Papers for inclusion were limited to those using a prospective longitudinal design, written in English and which measured loneliness at baseline and SIB at a later time-point.

*Results:* After duplicates were removed, 1,395 original potential papers were identified, with 38 studies (1,094,462 participants) meeting the narrative review criteria and a subset of 31 studies included in the meta-analysis. The meta-analysis revealed loneliness was a significant predictor of both suicidal ideation and behaviour and there was evidence that depression acted as a mediator. Furthermore, studies which consisted of predominantly female participants were more likely to report a significant relationship between loneliness and later SIB, as were studies where participants were aged 13-22 or  $\geq 54$  years at baseline or based in Europe.

*Limitations:* There was considerable variability in measures, samples and methodologies used across the studies and only one study explored suicide death. Less than half (n= 17) of the 38 studies stated their participant sample was representative of the target population. Middle-aged adults were under-represented, as were individuals from ethnic minority backgrounds. All studies were conducted in countries where self-reliance and independence (i.e., individualism) are the cultural norm.

*Conclusions:* Loneliness predicts later SIB in select populations. However, due to the heterogeneity of the studies, further research is needed to draw more robust conclusions. A focus on more collectivist countries is also required.

## 2.2. Introduction

Suicide death is the fourth leading cause of death in 15–19-year-olds, with prevalence increasing with age (World Health Organization, 2021b). Indeed, in some countries one in nine young adults have reported making a suicide attempt (Wetherall *et al.*, 2018) indicating significant jeopardy to loss of life-years. Progress in predicting suicidal behaviour has not improved markedly in the last 50 years (Franklin *et al.*, 2017) and therefore identifying more specific risk factors for suicidal behaviour remains an urgent research priority.

There are many theories which offer explanations for suicidal behaviour. One such approach is the Integrated Motivational-Volitional Model of suicidal behaviour (IMV; O'Connor, 2011; O'Connor & Kirtley, 2018), which allows for the exploration of biological, psychological and social factors contributing to self-injurious acts. Relative to psychiatric illness, psychological factors are comparatively under-researched. In this review we focused on the psychological factor of loneliness in relation to self-injurious behaviour.

Loneliness is defined as ‘when a person’s network of social relations is deficient in some important way, either quantitatively or qualitatively’ (Perlman & Peplau, 1981, p. 31). The distinction between social isolation and loneliness is important to highlight. Social isolation is outwardly visible to an onlooker; inferred by the lack of social proximity and engagement with others, though the individual themselves may not feel alone. By contrast, loneliness is a subjective psychological state identified through introspection and thereby incorporates those who may feel lonely within a crowd (Bondevik & Skogstad, 1998).

Loneliness has gained increasing attention from national governments and public health organisations (Department for Digital, Culture, Media and Sport, 2018; Loneliness Taskforce, 2018), with the recognition that worldwide, approximately 11-17% of the general population experience loneliness at some time in their lives (Beutel *et al.*, 2017; British Red Cross, 2016; Victor & Yang, 2012). Loneliness has consistently been found to be associated with both suicidal ideation and behaviour in research studies (Hedley *et al.*,

2018; Stickley & Koyanagi, 2016; Stravynski & Boyer, 2001; Teo *et al.*, 2018) as well as in more general systematic reviews (Calati *et al.*, 2019; Mushtaq *et al.*, 2014).

Furthermore, some studies suggest that loneliness is more closely related to suicide risk than perceived social support (Chang *et al.*, 2017).

Cross-sectional research indicates that the prevalence of loneliness is age dependent (Batigun, 2005); being most common in those <30 and >80 years of age (Yang & Victor, 2011); peaking in adolescence and old age (Qualter *et al.*, 2015). These age ranges coincide with increased prevalence of suicidal behaviour (though not suicide death) in younger and older adults compared to other age groups (Nock & Prinstein, 2005; Turecki & Brent, 2016). This, therefore, suggests that demographic factors may influence the detection of loneliness predicting later suicidal ideation and/ or behaviour (SIB). However, the nature of the relationship between gender, loneliness and SIB is less clear.

Men are three times more likely to die by suicide than women (Office for National Statistics, 2019; World Health Organization, 2019), whereas women are more likely to experience suicidal ideation or engage in self-harm (O'Connor *et al.*, 2018). Gender differences in loneliness have been less consistent. Some studies have found loneliness to be more prevalent in men while others have reported the reverse (De Jong Gierveld & Van Tilburg, 2010; Stokes & Levin, 1986), with a recent meta-analysis finding no gender differences in loneliness overall (Maes *et al.*, 2019). Collectively, the evidence points to no gender difference in the association between loneliness and SIB cross-sectionally (Beutel *et al.*, 2017). These findings therefore suggest that if loneliness is associated with later SIB, age may be the only demographic factor to moderate this association. However, as levels of loneliness may differ between cultures (Barreto *et al.*, 2021), we also aimed to investigate whether the latter relationship is affected by geographical location.

To date, prospective studies investigating the relationship between loneliness and SIB are scarce; reviews have typically focused on loneliness as a risk factor for mental health difficulties (e.g., affective disorder), specifically excluding SIB as outcome measures (Holt-Lunstad *et al.*, 2015). These prospective reviews have found loneliness to be a stronger predictor of later depression, when compared to anxiety or substance abuse as outcome variables (Beutel *et al.*, 2017; Van Orden *et al.*, 2010; Vanhalst *et al.*, 2012; Wang *et al.*, 2018). Furthermore, as loneliness has been found to have a reciprocal relationship with depression (Cacioppo *et al.*, 2006a; Qualter, 2010), and depression is associated with SIB (Hawton *et al.*, 2013), it could be argued that depression may mediate

a prospective loneliness-SIB relationship. However, to date, no review has systematically explored the role of depression in the loneliness–SIB relationship over time, and therefore we investigated its mediating role in the present study.

To robustly explore whether loneliness is a prospective risk factor of SIB, a broad definition of suicidal behaviour was used to include self-harm, with the latter defined by the National Institute for Health and Care Excellence Guidelines (NICE, 2011) as “self-injury or self-poisoning irrespective of the apparent purpose of the act”. As a result, we included any studies of non-suicidal self-injury (NSSI), suicide attempt and suicide. In addition to acts of suicidal behaviour, given that approximately 12% of all individuals experience suicidal ideation, self-injurious thoughts or NSSI will attempt suicide within 5 years (Mars *et al.*, 2019), we also investigated the relationship between loneliness and suicidal ideation or thoughts of self-harm, referred to throughout this chapter as suicidal ideation.

### 2.2.1 Current aims

This review had the following three aims:

- i. to explore whether loneliness is a significant predictor of later SIB;
- ii. to identify if the loneliness-SIB relationship varies as a function of socio-demographics (specifically age and gender) and/ or geographic location;
- iii. to determine whether the loneliness-SIB relationship is mediated by depression.

## 2.3 Methods

### 2.3.1 Research Strategy

Five major psychological and medical databases (CINHAL, MedLine, PsychArticles, PsychInfo and Web of Knowledge) were searched up to 18<sup>th</sup> of December 2019 with the findings published the following year (McClelland *et al.*, 2020). This search was then updated on 30<sup>th</sup> January 2022 for the purposes of this thesis. Both searches used the following search terms; (i) lonel\* OR “perceived social isolation” OR “perceived social exclusion” AND (ii) suicid\* OR “self-injurious” or “self-injury” OR “self injurious” OR “self injury” OR “self-harm” OR “self harm”. Data extraction had finished before being registered with Prospero and therefore could not be listed on the website. PRISMA

Guidelines (Moher *et al.*, 2015) were followed where titles and abstracts were screened by the first author. An inter-rater check of 95% accuracy of 40 papers was conducted by a researcher external to the research team to ensure appropriate selection/exclusion of studies.

### 2.3.2 Inclusion and exclusion criteria

The inclusion criteria required studies to be (i) an empirical paper, (ii) written in English, (iii) reporting a prospective design (i.e., where loneliness was measured as a predictor of later SIB at a future time point) and (iv) loneliness and SIB assessments were both measured directly. Studies reporting any form of suicidal ideation (including passive thoughts of suicide and self-harm) and all forms of suicidal behaviours (including suicide death, non-suicidal self-harm and suicide attempt) were included. Papers were excluded if i) they were a review paper, ii) they explored assisted suicide, or iii) loneliness was inferred by using an indirect measure (e.g., marital status). Any uncertainty regarding the inclusion or exclusion criteria was discussed between the study authors until an agreement was reached.

### 2.3.3 Data Extraction

Study sample demographics, key measures, findings, analyses, confounding variables and study author interpretations were extracted by the first author and collated on a data extraction sheet. 26.3% (n=10) of included papers were checked by an external researcher (a psychology graduate) for inter-rater reliability with 100% concordance after discussion.

### 2.3.4 Quality assessment

A quality assessment tool (see table 2.1) was designed specifically for this review based on the Quality Assessment Tool for Systematic Observational studies (QATSO; Wong *et al.*, 2008). Quality assessments were based on the aims of this review. Therefore, any extensive analysis of measures used for other variables was not considered when evaluating each study against the quality assessment criteria. Quality assessments were completed by the first author and 20% of the papers were checked by another researcher external to the team for inter-rater reliability. Disagreements between the researchers were



Table 2.1. Quality assessment tool

<b>Score</b>	<b>Design</b>	<b>Confounding variables</b>	<b>Participant retention</b>	<b>Validity of predictor measure</b>	<b>Validity of outcome measure</b>	<b>Included in meta-analysis</b>
0	Opportunity sampling	No attempt to control confounding variables during recruitment or analysis	Significant attrition/ loss of target population; Attrition not reported	Single-item assessment with no valid or reliable backing	Unclear assessment of suicidal ideation or behaviour; Measure is invalid or unreliable; Mixed assessment of SIB.	No
1	Representative samples	Some attempt to control for confounding variables (e.g., demographics)	Good participant retention $\geq 60\%$	1 or 2 items taken from a standardised measure of a wider psychological assessment	1 or 2 items taken from a standardised measure of a wider psychological assessment to assess either suicidal ideation or suicidal behaviour.	Yes

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2	Accounts for additional confounding variables e.g., suicidal history, depression, other psychological variables	Full measure or subscale targeted to explore loneliness	Full measure or subscale targeted to assess suicidal ideation or suicidal behaviour; Hospital records, death certificate or coroner's report
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resolved via discussion with 100% post-discussion concordance. Quality assessment scores were calculated with higher totals reflecting higher quality studies (max score= 9).

### 2.3.5 Statistical analyses

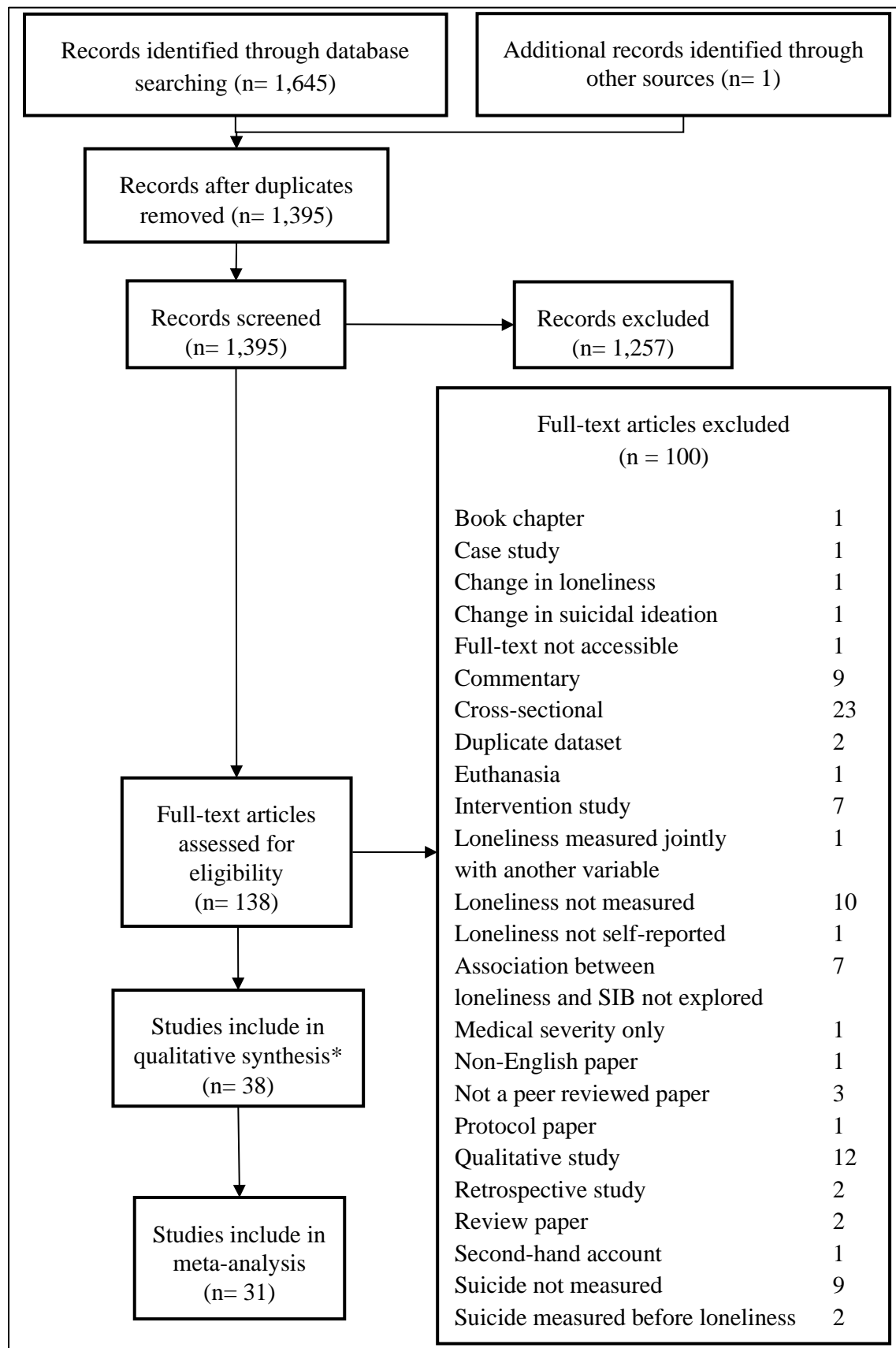
To identify the effect of loneliness independent of confounding variables, adjusted effect sizes, if available, were included in the meta-analysis. Comprehensive Meta-Analysis (version 3, Borenstein *et al.*, 2013) was used to conduct all meta-analyses, weighted by sample size. Moderation analysis was used to explore whether findings varied as a function of gender, age and quality assessment score. In each moderation analysis, averages were calculated for studies where multiple effect sizes were reported (e.g., across multiple timepoints or suicidal ideation and behaviour). In all cases where gender ratio was reported, this was done using a binary scale (male/ female). Subgroup analyses of gender were dichotomised based on gender prevalence within the sample (i.e., sample demographics were  $\geq 50\%$  female vs  $< 50\%$  female) as well as investigated continuously (i.e., % female in the sample). Moderation analysis of age was based on all studies where the mean age of the participant sample was reported and this was treated as a continuous variable. Analysis of depression as a mediator between loneliness and SIB was conducted using calculated r-values either provided by the paper authors or calculated by authors of this review (Ferguson & Bibby, 2012).

## 2.4. Results

As illustrated in Figure 2.1, a total of 1,395 original papers were initially identified by for potential inclusion in the systematic review. This included one paper which was identified following a search of references of studies which had already been included in the review. 37 papers met the eligibility criteria of this review, however Kleiman *et al.* (2017) published two studies within the same paper, resulting in 38 studies being investigated here.

Of the 38 included studies, five studies measured loneliness and/ or SIB at multiple timepoints, three studies investigated both ideation and behaviour at follow-up, one study measured both passive and active suicidal ideation, one study reported only some of the outcome measures they assessed (Bennardi *et al.*, 2019), one paper which investigated the association between loneliness and SIB in two different populations

Figure 2.1. Procedure for identifying applicable studies (screening and determining the eligibility for the current review)



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**Panel 1: Search Strategy**

\* 38 studies were identified from 37 papers. The databases searched in this review were Web of knowledge, Medline, CINAHL, PsychINFO and PsychArticles with EbscoHost being used to search the last 4 databases mentioned. The search terms were (i) lonel\* OR “perceived social isolation” OR “perceived social exclusion”, AND (ii) 52ssocia\* OR “self-injurious” OR “self injurious” OR “self-harm” OR “self harm”. Terms were truncated to allow for various terminologies used within the papers. These terms were used in all article searches in Web of Knowledge and in the abstracts and full articles of academic journals and journals of the remaining 4 databases. For Medline, PsychInfo, PsychArticles and CINHALL only, the search results were further limited by removing articles classified as a literature review, systematic review, brain imaging, mathematical model, meta-analysis, books and/or scientific simulation. This resulted in a total of 1,395 studies which were screened visually by the first author, followed by an inter-rater check of 20% of the papers by a research colleague with 100% concordance

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(Wang, Wang & Liu, 2021) and a final paper that, despite being an editorial (Pietrzak *et al.*, 2017), was included in the review as it was consistent with the inclusion and exclusion criteria. See Appendix 1 for additional information regarding these studies and how they are referred to within this review.

In all, 38 studies from 37 papers are discussed in this systematic review. An aggregated effect size was calculated for each study which explored loneliness and SIB across multiple timepoints (n= 5) or different forms of suicidal ideation at follow-up (Scheer *et al.*, 2021; see Appendix 1). This resulted in 45 effect sizes explored in this review based on data from 1,094,462 participants. Summaries of each study’s sample demographics, measures used, findings and quality assessment score are displayed in Table 2.2. Where relevant data were not available in the papers, study authors were contacted for additional information for inclusion in the meta-analysis (n=19), of which 16 replied, and 14 were able to assist with our request. In total, 33 studies (34 effect sizes) were included in the meta-analysis (see Appendix 2 for details of excluded studies). Effect sizes used were either reported by study authors or calculated by the authors of this review from information available in the paper. In order to effectively synthesise the findings from the papers included in this review, factors that influence the loneliness–SIB relationship were

**Table 2.2.** Summary of studies included in review including sample demographics and characteristics, study methods, measures used and results

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Anotonelli- Salgado <i>et al.</i> (2021).  Brazil, QA: 6; MA: Yes	N= 1674; 86.5% female, 18+ years old; 48.4% White; general population	2 months	ULCA-LS-3 (Hughes <i>et al.</i> , 2004)	<u>Ideation</u> : Single item: ‘Over the past month, have you had any desire or thoughts about killing yourself?’  <u>Behaviour</u> : None	PHQ-9 (Santos <i>et al.</i> , 2013)	<u>Unadjusted</u> : Baseline loneliness scores significantly differed between participant groups who reported no, remitted incidents or persistent suicidal ideation (p<0.001).  <u>Adjusted</u> : After adjustment for all covariates, loneliness was directly associated with the incidence of suicidal ideation between baseline and follow-up

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
						(OR= 2.12; 95%CI = 1.06-4.24; p=0.033).
Ayalon and Shiovitz-Ezra (2011).  Europe, QA score: 6 MA: Yes	Group 1: N= 6,294 (age 50-65 years)  Group 2: N= 2,891 (aged 66-75 years)  Group 3: N= 1,503 (aged >75 years)	2-3 years	Single-item: CES-D; (Radloff, 1977)	<u>Ideation</u> : Euro-D; 1 item (Prince <i>et al.</i> , 1999)  <u>Behaviour</u> : None	Euro-D (Prince <i>et al.</i> , 1999)	<u>Unadjusted</u> : Loneliness was a significant predictor of passive death wishes in all three age groups (p<0.001).  <u>Adjusted</u> : Loneliness was a significant predictor of passive death wishes in Groups 1 and 2 only (p<0.001). Loneliness was no longer a significant predictor

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
	54.4% female; ethnicity: NA; general population					of later passive death wishes in Group 3.
Ayuso- Mateos <i>et al.</i> (2021), Spain, QA: 7 MA: Yes	N= 1103; 66.6% female; 18+ years old; ethnicity: NA; general population	9 months	UCLA-LS-3 (Hughes <i>et al.</i> , 2004)	<u>Ideation</u> : Single item (not validated): “Have you experienced suicidal thoughts in the previous 30 days?”  <u>Behaviour</u> : None	CIDI (adapted) Kessler & Ustün (2004)	<u>Unadjusted</u> : Significant association identified.  <u>Adjusted</u> : Not reported
Batterham <i>et al.</i> (2022)	N= 1296; 50.1% female; 18+ years old;	12 weeks (8 timepoints,	De Jong Gierveld	<u>Ideation</u> : PHQ-9 item 9 (Santos <i>et al.</i> , 2013)	None	<u>Unadjusted</u> : One unit increases in loneliness was significantly



Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Australia QA score: 5 MA: Yes	ethnicity: NA; general population	aggregated effect size calculated)	Loneliness Scale	<u>Behaviour</u> : None		associated with a 16% increase in suicidal ideation risk.  <u>Adjusted</u> : Not reported.
Bennardi <i>et al.</i> (2019) Spain, QA: 8 MA: Yes	Group 1: N=1,206 (53.9% female; 18-59 years)  Group 2: N= 1,186; 54.5% female, 60+ years old; ethnicity: NA; general population	3.5 ( $\pm 0.18$ ) years	UCLA-LS-4 (Russell, Peplau and Cutrona, 1980; Spanish translation)	<u>Ideation</u> : WHO CIDI- suicide module (Kessler and Üstün, 2004)  <u>Behaviour</u> : None <sup>††</sup>	WHO CIDI – WMH survey version (Kessler and Üstün, 2004)	<u>Unadjusted</u> : Not reported.  <u>Adjusted</u> : Suicidal ideation remained significantly predictive of suicidal ideation at follow-up in Group 2 only (p = 0.009).

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Bonner & Rich (1988)  USA QA: 5 MA: Yes	N= 186; 54.3% female; age: NA; ethnicity: NA; general population	6 weeks	UCLA-LS-R (Russell, Peplau & Cutrona, 1980)	<u>Ideation</u> : SSI (Beck, Kovacs & Weissman, 1979)  <u>Behaviour</u> : None	Self-Rating Depression Scale (Zung, 1963)	<u>Unadjusted</u> : Loneliness significantly predicted suicidal ideation at follow-up (p<0.05).  <u>Adjusted</u> : Not reported
Chen <i>et al.</i> (2020)  USA QA: 9 MA: Yes	N= 262; 17.6% female; age: NA; 75.6% White; Military veterans	12 months	NIH Toolbox Adult Social Relationship Scales (Cyranowski <i>et al.</i> , 2013)	<u>Ideation</u> : Single item: PHQ-9, item 9 (Santos <i>et al.</i> , 2013)  <u>Behaviour</u> : None	PHQ-9 (Santos <i>et al.</i> , 2013)	<u>Unadjusted</u> : Loneliness was significantly associated with suicidal ideation.  <u>Adjusted</u> : For each additional point in loneliness score at

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
						baseline, there was an average 0.21-point decrease in SI score.
Fulginiti <i>et al.</i> (2018) USA QA: 7 MA: Yes	N= 995; 59.9% female; age: 11-18 years; 27.6% Hispanic, 19.5% Black; general population	1.5 years	LSDQ (Asher <i>et al.</i> 1984)	<u>Ideation</u> : CDI (1 item) <u>Behaviour</u> : None	CDI	<u>Unadjusted</u> : loneliness did not significantly predict suicidal ideation at follow-up  <u>Adjusted</u> : None
Gallagher <i>et al.</i> (2014)	N= 144; 72% female, age: 13.52 ± 0.74; 75% White; Psychiatric inpatients (admitted to	9 months & 18 months (aggregated	LSDQ (Asher <i>et al.</i> 1984)	<u>Ideation</u> : SIQ (Reynolds, 1985)  <u>Behaviour</u> : None	DISC-IV (Shaffer <i>et al.</i> 2000)	<u>Unadjusted</u> : Loneliness significantly predicted suicidal ideation 9 months later (p<0.05) but not 18 <sup>th</sup> months later.

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
USA QA: 8 MA: Yes	hospital following self-harm)	effect size calculated)				<u>Adjusted:</u> None
Groholt <i>et al.</i> (2006) Norway QA: 4 MA: Yes	N= 92; 90% female; aged 16.9 ± 1.8 years; ethnicity: NA; clinical population (admitted to hospital for self-harm)	9 years	UCLA- LS-5 (Russell, Peplau & Cutrona, 1980)	<u>Ideation:</u> None  <u>Behaviour:</u> Self-report suicide attempt	BDI	<u>Unadjusted:</u> loneliness did not significantly predict suicide attempt at follow-up.  <u>Adjusted:</u> None

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Hom <i>et al.</i> (2019)  USA QA: 6 MA: Yes	N =226; 89% female; aged 19.42 years; 74% White; general population	1 month & 2 months  (Aggregated effect size calculated)	UCLA-LS-R (Russell, Peplau & Cutrona, 1980)	<u>Ideation</u> : DSI-suicide subscale (Joiner <i>et al.</i> 2002)  <u>Behaviour</u> : None	None	<u>Unadjusted</u> : Loneliness significantly predicted suicidal ideation at both follow-up timepoints (p<0.01).  <u>Adjusted</u> : None
Joiner and Rudd (1996)  USA QA: 6 MA: Yes	N= 234; 43.1% female; aged 19.9 years; 62% White; general population	10 weeks	UCLA-LS-R (Russell, Peplau & Cutrona, 1980)	<u>Ideation</u> : DSI Suicidality Subscale (Metalsky, 1991)  <u>Behaviour</u> : None	BDI (Beck <i>et al.</i> , 1988)	<u>Unadjusted</u> : Loneliness was a significant predictor of suicidal ideation (r= 0.3, p<0.01).  <u>Adjusted</u> : Loneliness was no longer a significant predictor of suicidal ideation once depression

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
and hopelessness were controlled for.						
Joling and O'Dwyer (2018)	Group 1: N= 9 adults with depression and suicidal thoughts	2 years	De Jong Gierveld loneliness scale	<u>Ideation</u> : Single item: MINI, (Sheehan <i>et al.</i> , 1998)	CES-D (Radloff, 1977)	<u>Unadjusted</u> : Those who reported suicidal ideation (Group 1) reported the highest loneliness scores at follow-up, followed by Group 2 then 3 (p<0.01).
Netherlands QA: 5 MA: Yes	Group 2: N= 67 adults with depression and no suicidal thoughts  Group 3: N= 116 with no depression or suicidal thoughts		(de Jong- Gierveld & Kamphuls, 1985)	<u>Behaviour</u> : None		<u>Adjusted</u> : None

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
	(70.3% female, 69.5 ±10.4 years)  Ethnicity: NA; general population (Live-in carers)					
Junker, Bjorngaard, and Bjerkeset (2017).	N= 8, 965; 49.7% female; aged 16 ± 1.08 years (at follow-up); ethnicity: NA; general population	11.9 years	Single-item: Young-HUNT 1 (Holmen <i>et</i> <i>al.</i> , 2014)	<u>Ideation</u> : None  <u>Behaviour</u> : Hospital records	SCL-5 (Strand <i>et al.</i> , 2003)	<u>Unadjusted</u> : None  <u>Adjusted</u> : Controlling for baseline demographics, those who reported a higher level of loneliness at baseline were more likely to attend hospital for self-

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Norway QA: 5 MA: Yes						harm than those who reported a lower level of loneliness.
Kleiman <i>et al.</i> (2017, Study 1)  Worldwide QA: 2 MA: No	N= 54; 79.6% female; aged 23.24 ± 5.26 years; 81% North American; general population	21.3 ± 11.7 days	Single-item: EMA one-word affect label	<u>Ideation</u> : Three items: EMA one- word affect label (unvalidated)  <u>Behaviour</u> : None	None	<u>Unadjusted</u> : Baseline loneliness did not predict suicidal ideation at follow-up.  <u>Adjusted</u> : Controlling for baseline suicide ideation, loneliness did not predict suicide ideation at follow-up.



Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Kleiman <i>et al</i> (2017, Study 2)  USA QA: 2; MA: No	N= 36 severe suicide ideation or recent suicide attempt; 44.1% female; aged 47.74 ± 13.06 years; 82% 'European decent' ; Clinical population (inpatient sample)	10.32 ± 6.45 days	Single-item: One-word EMA affect label	<u>Ideation</u> : Three items: EMA one- word affect label (unvalidated)  <u>Behaviour</u> : None	None	<u>Unadjusted</u> : Baseline loneliness did not predict suicidal ideation at follow-up.  <u>Adjusted</u> : Controlling for baseline suicide ideation, loneliness did not account for any variability in suicide ideation at follow-up.
Klim <i>et al.</i> (2021)	N= 79; 53.2% female, age = NA; 79.8% White; clinical	3 months	NIH Toolbox Adult Social Relationship Scale	<u>Ideation</u> : Single item: Beck Suicide Scale	NA	<u>Unadjusted</u> : None  <u>Adjusted</u> : Loneliness was not significantly associated with

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
USA QA: 5 MA: No	population (inpatient sample)		(Cyranowski <i>et al.</i> , 2013)	<u>Behaviour</u> : None		suicidal ideation after controlling for age and gender
Lasgaard, Goosens and Elkilit (2011) Denmark QA: 7 MA: Yes	N=541* ; 60% female; aged 17.11 ± 1.12 years; ethnicity: NA; general population	1 year	UCLA-LS-3 (Russell, 1996)	<u>Ideation</u> : SPS Suicide Ideation subscale (Cull and Gill, 1989)  <u>Behaviour</u> : None	BDI-Y ; Danish version (Thastum <i>et al.</i> , 2009)	<u>Unadjusted</u> : Loneliness at baseline significantly predicted suicide ideation at follow-up.  <u>Adjusted</u> : When depression was controlled for, loneliness was no longer a predictor of later suicidal ideation.

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
McGraw <i>et al.</i> (2008)  Australia QA: 2 MA: No	N= 204*; 59.8% female; aged 17.4 ± 0.6 years; 82% Australian; general population	1 year	UCLA-LS-R (Russell, Peplau & Cutrona, 1980)	<u>Ideation</u> : 1 item; ‘I thought about hurting myself’  <u>Behaviour</u> : None	DASS-21 (Lovibond and Lovibond, 1995)	<u>Unadjusted</u> : Those who reported self-harm ideation at follow-up had reported lower peer connectedness (therefore higher loneliness) at baseline.  <u>Adjusted</u> : None
Na <i>et al.</i> (2021)  USA QA: 5 MA: Yes	N= 670; 13.6% female; age= NA; ethnicity= NA; military veterans	1 years	UCLA-3 (Hughes <i>et al.</i> , 2004)	<u>Ideation</u> : Two items: PHQ-9 (Santos <i>et al.</i> , 2013)  <u>Behaviour</u> : None	NA	<u>Unadjusted</u> : Loneliness scores at baseline significantly differed between those who did and did not report suicidal ideation at follow-up ( $\chi^2=8.28, 0.001$ ).

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
<u>Adjusted: None</u>						
Nichter <i>et al.</i> (2021), USA QA: 6 MA: Yes	N= 2307; 8.5% female; 22-93 years; 77.1% White; Military veterans	7 years	UCLA-3 (Hughes <i>et al.</i> , 2004)	<u>Ideation</u> : None  <u>Behaviour</u> : Single item, not validated: “Have you ever tried to kill yourself?”	PHQ-4 (Lowe <i>et al.</i> , 2010)	<u>Unadjusted</u> : Loneliness scores were significantly higher in those who died by suicide by follow-up ( $\chi^2=-7.28$ , $p < 0.001$ ).  <u>Adjusted</u> : Loneliness scores were significantly higher in those who died by suicide by follow-up (RRR: 1.27, 95% CI 1.08–1.48).

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Nickel <i>et al.</i> (2006)  Germany, Austria and  Poland QA: 3 MA: Yes	Group 1: N= 28 Patients with bulimia (purging type), no depression; 100% female; 23.5 6 ± 3.6  Group 2: N= 425 Inatients with depression, no eating disorder; 100% female; 33.4 6 ± 5.1 years; ethnicity: NA	1 year	QoL, 1 item (Averbeck <i>et al.</i> , 1997)	<u>Ideation</u> : None <u>Behaviour</u> : Single item; Attempting suicide in the last 12 months	None	<u>Unadjusted</u> : Loneliness at baseline was identified as a significant predictor of suicide attempts in the 12-months post- baseline in the Bulimia Nervosa group but not the Major Depression group.  <u>Adjusted</u> : None

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Clinical population (inpatient, outpatient and community samples)						
O'Connor <i>et al.</i> (2021)  UK, QA : 5 MA : Yes	N= 2589; 55.1% female; 18+ years; 90.5% White; general population	6 weeks (3 timepoints)	UCLA 3-item (Hughes <i>et al.</i> , 2004)	<u>Ideation</u> : Single item; experienced suicide thoughts in the past week  <u>Behaviour</u> : Two items: Attempting suicide in the past week, harming self in the past week.	PHQ-9	<u>Unadjusted</u> : Loneliness was a significant predictor of later suicidal ideation, but not non- suicidal self-harm or suicide attempt  <u>Adjusted</u> : None

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Paul and Fancourt (2022)  UK QA: 6 MA: Yes	N= 49, 227; female: NA; 18+ years 'Predominantly White'; general population	59 weeks (4+ timepoints)	UCLA 3-item (Hughes <i>et al.</i> , 2004)	<p><u>Ideation</u>: Single item: 'Over the last week, how often have you been bothered by self- harming or deliberately hurting yourself'</p> <p><u>Behaviour</u>: Attempt and NSSI. PHQ-9, item 9: 'Over the last week, how often have you been bothered by thoughts that you would be better off</p>	None	<p><u>Unadjusted</u>: loneliness was associated with a 3.77 (95% CI: 3.61–3.93) times higher odds of self-harm thoughts and 2.18 (95% CI: 2.02–2.34) higher odds of self-harm behaviours</p> <p><u>Adjusted</u>: Loneliness continued to be associated with reduced likelihood of self-harm thoughts and increased likelihood of self- harm behaviours even when</p>

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
				dead or hurting yourself in some way?’		adversities and worries were included in the models.
Pietrzak <i>et al.</i> (2017)  USA, QA: 7 MA: Yes	N= 2,093; 8% female; aged 62.4 ± 13.8 years; 78.5% White; Military veterans (ex-POW)	4 years	Short Loneliness Scale	<u>Ideation</u> : PHQ-9, 1- item (Spitzer <i>et al.</i> , 1999)  <u>Behaviour</u> : None	None	<u>Unadjusted</u> : Baseline loneliness was associated with increased incident of future suicidal ideation.  <u>Adjusted</u> : None
Rissanen <i>et al.</i> (2021)	N= 660; 94.5% female; 14.5 ± 1.3 years; ethnicity:	5 years	YSR	<u>Ideation</u> : None	BDI	<u>Unadjusted</u> : Significant (HR= 0.45, 95% CI: 0.23–0.87)  <u>Adjusted</u> : There was no evidence that loneliness influenced the



Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Finland QA: 5 MA: Yes	NA;school general population			<u>Behaviour</u> : Single item, not validated: ‘Have you ever cut yourself?’		initiation of self-cutting independent of depression scores ( $c' = -0.576$ , $p = 0.127$ ) however adjusted for experiences of being bullied and lifestyle only, loneliness was a significant association with later self-harm 0.49 (0.25–0.96)*.
Salzinger <i>et al.</i> (2007)	Group 1: N: 100 Registered on the NYC Maltreatment Register.	6 ± 0.6 years	LSDQ (Asher <i>et al.</i> 1984)	<u>Ideation</u> : YRBS, 4- items.	None	<u>Unadjusted</u> : Loneliness did not predict suicide ideation or behaviour at follow-up.  <u>Adjusted</u> : None

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
USA, QA: 5 MA: Yes	Group 2: N:100 healthy, matched controls.  35% female, 10.5 ± 0.9 years old; 54% Hispanic. School specialist population vs. school general population			<u>Behaviour</u> : YRBS. 2 items (Garrison <i>et al.</i> , 1993)		
Sasaki <i>et al.</i> (2021)	N= 875; 47.1% female, 41.74 ± 10.4 years; ethnicity: NA;	5 months	Single item: “I feel lonely”	<u>Ideation</u> : Single item not validated: ‘I feel like I want to die’	None	<u>Unadjusted</u> : Loneliness was significantly associated with later

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Japan QA: 4 MA: Yes	general population (employed only)			<u>Behaviour</u> : NA		suicidal ideation (OR= 4.17, 95% CI: 3.05–5.69, p <0.001).  <u>Adjusted</u> : Loneliness was significantly associated with later suicidal ideation when controlling for baseline demographics, but not when controlling for pre-existing mental health condition as well.
Scheer <i>et al.</i> (2021), USA,	N= 1047; 0% female; 33.2 ± 11.5; 53.5%	1 year	UCLA-LS-8: 8 items (Hays &	<u>Ideation</u> : Three items: Active suicidal ideation:	None	<u>Unadjusted</u> : None.  <u>Adjusted</u> : Loneliness was not significantly associated with

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
QA: 6, MA: Yes	White; sexual minority men		DiMatteo, 1987)	‘In the past week, have you been having thoughts about killing yourself?’ or ‘In the past few weeks, have you wished you were dead?’  Passive suicidal ideation: ‘In the past few weeks, have you felt that you or your family would be better off if you were dead?’		either active or passive suicidal ideation at follow-up.

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
			(Aggregated effect size calculated)			
			<u>Behaviour</u> : NA			
Schinka <i>et al.</i> (2013) USA QA: 5 MA: Yes	N= 832; 51.1% female, 8 years ± NA; 79% White	3 years	LSDQ (Asher <i>et al.</i> , 1984)  (T1 and T2)  (Aggregated effect size calculated)	<u>Ideation</u> : Single item: CBCL (Achenbach, 1992)  <u>Behaviour</u> : CBCL 1- item self-report (Achenbach, 1992);	CBCL; subscale (Achenbach, 1991).	<u>Unadjusted</u> : Loneliness did not predict suicidal ideation or behaviour at follow-up.  <u>Adjusted</u> : None

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Shaw <i>et al.</i> (2021)  UK QA: 4 MA: Yes	N= 448,811; 54.4% female, aged 40-70 years; 88.1% White; general population	Self-harm: 5 years  Death: 2.37 years	Single item: “Do you often feel lonely?”	<u>Ideation</u> : None  <u>Behaviour</u> : Death records, hospital admissions	Single item (not validated): “Do you ever feel depressed?”	<u>Unadjusted</u> : Loneliness was significantly associated with suicide death (HR= 3.20, 95% CI: 2.35 to 4.36, p <0.001)  <u>Adjusted</u> Model remained significant after controlling for sociodemographic, health, living arrangements, (HR= 1.43, 95% CI: 1.01, 2.03, p <0.05) but not when perceived social support was controlled for.

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Stein, Itzhaky and Levi-Belz (2017) Israel QA: 6 MA: No	Group 1: N= 163; 0% female, 53.4 ± 4.4 years; ex-prisoner of Kippur War veterans  Group 2: N=185; 0% female, 53.4 ± 4.4 years; non- captive veterans  79% White	12 years	UCLA-LS-v3 (Russell, 1996)	<u>Ideation</u> : Two items: SCL-90, 2 items (Derogatis and Cleary, 1977)  <u>Behaviour</u> : None	None	<u>Unadjusted</u> : Loneliness at baseline was not a significant independent predictor of suicide ideation at follow-up.  <u>Adjusted</u> : None

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Stevenson <i>et al.</i> (2021)  UK QA: 7 MA: Yes	N= 457; 70.2% female, aged 37.6 ± 12.3 years; ethnicity: NA; general population	4 months	Short loneliness Scale	<u>Ideation</u> : Four items: Suicidal Behaviours Questionnaire-Revised  <u>Behaviour</u> : None	HADS	<u>Unadjusted</u> : None  <u>Adjusted</u> : Loneliness was significantly associated with later suicidal behaviour (r= 0.52, p <0.001)
Stolz <i>et al.</i> (2016)  Europe QA: 4 MA: Yes	N= 6,791; 57.6% female, aged 80.5 ± 4.5 years; ethnicity: NA; general population	2 years	1 item, 2-point categorical question; ‘Do you often feel lonely?’	<u>Ideation</u> : EURO-D, 1 item from (Prince <i>et al.</i> , 1999)  <u>Behaviour</u> : None	None	<u>Unadjusted</u> : Those who reported often feeling lonely, or who reported an increase in feelings of loneliness were at increased risk of developing passive suicide ideation (p <0.001).



Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
<u>Adjusted</u> : None.						
Trakhtenbrot <i>et al.</i> (2016)  Israel QA: 7 MA: No	Group 1: N=53, history of medically serious suicide attempt (MSSA); 41.5% female; aged 37.6 ± 12.25 years; ethnicity: NA  Group 2: N=64 history of medically non- serious suicide attempt (MNSSA); 39.1%	5.6 ± 2.53 years	UCLA-LS-v3 (Russell, 1996)	<u>Ideation</u> : None  <u>Behaviour</u> : Hospital records	BDI (Beck, 1978)	<u>Unadjusted</u> : None  <u>Adjusted</u> : After controlling for demographic characteristics and mental pain domains, baseline loneliness was not a significant predictor of suicide behaviour at follow-up.

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
	female; 37.74 ± 13.05 years; ethnicity: NA  Group 3: N=36 psychiatric inpatients  40.27% female, aged 40.27 ± 13.26 years; ethnicity: NA					
Wang, Wang and Lui (2020)	Group 1: N= 539 left behind adolescents; 56.1%	6 months	Child Loneliness Scale	<u>Ideation</u> : None	None	<u>Unadjusted</u> : Loneliness was positively correlated with NSSI at follow-up in both left-behind and non-left behind participant

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
China QA: 6 MA: Yes	female; aged 13.51 ± 1.02 years.  Group 2: N= 474 non- left behind adolescents; 51.3% female; 13.42 ± 1.14 years.  100% Chinese; specialist population			<u>Behaviour</u> : NSSH, Deliberate Self-Harm Inventory (DSHI)	samples (r= 0.34, p <0.01 and 0.11, p <0.05 respectively)  <u>Adjusted</u> : None	

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Wang <i>et al.</i> (2021)  China QA: 7 MA: Yes	N= 625; 52.8% female, 13.48 ± 0.98 years; 100% Chinese; general population	6 months	Child Loneliness Scale	<u>Ideation</u> : None  <u>Behaviour</u> : NSSH, Deliberate Self-Harm Inventory (DSHI)	CES-DC	<u>Unadjusted</u> : The bivariate association between baseline loneliness and NSSI during follow-up was significant (OR= 1.10, 95% CI: 1.07–1.14, p <0.001).  <u>Adjusted</u> : Loneliness was significantly associated with NSSI enactment at follow-up (OR= 1.06 95% CI: 1.01–1.11 p=0.019)

Study, Country, QA, MA	Baseline participant summary (n, % female, age, ethnicity, population)	Follow-up duration (average)	Measures			Results
			Loneliness	Suicide	Depression	
Wichstrøm (2009)  Norway QA: 4 MA: Yes	N=3,906; 56% female, aged 16.5 ± 1.9 years; ethnicity: NA; general population	5 years	UCLA; 5-items (Russel <i>et al.</i> 1980)	<u>Ideation</u> : None  <u>Behaviour</u> : Two items;  ‘Have you ever taken an overdose of pills or otherwise tried to harm yourself on purpose?’  ‘Have you ever tried to kill yourself?’	Depressive Mood Inventory (Kandel and Davies, 1982)	<u>Unadjusted</u> : Baseline loneliness scores were significantly different between those reporting no self-injury, NSSI and suicide attempts at follow-up.  <u>Adjusted</u> : Loneliness was a significant predictor of self- injury at follow-up after controlling for demographic characterises and baseline variables

QA= Quality Assessment score; MA= Meta-Analysis; n= number of participants. Ex-POW: ex-prisoners of war; MSSA= medically serious suicide attempt; MNSSA= medically non-serious suicide attempt. BDI= Beck Depression Inventory; BDI-Y= Beck Depression Inventory for Youth; CBCL= Child Behaviour Checklist; CDI= Children's Depression Inventory CES-D= Centre for Epidemiologic Studies Depression Scale; DASS-21= Depression, Anxiety and Stress Scale; DISC-IV= Diagnostic Interview Schedule for Children; DSI= Depressive Symptom Inventory; EMA= Ecological Momentary Assessment; EURO-D= Euro- depression scale; LSDQ= Loneliness and Social Dissatisfaction Questionnaire; MIN= Mini-International Neuropsychological Interview; PHQ-9= Patient Health Questionnaire-9; QoL= Quality of Life Questionnaire; SB= Suicide Behaviour; SI= Suicide ideation; SLC-5= Hopkins Symptom Checklist; SCL-90= Symptom Checklist-90; SIQ= Suicide Ideation Questionnaire; SPS= Suicide Probability Scale; SSI= Scale for Suicidal Ideation; T=Timepoint; UCLA-LS= UCLA Loneliness Scale; WHO CIDI= World Health Organisation Composite International Diagnostic Interview 3.0; YRBS= Youth Risk Behavior Survey; YSR= Youth Self-Report. \* Sample size and demographic data recorded at follow-up. † Studies which share the same sample population from the NICHD study. †† Suicide behaviour data was excluded due to insufficient data, see Appendix 1 for details. Unadjusted = findings from univariate analysis. Adjusted= findings from multivariate analysis or analyses where variables are controlled.

also critically examined in tandem with the aims outlined in the introduction. To investigate the extent to which loneliness predicts SIB, the results presented here are grouped by outcome variable (suicidal ideation vs. all suicidal behaviour including suicide death, suicide attempt and non-suicidal self-harm). The results of this review are separated by approach, with narrative summaries discussed in section 3.1 and meta-analytical findings discussed in section 2.4.6.

This section discusses all studies included in the review. The results are presented as follows:

- 2.4.1 Identification of a loneliness-SIB relationship
- 2.4.2 Methodological quality
- 2.4.3 Evidence of a loneliness-SIB relationship in adjusted and unadjusted univariate analyses
- 2.4.4 Demographics (age, gender, ethnicity) or geographical location in relation to loneliness and SIB
- 2.4.5 Other factors (psychometric measures used, sample size, generalisability, recruitment site, follow-up duration) affecting the loneliness-SIB relationship
- 2.4.6 Meta-analysis

### 2.4.1 Identification of a loneliness-SIB relationship

28 studies explored suicidal ideation as an outcome and 17 results (14 studies) measured suicidal behaviour, including four studies which measured both suicidal ideation and behaviour (see Table 2.2). Of the 28 analyses that explored suicidal ideation, 19 results indicated that loneliness was a significant predictor variable. Additionally, Stein *et al.* (2017) reported an indirect pathway from post-traumatic stress syndrome (PTSS) to loneliness at the same timepoint predicting later suicidal ideation.

Of the studies which explored any form of suicidal behaviour, ten studies (11 results) found loneliness to be a significant predictor of later self-injury, suicide attempt or suicide

death. Three of the six studies which did not identify an association explored suicide attempt at follow-up and one explored suicide death (Shaw *et al.*, 2021).

## 2.4.2 Methodological quality

Individual quality assessment scores are reported in Table 2.2. The maximum score obtainable was nine. The mean score across the 38 studies was  $5.39 \pm 1.6$  (range: 2 to 8). The highest scoring studies were Bennardi *et al.* (2019), Chen *et al.* (2021) and Gallagher *et al.* (2014) who each scored eight. The lowest scoring domain was participant retention, with only 14 studies retaining over 60% of the participants at follow-up. Less than half of the studies (n= 17 studies) reported having representative participant samples. The highest scoring domain was the validity of the predictor variable, where 29 studies used either a full measure or subscale of a validated measure of loneliness.

## 2.4.3 Evidence of a loneliness-SIB relationship in adjusted and unadjusted univariate analyses

All studies were investigated to explore the unadjusted relationship between loneliness and SIB, and then adjusted for any other factor (e.g., demographic characteristics mental health history)

### 2.4.3.1 Unadjusted Univariate Analysis

Across the 38 studies in this review, 27 studies (33 effect sizes) reported unadjusted effect sizes. 25 effect sizes identified a significant association between loneliness and later suicidal ideation (15 studies) or behaviour (10 studies). This included Nickel *et al.* (2006) who found a significant association between loneliness and behaviour in a participant sample with bulimia, when compared to a participant sample with depression.

Significant unadjusted loneliness-SIB results related to all studies based in mainland Europe, Australia and Asia. UK and USA-based studies were more evenly split. Five of the eight studies which did not find a significant unadjusted association between loneliness and SIB used the LSDQ loneliness measure, whereas seven used a single-item measure to assess the outcome variable.



#### 2.4.3.2 Adjusted Univariate Analyses

21 studies (23 results) reported adjusted effect sizes. Descriptions of the controlled variables are summarised in Appendix 3. 15 studies (16 effect sizes) reported that the loneliness-SIB relationship remained significant after controlling for confounding factors. Of the studies to identify a significant association between loneliness and later SIB, ten were based in Europe and ten recruited adolescent/ young adult (13-21 years) or older adult (>54 years) participants, with some overlap in studies between these observations.

#### **2.4.4 Demographics in relation to loneliness and SIB**

In order to identify the overall independent association between loneliness and later SIB, the following observations of this review are based on multivariate results, where provided by the studies (see Appendix 3). Where this was not possible, unadjusted data was used.

##### 2.4.4.1 Age

32 studies (35 results) reported the average age of the whole participant sample or age range. Participants ranged in age (at baseline) from 8 to 102 years old across the included studies (see Table 2.2). Across these studies there was evidence that the presence of a loneliness – SIB relationship was age dependent.

No studies with an average participant age of <11 years (n= 2 studies, 4 effect sizes) found a significant association between loneliness and later SIB. Additionally, of the eight studies to recruit participants with an age between 23 -53 years, only two (Antonelli-Salgado *et al.* 2021; Stevenson *et al.*, 2021) found a significant association between loneliness and later SIB. In contrast, all studies with an average participant age between 13-22 (n= 12 studies, 13 effect sizes) or  $\geq 54$  (nine studies, 10 effect sizes) years reported a positive association between loneliness and SIB. These latter findings include two studies which specifically explored the role of age in relation to loneliness and later SIB, with both measuring suicidal ideation as the outcome variable. Ayalon and Shiovitz-Ezra (2011) found that loneliness did not predict later suicidal ideation in those over 75 years of age but did in those aged 55-65 and 66-75 years. Equally, Bennardi *et al.* (2019) found a significant association between loneliness and suicidal ideation in those aged  $\geq 60$  years but not in those aged <60 years.

#### 2.4.4.2 Gender

The collective distribution of males and females in the included studies of this review (53.6% female) was slightly higher than that of the world population (The World Bank, 2020; 49.58%). Two studies exploring male-only populations found no significant association between loneliness and suicidal ideation (Scheer *et al.* 2021, Stein *et al.*, 2017) while one study exploring female-only populations found a significant association between loneliness and later suicidal behaviour (Nickel *et al.*, 2006). 13 studies included predominantly male participants, of which six found a significant association between loneliness and later SIB. By comparison, of the 26 studies which recruited predominantly female participants, 19 studies found a significant association between loneliness and SIB.

#### 2.4.4.3 Ethnicity

18 studies (24 effect sizes) reported the ethnicity of the study sample, of which 16 studies included primarily white participants. The most common ethnicity recruited by Fulginiti *et al.* (2018) was white, however this only accounted for 47% of the whole participant sample, with the remainder of the sample identifying as various minority ethnicities.

Both studies (three results) where white was a minority ethnicity in the participant sample, did not observe a significant association between loneliness and SIB (Fulginiti *et al.*, 2018; Salzinger *et al.*, 2007). 11 (12 effect sizes) of the 16 studies (21 effect sizes) to recruit predominantly white participants reported a significant association between loneliness and later SIB. Of the seven studies not to identify an association between loneliness and SIB, the participants were typically either very young (<11 years; Schinka *et al.*, 2013) or middle aged (four studies),

#### 2.4.4.4 Geography

Studies were commonly conducted in either Europe (n=15 studies, 19 results) or the USA (n=14 studies, 16 results). All studies were conducted in middle- (Brazil, Antonelli-Salgado *et al.* 2021) or high-income countries (n= 37 studies). Of the 19 results from European populations, 16 found a significant result. The three results (across two studies; O'Connor *et al.*, 2021; Shaw *et al.*, 2021), that did not report a significant association between loneliness and SIB were both based on aggregated data exploring suicidal behaviour in the UK. Half of the USA-based studies found a significant association between loneliness and SIB (n= 16 studies). Of the remaining studies, those conducted in

Australia (Batterham *et al.*, 2022; McGraw *et al.*, 2008), Brazil (Antonelli-Salgado *et al.*, 2021) or China (Wang, Wang & Liu, 2021; Wang *et al.*, 2021) found a significant association between loneliness and SIB. Conversely those conducted in Israel (Stein *et al.*, 2017; Trakhtenbrot *et al.*, 2016), Japan (Sasaki *et al.*, 2021) or worldwide (Kleiman *et al.*, 2017 Study 1) found that loneliness was not a significant predictor of SIB.

#### 2.4.5 Other factors associated with the loneliness-SIB relationship

Other factors which were explored in relation to the identification and detection of a loneliness-SIB relationship are summarised below. These include the study measures employed in each study, participant sample size, generalisability of the participant sample to the target population, recruitment site and follow-up duration.

##### 2.4.5.1 Suicidal Ideation Measures

As noted in section 3.1.1, 28 studies explored the association between loneliness and suicidal ideation (see Table 2.2). Overall, 20 of the 28 studies that measured suicidal ideation found loneliness to be a significant predictor, however this reduced to 19 studies once some studies controlled for other factors (see section 3.1.4).

14 of these studies employed a single-item measure taken from a larger psychometric assessment, of which eight identified loneliness as a significant predictor of later suicidal ideation. Four studies that used a subscale from a wider measure consistently found a significant association between loneliness and suicidal ideation. Na *et al.* (2021) used two items from the Public Health Questionnaire and identified a significant association between loneliness and suicidal ideation. Alternatively, Salzinger *et al.* (2007) measured suicidal ideation based on four items from the Youth Risk Behaviour Survey and found no significant association with loneliness. The remaining six studies employed either a one- (n= 4 studies) or three-item (n= 2 studies) non-validated suicidal ideation measure. Of these six studies, only Antonelli-Salgado *et al.* (2021), Ayuso-Mateos *et al.* (2021) and McGraw *et al.* (2008) identified loneliness to be a significant predictor of SIB.

##### 2.4.5.2 Suicidal Behaviour Measures

Suicidal behaviour was measured in 14 studies (17 effect sizes; (see Table 2.2) using either self-report items (n= 10 studies), hospital records (n=3 studies) or death records (n= 1 study). 11 effect sizes were significant, however no discernible trend relating to form of

suicidal behaviour (non-suicidal self-injury, suicide attempt, suicide death) was observed between studies which reported a significant or non-significant association between loneliness and later suicidal behaviour.

All five studies (five effect sizes) which used a non-validated item (or items) of self-reported suicidal behaviour, identified a significant result with baseline loneliness. In contrast, of the four studies (five effect sizes) to use one- or four-items from a validated measure, only Paul and Fanourt (2022) found a significant association between loneliness and suicidal behaviour. Only two studies (Wang, Wang & Lui, 2021; Wang *et al.* 2021) used a standardised self-report scale to measure self-harm, with both studies using the Deliberate Self-Harm Inventory. Both studies reported a significant association between loneliness and later self-harm across the three effect sizes they reported. Of the three studies to use hospital records, only Junker *et al.* (2017) and Shaw *et al.* (2021) observed a significant association with baseline loneliness, while Trakhtenbrot *et al.* (2016) did not. Only Shaw *et al.* (2021) explored suicide death as an outcome measure and no significant association was observed between loneliness and later suicide death.

#### 2.4.5.3 Loneliness Measures

13 measures of loneliness were utilised across the studies included in this review.

##### Single-item measures

Eight studies (nine results) employed a single-item loneliness assessment; either an unvalidated one-word ecological momentary assessment (EMA; Kleiman *et al.*, 2017, Study 1; Kleiman *et al.*, 2017, Study 2), an unvalidated single-item question (Sasaki *et al.*, 2021), or a validated item from a wider psychometric measure (five studies). All studies which used an unvalidated single-item loneliness measure did not identify a significant association between loneliness and later suicidal ideation. Shaw *et al.* (2021) was the only study to employ a validated single item loneliness measure without observing a significant association between loneliness and later suicide behaviour.

##### Loneliness and Social Dissatisfaction Questionnaire (LSDQ) and Child Loneliness Scale (CLS)

The Loneliness and Social Dissatisfaction Questionnaire (LSDQ) and the Child Loneliness Scale (CLS) are both measures designed specifically for children and young people (<18 years old). All four studies (6 results) to employ the LSDQ were based in the USA. Only

Gallagher *et al.* (2014) reported a significant association between loneliness and later SIB. Compared to the other three studies to use the LSDQ, Gallagher *et al.* (2014) had the smallest participant sample size, highest proportion of female participants and was the only study to use an inpatient sample. In contrast to the LSDQ, the CLS was used exclusively in China by two studies (three results). Wang, Wang and Liu (2021; two results) and Wang *et al.* (2021) both reported a significant association between loneliness and later non-suicidal self-harm. Observed overarching commonalities between the of studies detecting a significant loneliness-SIB association using either the LSDQ or CLS were the average participant age (approximately, 13 years old. See section 3.2.1.) and the shorter follow-up time (6 months; see section 3.1.16).

#### University of California Los Angeles – Loneliness Scale (UCLA-LS)

18 studies (21 results) used a form of the University of California Los Angeles Loneliness Scale (UCLA-LS), of which 17 results reported a significant association with later SIB. Of the four studies not to detect an association between loneliness and SIB, all explored the adult population, two results were accounted for by both Israel-based studies (Stein *et al.*, 2017; Trakhtenbrot *et al.*, 2016) and three investigated suicidal behaviour as an outcome variable.

#### NIH toolkit

Two USA-based studies (Chen *et al.*, 2020; Klim *et al.*, 2021) used the NIH adult social relationship measure, with only Chen *et al.* (2021) observing a significant association between loneliness and later SIB.

#### De Jong Gierveld Loneliness Scale, The Short Loneliness Scale & Youth Self-Report

All studies which used the Short Loneliness Scale (Stevenson and Wakefield, 2021; Pietrzak *et al.*, 2017), the De Jong Gierveld Loneliness Scale (Batterham *et al.*, 2022; Joling *et al.*, 2017) or the Youth Self-Report (Rissanen *et al.*, 2021) identified loneliness as a significant predictor of later SIB.

#### 2.4.5.4 Sample Size

Data from 1,094,462 participants were included in this review. Sample sizes of the included studies ranged from 36 (Kleiman *et al.*, 2017, Study 2) to 502, 536 (Shaw *et al.*, 2021) with the median sample size of 968 participants. No discernible association was

observed between sample size and whether a significant loneliness-SIB association was identified.

#### 2.4.5.5 Generalisability of Sample Population

Of the 38 studies included in this review, 11 studies (13 results) were representative of the target population (ten studies explored the general population), including two studies (Ayuso-Mateos *et al.*, 2021; Na *et al.*, 2021) which weighted their data to represent their target population. Nine of these studies (11 results) had sample sizes above the collective median sample size calculated in this review and six of these studies recruited participants from Europe. Nine of the 11 representative studies observed a significant association between loneliness and later SIB; however, no commonalities were observed between those which did and did not report a significant association between loneliness and SIB.

Ten studies stated their participant samples were not representative, including five studies based in the USA. Another three studies (Lasgaard, Goosens & Elkilit, 2011; O'Connor *et al.*, 2021; Sasaki *et al.*, 2021) were representative at baseline but not at follow-up. The remaining 12 studies did not comment on the generalisability of their participant sample.

#### 2.4.5.6 Recruitment site: Geography

21 of the 28 results (23 studies) which recruited exclusively from the general population identified loneliness as a significant predictor of later SIB. This includes Bennardi *et al.* (2019) who found a significant association between loneliness and suicidal ideation in participants  $\geq 60$  years old, and seven studies who recruited children or university students. Of the five studies (seven effect sizes) which did not identify loneliness as a significant predictor within a general population sample, three had a follow-up of less than 6 months and one had a follow-up beyond five years (Schinka *et al.*, 2013; see section 3.1.16).

Of the six studies which recruited exclusively from clinical populations (i.e., psychiatric inpatient wards, patients admitted following suicidal behaviour, community mental health patients) only half (n= 3 studies) found that loneliness was a significant predictor of later SIB. However two of these studies were based on univariate analyses, while all three studies which did not to observe a significant association between loneliness and SIB controlled for other factors (e.g., age, suicidal ideation; see Appendix 3).

Five studies recruited military veterans, of which four reported a significant association between loneliness and later SIB. Of these studies, only Stein *et al.* (2017) reported no

significant association between loneliness and later SIB. Stein *et al.* (2017) was also the only study to recruit veterans who had formerly been ex-prisoners of war and the only study not to be based in the USA.

Three studies recruited children from specialist groups (child welfare families, Fulginiti *et al.*, 2018; child protection register, Salzinger *et al.*, 2007; left-behind children Wang, Wang & Liu, 2021) of which only Wang, Wang and Liu (2021) observed a significant association between loneliness and later SIB. Equally Wang, Wang and Liu (2021) was the only study from China, while Fulginiti *et al.* (2018) and Salzinger *et al.* (2007) were from the USA (see section 3.2.4).

Only Scheer *et al.* (2021) recruited sexual-minority participants and found no significant association between loneliness and later suicidal ideation. However, this study was not representative of the target population.

#### 2.4.5.7 Follow-Up Duration

Follow-up duration ranged from an average of seven days (Kleiman *et al.*, 2017, Study 2) to 16.7 years (Antonelli-Salgado *et al.*, 2021). Loneliness was commonly found to be a significant predictor of SIB between ten weeks to five years after baseline loneliness assessment. Of the 28 results (27 studies) within this timespan, only five results were not significant. This included Bennardi *et al.* (2019) who found a significant association in those aged  $\geq 60$  years old but not  $< 60$  years old. No commonalities were observed between these studies.

Of the six results (four studies) with a follow-up duration of less than ten weeks, only Bonner and Rich (1988) and O'Connor *et al.* (2021) found an association between loneliness and later SIB. Of the studies not to observe a significant association between loneliness and SIB less than ten weeks later, this included both studies which used EMA (Kleiman *et al.* 2017, study 1; Kleiman *et al.* 2017, study 2).

Nine results (seven studies) had a follow-up time beyond five years, of which three results (Groholt *et al.*, 2006; Junker *et al.*, 2017; Nichter *et al.*, 2021) reported a significant association between loneliness and later SIB. These studies which did not find a significant association were either based in the USA or Israel and used the LSDQ or UCLA-LS assessment measures.

## 2.4.6 Meta-analysis

34 effect sizes from 33 studies were initially included within the meta-analysis to empirically explore the association between loneliness and later SIB. Wang, Wang and Liu (2021) reported loneliness and suicidal behaviour effect sizes for two separate participant samples, therefore these were listed separately in the meta-analysis analysis. Data availability varied across the studies which is reflected by the varying number of studies reported within each section of the meta-analysis.

The meta-analytic findings are described as follows:

- i. Identification of a loneliness-SIB relationship
- ii. Moderating effect of methodological quality
- iii. Moderating effects of socio-demographic characteristics (age, gender) on to the loneliness-SIB relationship.
- iv. The role of depression as a mediator of the loneliness-SIB relationship.

### 2.4.6.1 Association between loneliness and SIB

Effect sizes for the overall study samples were entered into the meta-analysis irrespective of whether the outcome was suicidal ideation or behaviour. To prevent over-representation of study samples, overall effect sizes for suicidality were calculated for studies which measured both suicidal ideation and behaviour separately. This resulted in one effect size per participant sample.

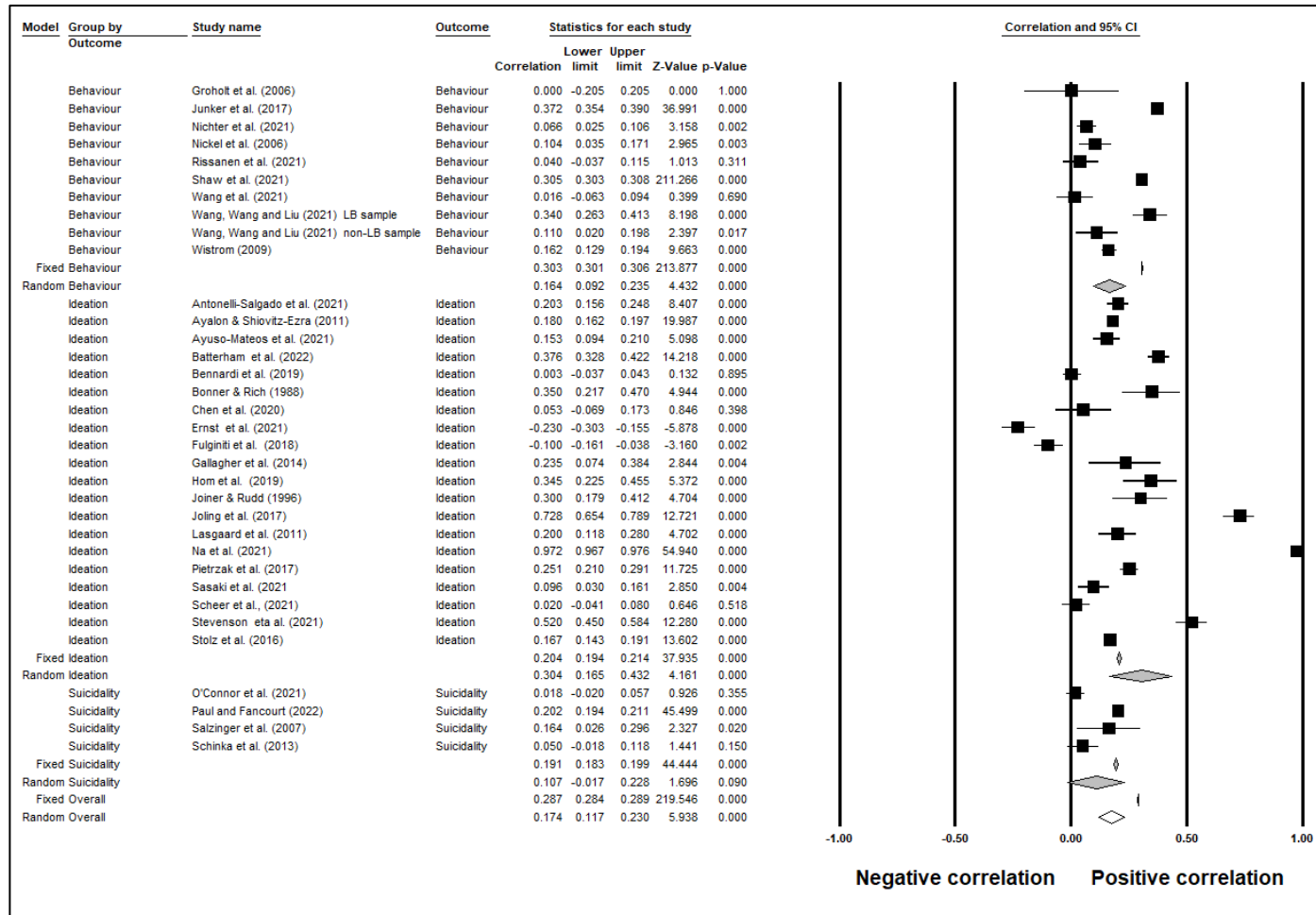
There was significant statistical heterogeneity across the studies ( $I^2= 99.28$ , Cochrane Q (2): 4577.31,  $p < 0.001$ ) and therefore random effects models are reported for the meta-analyses of this study. The overall random effects model illustrated that loneliness was a significant predictor of later SIB ( $r= 0.17$  95% CI: 0.12- 0.22,  $z= 5.94$ ,  $p < 0.001$ ; see Figure 2.2). There was no evidence of publication bias (Classic Fail-Safe  $N= 4,325$   $z$ -value= 85.27268,  $p < 0.00001$ ) as illustrated by the symmetrical distribution of the studies on the funnel plot in Figure 2.3.

### 2.4.6.2 Association between loneliness and SIB by outcome variable

This analysis investigated the difference between loneliness when predicting suicidal ideation compared to suicidal behaviour. To avoid participant over-representation, we elected to exclude studies from this analysis where suicidal ideation and suicidal behaviour

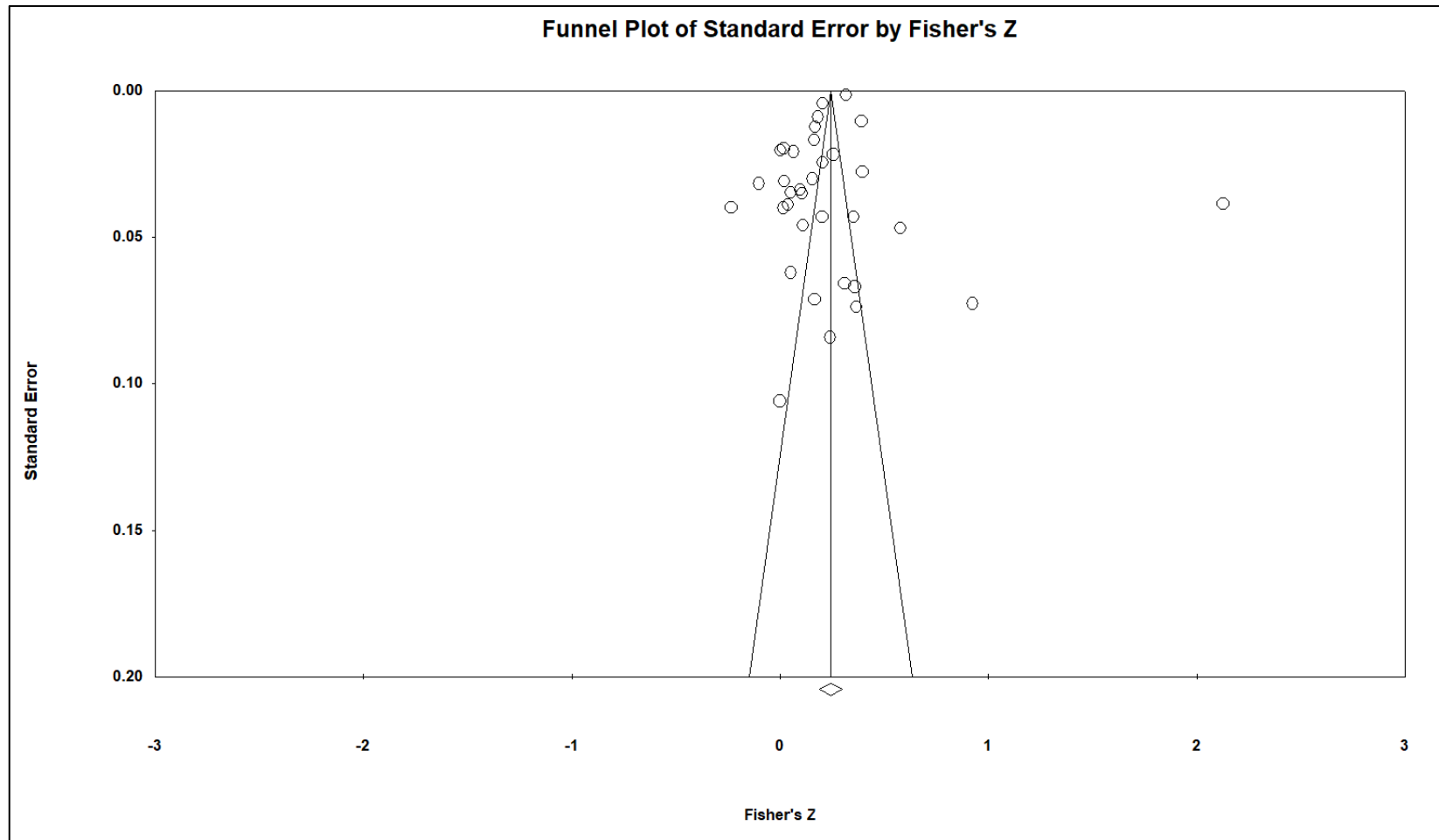


Figure 2.2. Forest plot of overall effect sizes from whole participant group (n= 33 studies, 34 effect sizes)



Suicidality = overall effect size of studies which measured both suicidal ideation and behaviour as outcome variables. Black squares show effect size her study, grey diamonds depict effect sizes per subgroup, white diamond depicts overall effect size between across study subgroups.

Figure 2.3. Funnel plot illustrating publication bias following a random effects model of overall effect sizes included in meta-analysis (n=32 studies)  
Circles represent individual studies. Diamond indicates overall effect size.



were measured separately (n= 4 studies). Based on the remaining 27 studies, moderation analysis revealed that the random effect sizes for suicidal ideation and behaviour were significantly different ( $Q(1) = 1, 166.390, p < 0.001$ ) with random effects models showing that loneliness was a stronger predictor of suicidal ideation ( $r = 0.304, 95\% \text{ CI: } 0.165\text{--}0.432, p < 0.001, n = 20$  studies) than suicidal behaviour ( $r = 0.164, 95\% \text{ CI: } 0.092\text{--}0.235, p < 0.001, n = 10$  studies).

#### 2.4.6.3 Methodological quality

All 33 studies were included to investigate quality assessment score as moderator between loneliness and SIB. To prevent over-representation, Wang, Wang and Lui (2021) was included in this analysis using an aggregated effect size across the two participant groups included in their study. Moderation analysis indicated that the quality assessment score was not a statistically significant moderator between loneliness and later SIB.

#### 2.4.6.4 Moderating effect of age

23 studies (24 participant groups) provided sufficient data to explore whether age moderated the association between loneliness and later SIB. Moderation analysis indicated that age did not moderate the loneliness-SIB relationship ( $r = 0.002, se = 0.002, 95\% \text{ CI: } -0.002, 0.005$ ). However, there was a dearth of studies covering mid-to-late life (see Figure 2.4).

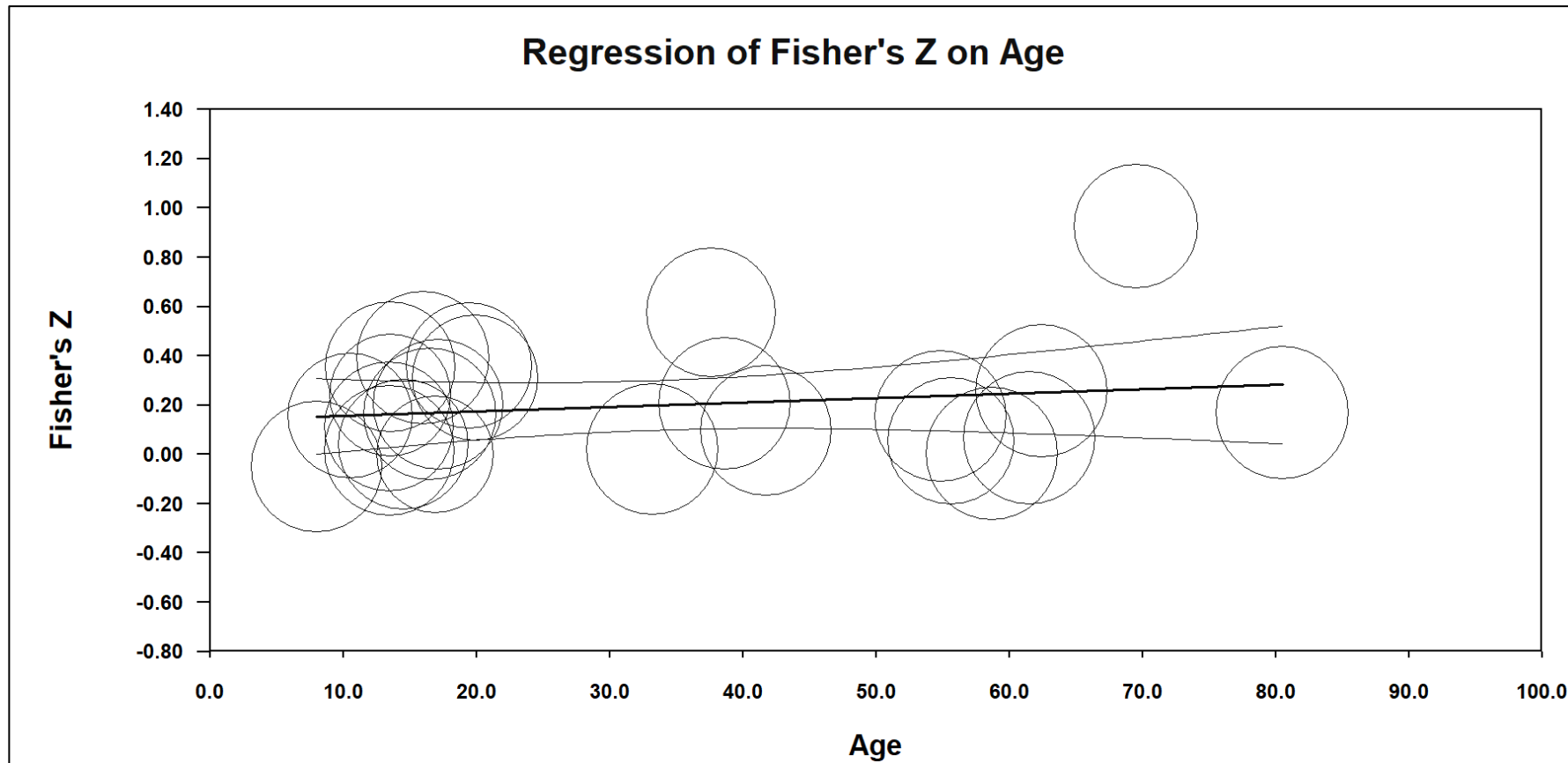
#### 2.4.6.5 Moderating effect of gender

28 studies were included in the moderation analysis to explore loneliness predicting SIB as a function of gender. As illustrated in figure 2.5, the random-effects moderation analysis indicated that in the majority female studies ( $n = 21$  studies), loneliness accounted for 20.3% of the variance in later SIB ( $95\% \text{ CI } 12.8\text{--}27.5\%, p < 0.001$ ) and in majority male studies ( $n = 7$ ) loneliness accounted for 18.3% of the SIB variance ( $95\% \text{ CI } 4.9\text{--}31.0\%, p < 0.01$ ). The mixed effects model showed there was no significant difference between the dichotomised groups (males vs females) or when gender was reported as a continuous variable (percentage of sample being female).

#### 2.4.6.6. Depression as a mediator of loneliness and later SIB

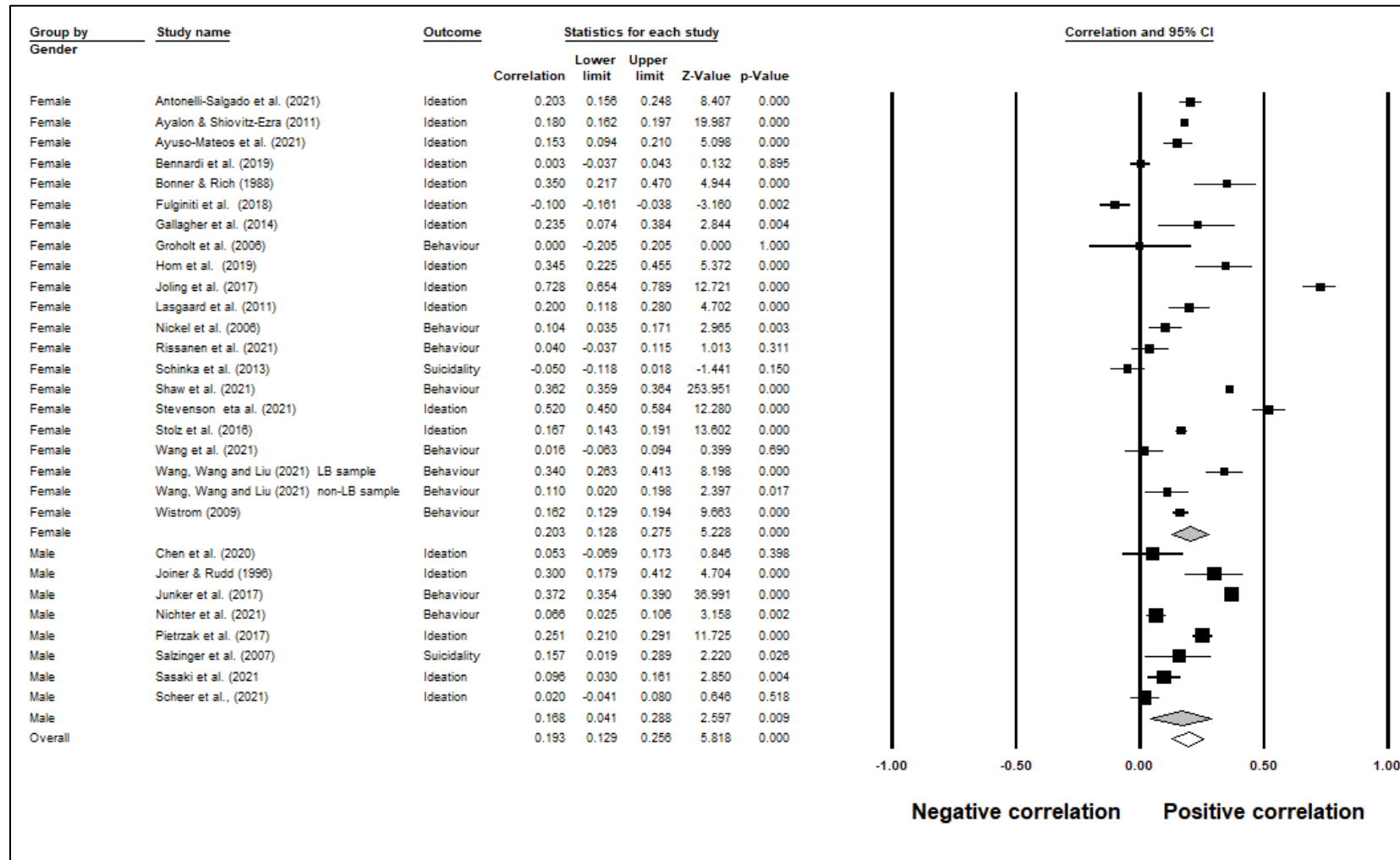
Eight studies provided sufficient data to investigate depression as a mediator between loneliness and SIB (see Appendix 4 for a list of included studies). Models were run from a correlation matrix and were specified in *Mplus* 8.4 (Muthén & Muthén, 2017) using

Figure 2.4. Age as a continuous moderator between loneliness and later SIB (n= 23 studies, 24 effect sizes)



Circles represent individual study effect sizes. The thick centre line demonstrates line of best fit of the association between loneliness and SIB when moderated by age. The thin lines above and below the centre line represents 95% confidence intervals.

Figure 2.5. Forest plot between gender (n= 27 studies, 28 effect sizes) random effect size summarised



Black squares are proportional to study size weighting. Grey diamonds depict overall effect size per subset of studies (male/ female). White diamond depicts overall effect size between across study subgroups.

maximum likelihood estimation. All eight of the included papers provided associations between; loneliness and SIB, loneliness and depression, and depression and SIB. Based on this, the following estimates were entered into the meta-analytic mediation model: (1) the average association between loneliness and depression ( $r = 0.324$ ), depression and SIB ( $r = 0.315$ ) and loneliness and SIB ( $r = 0.212$ ). The sample sizes ranged from 101 to 1,881, the median sample size was 740 and the mean was 21,339.

Based on the mean sample size, the relationships between loneliness and depression ( $\beta=0.111$ ,  $p < 0.01$ ), depression and SIB ( $\beta=0.278$ ,  $p < 0.001$ ) and loneliness and SIB ( $\beta=0.083$ ,  $p < 0.05$ ) were all significant. Equally, the indirect effect from loneliness to SIB via depression was also significant ( $\beta=0.031$ ,  $se= 0.012$ ,  $p < 0.05$ ). Based on the median sample size there was a significant indirect effect from loneliness to SIB via depression ( $\beta=0.031$ ,  $se= 0.011$ ,  $p < 0.01$ ), therefore, depression appeared to partially mediate the relationship between loneliness and SIB.

## 2.5 Discussion

This review aimed to synthesise findings from existing studies pertaining to whether loneliness predicted later SIB, and if so, whether socio-demographic factors or depression were associated with this relationship. Of the 38 studies (45 aggregated results) that met review criteria, 30 studies (33 results) found that loneliness was a significant predictor of later SIB. There was also evidence that depression mediated the loneliness and later SIB relationship. Of all studies considered within the narrative component of the review, the loneliness-SIB association was more frequently observed in studies that were predominantly female in composition. Age-dependent effects were also evident.

The finding that loneliness predicted later SIB fits with several theories of suicide behaviour. For example, the IMV model (O'Connor and Kirtley, 2018) argues that loneliness may act similarly to social isolation which is included in the model. If so, loneliness may act as a motivational factor, increasing the likelihood of suicidal ideation developing (McClelland *et al.*, 2021). This is further reflected in the Interpersonal Theory of Suicide (ITS; Van Orden *et al.*, 2010) which also suggests that loneliness contributes to thwarted belongingness; an important predictor of suicidal ideation.

Loneliness was more strongly associated with SIB in the long-term (ten-week to five-year follow-up) compared to in the short-term. This may relate to the stability of loneliness,

where, if present over a long time, may be more pernicious. However, this requires more detailed investigation. The moderation analysis revealed that loneliness independently predicted both suicidal ideation and behaviour separately. Narrative observations of the studies illustrated that the association between loneliness and suicidal ideation was more common overall. However, the association between loneliness and later suicide attempt (i.e., not self-harm) specifically, was observed to be more at chance-level. Furthermore, Shaw *et al.* (2021) was the only study to investigate suicide death as an outcome variable, with no association observed in relation to baseline loneliness. Although the Biobank data used by Shaw *et al.* (2021) was representative of the UK population in many domains, the participants were found to be more affluent and healthier than the general population. Therefore, these characteristics should be explored further to identify what, if any role, they have in the association between loneliness and suicidal behaviour.

The meta-analysis found that depression partially mediated the relationship between loneliness and later SIB. However, these results were limited to less than a quarter of all studies included in the narrative review, as most studies either did not include depression or did not provide sufficient data to allow an association between loneliness and depression to be identified. There are sizeable similarities between loneliness and depression, including negative cognitive styles, attention bias and internalised social attitudes (Qualter *et al.*, 2013; Beam & Collins, 2018). However understanding the extent to which loneliness and depression are associated with one another would benefit clinical and general population interventions for supporting psychological wellbeing. Furthermore, based on the findings of this review, determining the potential mechanisms through which loneliness may lead to depression could also benefit suicide interventions.

Of the subsample of studies included in the moderation analysis exploring gender as a moderator of loneliness and SIB, no statistically significant difference was identified. However, both groups (predominantly male versus predominantly female studies) found loneliness was significantly associated with later SIB. Nevertheless, the confidence intervals were considerably greater in the majority-male meta-analysis, likely due to the smaller number of studies in this group compared to the number of majority-female studies (seven and 21 respectively). Any potential gender differences may be affected by social stigma, which is associated with self-reported loneliness in male populations (Borys & Perlman, 1985; Nicolaisen & Thorsen, 2014). Those of Western countries are indicated to be particularly less accepting of men disclosing loneliness. Nicolaisen and Thorsen (2014) suggested that studies which include De Jong Gierveld measures may be the only studies to

detect gender differences due to their assessment of social and emotional loneliness separately. However only two studies in this review used the De Jong Gierveld scale and neither explored gender differences. In contrast, Barreto *et al.* (2021) found that based exclusively on the UCLA loneliness scale (version three; Russell, 1996), men were significantly more likely to report loneliness than women. However, neither Nicolaisen and Thorsen (2014) or Barreto *et al.* (2021) investigated these associations in relation to later SIB. Finally, all studies in the review reported gender on a binary scale, which may have affected the findings. Future research investigating the loneliness-SIB relationship may benefit from reporting the loneliness-SIB relationship in non-binary populations when capturing demographic information.

Regarding age, observations made in this review support existing research (Victor & Yang, 2012) that the loneliness-SIB relationship was more likely to be identified in those aged 13-22 or  $\geq 54$  years at baseline, thereby suggestive of a U-shaped relationship. It may be that these two age groups coincide with when loneliness peaks across the lifespan. Research argues that peer group membership becomes more apparent during adolescence and during major transitions in social status. Such social transitions occur at both timepoints identified here: emerging adults (e.g., school finisher, college/ university graduate) and working adult to retiree. Nicolaisen and Thorsen (2014) argue that at these social transition timepoints, individuals spend more time focusing on their next role in society, thereby loosening ties with existing social supports (e.g., school friends, colleagues). As the transition progresses, new bonds are established, and the maintenance of former social bonds become more difficult. If these new bonds are not formed, or social identity is not suitably adjusted, this may create an opportunity for loneliness to develop (Sawir, *et al.*, 2008).

Despite this age-related trend, two studies (Ayalon & Shiovitz-Ezra, 2011; Bennardi *et al.*, 2019) noted a 'drop-off' in the loneliness-SIB relationship in adults aged approximately 65 years old and over. It could be argued that the transition from working adult to retiree had already happened for those aged  $>65$  years old. Therein, these populations had already adjusted to their new role in society, leading to this loss in the association between loneliness-SIB. Both Ayalon and Shiovitz-Ezra (2011) and Bennardi *et al.* (2019) postulated this observation was perhaps due to loneliness being considered 'an on-time event' (Ayalon & Shiovitz-Ezra, 2011) due to the limitations associated with older age (e.g., death of older and frailer friends and family, one's own limited health and mobility) while trying to maintain a social life.



Commonalities across studies were also observed in terms of geography. Most of the studies in this review were based in Europe or America. Almost every European study found a significant relationship between loneliness and later SIB, whereas American results were more variable. Although this review included studies from Asia and Australia, this research was limited, therefore reliable inferences cannot be made regarding observed or hypothesised differences between continents. Despite this, it is important to highlight that the European-based studies often had larger sample sizes than other countries in this review, as well as having more female-dominant sample populations. The findings here suggest the loneliness-SIB relationship is more detectable in studies with larger participant sample sizes (potential small effects). However, as females were over-represented in this review and the range of geographical locations of studies was limited, it is not yet possible to infer whether geography or gender moderate the relationship between loneliness and SIB. Lastly, while most studies used interviews or paper questionnaires to assess the key measures, two studies used EMA (Kleiman *et al.*, 2017, Study 1; Kleiman *et al.*, 2017, Study 2). These studies were outliers to multiple trends observed in this review (e.g., gender and follow-up duration). Thus, the mode of measurement may influence whether a loneliness –SIB relationship is detected. Future research is required to better understand whether EMA studies of loneliness are exploring something different from traditional study measurement scales.

In terms of the sample populations, most of the studies of this review were either not representative or did not comment on the representativeness of their participant sample. Despite this, studies which were representative were overwhelmingly based on the general population and over two thirds of these studies found a significant association between loneliness and SIB. Furthermore, there was a trend in loneliness being predictive of later SIB in military (non-ex-prisoner of war) veterans, however this was based on a sample of four studies. Findings based on psychiatric populations were less consistent. It may be that psychiatric populations may be more aware and engaging in social networks available to them, while general population and veteran are not.

### 2.5.1 Limitations

The considerable heterogeneity across the studies means that the aggregate findings discussed here should be interpreted with caution. Although this review finds evidence that loneliness predicts SIB, the definition of suicidal behaviour and its constituent terms (e.g., self-harm, suicide attempt) varied considerably across studies (as illustrated by Nickel *et*

*al.*, 2006 see Appendix 1). Only one study specifically explored loneliness in relation to suicide death (Shaw *et al.*, 2021). In contrast, Trakhtenbrot *et al.* (2016) included all participants who died by suicide within their suicide attempt group, but did not make any comparisons between those who had died or survived. Given this review identified mixed results between loneliness and suicide attempt, it would have been helpful to investigate loneliness between more nuanced outcomes (e.g., suicide attempt vs suicide death) to fully explore the extent to which loneliness predicts SIB. Furthermore, level of lethality and suicide intent, was not explored in most studies, which may have further contributed to some of the inconsistent findings of this review. For example, Rissanen *et al.* (2021) explores participant ‘self-cutting’ behaviours, yet whether this was a means to cope (i.e., to aid survival by relieving pain) or with suicidal intent, was not reported. Understanding the association between loneliness and suicidal intent behaviours, can help to understand the lethality of the association between loneliness and SIB.

With regard to predictors of a loneliness-SIB association, female-dominant studies typically had larger participant sample sizes and were usually based in Europe. Observationally, these three features (gender, locality and sample size) were consistently associated with identifying a significant relationship between loneliness and later SIB, so it is not possible to distinguish which of these elements is the most influential. Meta-analyses did identify gender or age as significant moderators between loneliness later SIB, however certain factors must be considered when interpreting these results. For example, male populations were under-represented in this review. Alternatively, nine studies had a mean participant age between 24 and 53 years old, however only four could be included in the meta-analysis investigating age as a moderator. Therefore, further prospective data exploring loneliness and SIB is required based on men and middle-aged adults.

Eight studies were included in the mediation meta-analysis of depression between loneliness and SIB. Nine additional studies measured depression in relation to SIB, yet they did not investigate - or provide sufficient data for authors of this review to investigate – the correlation between loneliness and depression. As such including these additional studies would have reduced the power of the meta-analysis and increased the chance of a type II error.

Finally, an exclusion criterion for this review was that studies must have been available in English, therefore not all published works on the topic of loneliness in relation to later SIB may have been included. This may be reflected in the absence of studies based in low-

income countries, where papers on this topic may have been written in a non-English language. Additionally, most studies were from Western countries where self-reliance and independence (i.e., individualism) is the cultural norm. Research indicates that when compared to collectivism, individualism is a protective factor against loneliness (Lykes & Kemmelmeier, 2014), which would suggest that the loneliness-SIB relationship may be stronger in countries not addressed in this review. Due to the lack of collectivist countries included in this review, comparisons could not be made to identify whether these results were limited to individualistic populations or were internationally applicable.

## 2.5.2 Conclusions

In conclusion, loneliness was shown to predict future SIB in both the narrative review and meta-analysis. There was evidence of a loneliness and later SIB relationship among those aged 13 to 22 years, or over 54 years at baseline and in participant samples that were predominantly female. However, these differential relationships were not supported by moderation analyses in a subsample of the studies. Mediation analysis found that depression acted as a mediator of the loneliness to later SIB relationship. Finally, it was observed that loneliness was particularly predictive of later SIB in the long-term (ten weeks to five years). Future research would benefit from focusing on suicide death as an outcome measure and recruiting participants representative of collectivist cultures.

# Chapter 3: Exploring the association between loneliness and other psychoaffective states in relation to self-injurious thoughts and behaviour in the context of the Integrated Motivational-Volitional Model

## 3.1 Abstract

*Background:* Suicide is a worldwide public health concern and can occur at any time across the life course (World Health Organization, 2021b). The impact of loneliness on mental and physical wellbeing has received increasing attention in recent years, however its role in the development of self-injurious thoughts and behaviours, remains unclear. The current study explored loneliness in relation to other psychological variables associated with self-injurious thoughts and behaviour.

*Methods:* An online survey collected anonymous data between September 2018 and April 2019 from adult UK residents aged  $\geq 18$  years old. The survey included self-reported measures of loneliness and suicidal ideation, along with measures of defeat, entrapment, social isolation, stress, trauma, perfectionism, autobiographical memory, coping and social support. After data cleaning, data from 400 participants (aged 18-76 years) was included in the final analysis.

*Results:* Loneliness was significantly correlated with all study variables except for using memory to direct one's own behaviour. Univariate multinomial logistic regression analyses identified that loneliness independently distinguished between participants with no history of self-injurious thoughts or behaviours (NH), those with a history of self-injurious thoughts only (SI), and those with a history of self-injurious behaviours (regardless of self-injurious thoughts history; SB). When other key variables were controlled for, loneliness distinguished between those with and without a history of self-injurious thoughts or behaviours. However, loneliness did not distinguish between SI and SB participant groups. The association between childhood emotional abuse and suicidal ideation was moderated by loneliness. Loneliness partially mediated the association between childhood trauma (emotional neglect, emotional abuse, physical neglect, sexual abuse) and suicidal ideation, as well as the association between socially prescribed perfectionism and suicidal ideation.

Loneliness also moderated the association between problem-focused, emotion-focused and avoidant coping (but not socially supportive coping) in relation to suicidal ideation. Further moderation analyses revealed that loneliness moderated between both defeat and entrapment, and entrapment and suicidal ideation.

*Conclusions:* Within the context of the IMV model, loneliness is likely to operate as a motivational moderator. The presence of loneliness may increase the likelihood of suicidal ideation in those who either have a history of emotional abuse or high traits of socially prescribed perfectionism. In the absence of defeat, mental health professionals may benefit from exploring loneliness as a possible contributor to mood in patients presenting with entrapment. The introduction of problem- or emotion-focused coping tools may help reduce suicidal ideation in those experiencing loneliness. Further prospective research exploring the association between childhood trauma and adulthood loneliness is required. Such research may aid the development of clinical and community-based suicide prevention interventions.

## **3.2 Introduction**

Suicide is a serious global health concern (World Health Organization, 2019). Beyond those who die by suicide, substantially more experience self-injurious thoughts or behaviour at some point in their lives (O'Connor *et al.*, 2018; Aschan *et al.*, 2013). Despite the scale and impact of self-injury, as well as the development of suicide prevention strategies, suicide remains a major public health concern. However, there is growing recognition that the factors underpinning self-injurious behaviours are multi-faceted and complex (O'Connor & Nock, 2014). Although many psychological variables are associated with suicide risk, the nature of the association has not been fully explored. In the current study we focus on one such factor, loneliness, and investigate the extent to which it is associated with suicidal ideation and behaviour, as well as other established suicide risk factors.

### **3.2.1 Loneliness**

Loneliness is an affectively laden cognition (Van Orden *et al.*, 2010) which arises from a discrepancy between the quantity or quality of the social relationships one has, compared to those desired (Perlman & Peplau, 1982). The impact of loneliness on wellbeing has received increasing attention in recent years (Lee *et al.*, 2021; Department for Digital,

Culture, Media and Sport, 2018), particularly following the onset of the global COVID-19 pandemic. Research suggests that between 10-36% of the general population experience loneliness at some point in their lives (Perlman & Peplau, 1982; Richard *et al.*, 2017; Yang & Victor, 2011). Distinct from social isolation, loneliness is not outwardly visible to others and therefore can go undetected by onlookers. Moreover, research has found that loneliness can have serious implications on one's psychological health and wellbeing. For example, loneliness has been longitudinally associated with both depression (Mushtaq *et al.*, 2014) and self-injurious thoughts and behaviour (McClelland *et al.*, 2020). However, not everyone who experiences loneliness goes on to experience self-injurious thoughts or behaviours. This, therefore, suggests that an inter-play of other factors must be considered when identifying the role of loneliness in the emergence of self-injury.

### 3.2.2 Loneliness within theoretical models of self-injurious behaviour

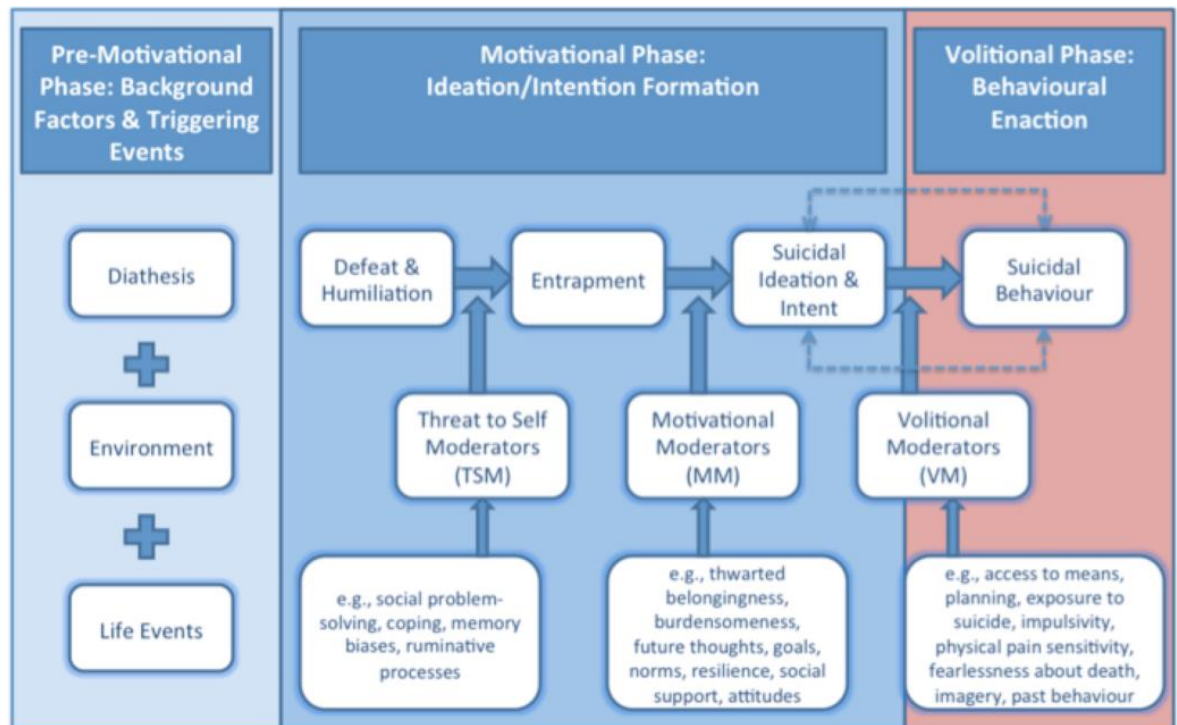
In recent years, evidence-based theories of suicide have been developed to outline how factors across the lifespan might influence the propensity of self-injurious behaviour in later life. Such theories are pivotal in guiding how novel, or under-explored, factors might interact with more established determinants of self-injury.

To date, loneliness is only expressly included in one prominent model of self-injurious behaviour; the Interpersonal Theory of Suicide (IPT; Joiner, 2005, Van Orden *et al.*, 2010). Within this theory, loneliness is posited to be a contributory factor to the emergence of thwarted belongingness, which, in combination with perceived burdensomeness, can give rise to the desire to die. However, other theoretical models, such as the Integrated Motivational-Volitional Model of suicidal behaviour (IMV; O'Connor, 2011; O'Connor & Kirtley, 2018;), expand upon the arguments of the IPT. The IMV model adopts a broad, life-course approach to understanding behaviour, by considering past experiences as well as current situational factors. Given the IMV model largely echoes arguments of the IPT, in addition to discussing early life factors, the IMV model shall be utilised to guide the research of the current study and is summarised below.

### 3.2.3 IMV Model

The IMV model considers an individual's past experiences (pre-motivational phase) and current situational factors (motivational phase) to predict the development of self-injurious thoughts. It is in this second phase of the tripartite structure that the IMV model (see figure 3.1) incorporates the key components of the IPT. The IMV model then considers a third

. Figure 3.1. The Integrated Motivational-Volitional Model (O'Connor & Kirtley, 2018)



phase (volitional phase) relating to the emergence of self-injurious behaviour. In this phase, a limited range of circumstances called volitional factors (e.g., knowing someone who has died by suicide, having a suicide plan), govern the transition from self-injurious thoughts to self-injurious acts.

### 3.2.4 Factors associated with self-injurious thoughts and behaviours

Within the IMV model, the pre-motivational phase describes vulnerability factors, or predispositions, to self-harm such as genetic history and early life trauma (O'Connor et al., 2020; Cleare et al., 2018). The latter may contribute to the development of maladaptive personality traits (e.g., socially prescribed perfectionism; Smith et al., 2018) and a life-long increased sensitivity to stress (Heisel *et al.*, 2003). While the pre-motivational phase pertains, in part, to traits that are stable over time, the motivational phase encompasses an individual's current psychological state, for example, loneliness. According to the motivational phase of the IMV model, ineffective stress management can lead to defeat, which can in turn give rise to entrapment and self-injurious thoughts. This can potentially lead to self-injury and death as outlined in the volitional phase.

### 3.2.5 Motivational Phase

The IMV model posits that transition across the motivational phase is moderated by several variables. For example, avoidant coping styles and over-generalised memory recall, in combination with pre-motivational factors, may render the emergence of self-injurious thoughts more likely (Xiong *et al.*, 2020). On balance, protective factors including adaptive coping (e.g., problem solving) and episodic memory, have been found to buffer the association between defeat and entrapment (Williams & Broadbent, 1986), while social support for example, may moderate the association between entrapment and self-injurious thoughts (Lee, 2019). However, it is important to highlight that the findings by Lee (2019), like most research exploring moderating effects of a similar topic, are based on cross-sectional data which cannot discern cause and effect. Although several factors have been identified which are believed to influence the emergence of self-injurious thoughts, how loneliness interacts with these variables to contribute to the emergence of self-injury remains unclear.

### 3.2.6 Loneliness as a risk factor for self-injury

As illustrated in figure 3.1, the IMV model defines factors associated with the transition from entrapment to suicidal ideation as ‘motivational moderators’. These include socially oriented factors such as social support and thwarted belongingness. Given that loneliness is conceptually related to thwarted belongingness and social support, it is likely to operate as a motivational moderator rather than a threat-to-self moderator. If so, loneliness would be expected to differentiate those with a history of self-injurious thoughts or behaviours, from those without. However, as a motivational moderator, loneliness would not be expected to play a key role in distinguishing between those with a history of self-injurious thoughts from those with a history of self-injurious behaviour. Instead, loneliness would be expected to potentially influence preceding factors as outlined by the IMV Model (i.e., pre-motivational factors or threat-to-self moderators) in relation to suicidal ideation, but not suicidal behaviour. If loneliness does operate as a motivational moderator, whether this effect is independent of social support also remains to be explored.

### 3.2.7 Loneliness and pre-motivational factors of the IMV model

It is well established that events in childhood shape how one interprets and responds to their environment in later life (Zanarini, 2000). For example, the development of an



avoidant attachment style during infancy is often associated with an avoidance of negative emotion from others, or oneself, in adulthood life (Makulincer & Shaver, 2019). Indeed, numerous parental characteristics and behaviours can have reverberating effects across the life-course and be assimilated into one's core self-beliefs. For example, parental expectations and parental criticism have been significantly associated with socially prescribed perfectionism (SPP) in adult offspring in later life (Frost *et al.* 1992). SPP is characterised by the belief that others have impossibly high expectations of the individual and such personality traits are consistently associated with high stress (Flett *et al.*, 2022) and avoidant of help-seeking (Abdollahi *et al.*, 2017). High traits of SPP have also been consistently associated with increased risk of suicidal ideation, behaviour and death (Smith *et al.*, 2018). Evidence suggests that people with high SPP traits also commonly report heightened or more frequent experiences of loneliness (Flett *et al.*, 2022). However, whether loneliness influences the association between SPP and suicidal ideation requires further investigation.

Adult personality and behaviour may also be shaped by early life trauma. A meta-analysis of seven prospective studies found that childhood trauma, specifically sexual or emotional abuse, or physical neglect, was significantly associated with suicide in adulthood (Zattie *et al.*, 2017). Emotional neglect (Musetti *et al.* 2021), physical abuse (Palgi *et al.*, 2011) and sexual abuse (Mullen *et al.*, 1994) in childhood are significantly associated with loneliness in adulthood. Similar to SPP, given the interpersonal element of most forms of trauma (i.e., excluding accidental injury) it is likely that such traumatic social experiences in early life (e.g., emotional abuse or neglect), may increase the likelihood of experiencing loneliness in later life.

Despite the associations between early life experiences and loneliness, loneliness is a normal emotion to experience on occasion. However, not everyone who experiences loneliness has suicidal thoughts or engages in behaviours, and not everyone who engages in suicidal behaviour is lonely. As such, there are likely to be situational or psychological factors which influence any identified association between loneliness and suicidal ideation.

### 3.2.8 Loneliness and Threat-to-Self Moderators of the IMV models

As illustrated in figure 3.1, threat-to-self moderators precede motivational moderators within the IMV model. Threat-to-self moderators include coping styles, memory biases and social problem solving. A review of 18 studies by Guerreiro *et al.* (2013) revealed that

emotion-focused and avoidant coping styles (e.g., drugs and alcohol), were regularly associated with self-injury whereas problem-solving was less regularly associated. Although there is no review to date which investigates the moderating role of coping strategies in relation to loneliness and self-injury, a review by Solmi *et al.* (2020) explored coping styles in relation to loneliness. The findings by Solmi *et al.* (2020) were similar to that of Guerreiro *et al.* (2013); emotion-focused coping was consistently, cross-sectionally associated with loneliness. As such, emotion-focused coping would be expected to be associated with both loneliness and suicidal ideation, as well as other coping styles potentially being influential in the loneliness- suicidal ideation interactive effect as well.

Another threat-to-self moderator is thinking style. Autobiographical memory can help individuals navigate challenges in the present and determine how to respond. As such this can have a direct impact on one's wellbeing, as illustrated by the IMV model. Understanding how loneliness influences the relationship between autobiographical memory and thinking styles, can help to understand how some individuals may be more likely to consider suicide.

### 3.2.9 Current study aim

The overarching aim of this study was to advance the understanding of the relationship between loneliness and self-injurious thoughts and behaviours in the context of the IMV model. The current study defined self-injury consistent with the NICE (2011) guidelines of self-harm, to include 'any act of self-poisoning or self-injury carried out by an individual irrespective of motivation'. According to this definition, therefore, this includes suicide attempts and self-injury without intent to die. The current study addressed four research questions:

1. To what extent does loneliness differentiate between those with a history of self-injurious thoughts, self-injurious behaviour, and no self-injury history?
2. To what extent do psychological variables, derived from the IMV model, differentiate between people with histories of self-injurious thoughts, self-injurious behaviour, and no self-injury history?
3. Is loneliness independently associated with self-injurious thoughts or behaviours when other psychological factors are controlled for?

4. Is loneliness a moderator of the defeat – entrapment relationship, and/or of the entrapment – suicidal ideation relationship within the context of the IMV model? If so, does this effect remain once social support is controlled for?
5. How do known early life risk factors (i.e., childhood trauma) and personality traits (i.e., socially prescribed perfectionism) interact with loneliness in predicting suicidal ideation?
6. How does loneliness interact with coping factors and suicidal ideation?

### 3.2.10 Key hypotheses

It was hypothesised that:

1. Loneliness scores would be higher for those with a history of self-injurious thoughts or behaviour than those without
2. Suicidal ideation, entrapment and childhood trauma scores would be higher in those with a history of self-injury than in those without. All other variables would distinguish between those with a history of self-injurious thoughts only, from those with no history of self-injurious thoughts or behaviours.
3. Loneliness would distinguish between participants with no history of self-injurious thoughts or behaviour, a history of self-injurious thoughts only, and those with a history of self-injurious behaviours.
4. Maladaptive states and traits (i.e., loneliness, childhood trauma, negative coping styles, perfectionistic traits, entrapment, defeat and stress) would be positively associated with suicidal ideation, all remaining variables (i.e., social support and adaptive coping styles) will be negatively associated with suicidal ideation.
5. Loneliness would operate as a Motivational Moderator, moderating the relationship between entrapment and suicidal ideation.
6. Loneliness will have a positive interactive effect with maladaptive coping styles in relation to suicidal ideation and a negative interactive effect between adaptive coping styles and suicidal ideation.

## 3.3. Methods

### 3.3.1 Recruitment and Procedure

The study employed a cross-sectional design using an online survey via the University of Glasgow's Online Survey System. The study was available between September 2018 and April 2019 to  $\geq 18$  years olds with a sufficient understanding of the written English language. The study was advertised via a snowballing approach on social media profiles held by the research team (e.g., Twitter, Facebook), public trading websites (Gumtree, Craigslist), University of Glasgow participant recruitment pages and the Suicidal Behaviour Research Laboratory (SBRL) website ([www.suicideresearch.info](http://www.suicideresearch.info)). Individuals who observed the study advert were invited to share the advert with their own contacts. Participants were recruited using opportunity sampling, where interested participants who viewed the study advert were invited to access a weblink. The initial survey screen displayed the participant information sheet and consent form. Also included were hyperlinks to contact information of support services and privacy notice. Participants indicated consent and eligibility by clicking an electronic checkbox under the consent form. They were then directed to the next page to commence the anonymous survey. The support services sheet was available throughout the survey should participants wish to discuss personal experiences at any point during their participation. After survey completion, participants were invited to enter a prize draw by following a separate link to enter their contact details. This link was detached from the survey to ensure participants' contact details could not be linked to their survey responses while still enabling the winner to be contacted. The winner of the draw was selected at random and offered a choice prize of either an iPad Mini or High Street vouchers to the value of £200.

Ethical approval was granted by the University of Glasgow Medical, Veterinary and Life Sciences Ethics Committee (Project No: 200180003) and the study investigation was conducted in accordance with the Declaration of Helsinki (2013).

### 3.3.2 Measures

All measures included in the survey are listed below. All reported Cronbach's alphas ( $\alpha$ ) were calculated based on the present sample.

*Demographics.* Age, gender, nationality, sexuality and employment status were asked using a multiple-choice responses and free-text box was provided for use at the participants discretion.

*History of self-injurious thoughts and behaviours.* Items from the Adult Psychiatric Morbidity Survey (McManus *et al.*, 2007) were modelled to capture suicidal ideation history in the current study pertaining to occurrence, frequency and recency of participant's self-injurious thoughts and behaviours (see Appendix 5).

*Loneliness.* University of California Los Angeles Loneliness Scale version 3 (UCLA-LS version 3; Russell *et al.*, 1980) is a 20-item (score range: 20-80) self-report assessment of loneliness (e.g., 'I lack companionship') using a 4-point Likert-type response scale (from 'never' to 'often'). High scores reflected greater loneliness. The UCLA-LS is a leading measure of loneliness with high reliability and validity across a range of populations and cultures (Russell *et al.*, 1980). There was excellent internal consistency in the current study (Cronbach's  $\alpha=0.94$ )

*Suicidal ideation.* Suicide Probability Scale – Suicide Ideation subscale (SPS ; Cull *et al.*, 1989). The 8-item suicide ideation subscale (score range 8-24) assesses various thoughts of suicide (e.g., 'I feel the world is not worth continuing to live in') and respondents answered on a 4-point Likert-type scale (from 'none of the time', to 'most or all of the time'). Higher scores reflected greater suicidal ideation. In this study, the measure demonstrated excellent internal consistency (Cronbach's  $\alpha=0.92$ ).

*Stress.* The Perceived Stress Scale-Short Form (PSS-short; Cohen & Williamson, 1988) is a 4-item (score range 0-16) scale that assesses how often a participant felt or thought a certain way (e.g., 'Felt that things were going your way?') answered on a 5-point Likert-type scale (from 'never' to 'very often'). High scores indicated greater stress. The PSS-short has been found to be a reliable, brief measure of stress (Lee, 2012) with good internal consistency within the current study (Cronbach's  $\alpha=0.86$ ).

*Childhood trauma.* The Child Trauma Questionnaire (CTQ-short; Bernstein *et al.*, 1998) is a 28-item questionnaire that retrospectively measures childhood abuse and neglect (e.g., 'I believe I was physically abused') with responses measured using a 5-point Likert-type scale (from 'never true' to 'very often true'; total subscale scores range: 0-4). High scores indicated more trauma. The measure has been found to be an appropriate tool for clinical and non-clinical populations (Bernstein *et al.*, 2003). In the current study, internal

consistency of the CTQ subscales were ‘strong’ for emotional abuse (CEA; Cronbach’s  $\alpha=0.90$ ), emotional neglect (CEN; Cronbach’s  $\alpha=0.92$ ) and sexual trauma (CSA; Cronbach’s  $\alpha=0.97$ ), ‘good’ for physical neglect (CPN; Cronbach’s  $\alpha=0.78$ ). Due to a technical error one item was omitted from the physical abuse subscale, however internal consistency was still ‘good’ (CPA; Cronbach’s  $\alpha=0.80$ ).

*Socially Prescribed Perfectionism.* The Multidimensional Perfectionism Scale (HFMP; Hewitt *et al.*, 1991) is comprised of 15 items (score range 15-105) relating to Socially Prescribed Perfectionism (e.g., ‘The people around me expect me to succeed at everything I do’) taken from a larger measure of perfectionism. Answers are reported on a 7-point Likert-type scale (from ‘strongly disagree’ to ‘strongly agree’). High scores on this measure indicate more socially prescribed perfectionistic traits. This measure is widely used (Hewitt *et al.*, 1991) and showed strong internal consistency in the current study (Cronbach’s  $\alpha=0.90$ ).

*Autobiographical memory.* The Thinking About Life Experiences Scale (TALE; Bluck & Alea., 2011) is a 15-item questionnaire that measures three functions of autobiographical memory. The three subscales are: Self-Continuity (the retrospective awareness of oneself over-time), Social Bonding (thinking and discussing past events to get to develop new bonds or maintain existing ones) and Directing Behaviour (the action of drawing on one’s past lessons to guide current decisions and actions). Responses were captured using a 5-point Likert-type scale (from ‘almost never’ to ‘very frequently’; score range 0-20). Higher scores echoed greater use of the specific memory recall style, thereby demonstrating one’s ability to draw upon past experiences to guide behaviour in the present. Based on the current study, good internal consistency was identified for Self-Continuity (Cronbach’s  $\alpha=0.80$ ), Social Bonding (Cronbach’s  $\alpha=0.83$ ) and Directing Behaviour (Cronbach’s  $\alpha=0.80$ ).

*Defeat.* The Defeat Scale (Gilbert & Allan, 1998) is a 16-item questionnaire that measures an individual’s perceived struggle or loss of social rank (e.g., ‘I feel that I have not made it in life’), which has been linked to low psychological health. Respondents answered using a 5-point Likert-type scale (from ‘never’ to ‘always’ score range 0-64) with higher scores reflecting greater defeat. This measure has high internal consistency in the general population (0.94 student population, Gilbert & Allan, 1998). The measure demonstrated excellent internal consistency in the current study (Cronbach’s  $\alpha=0.97$ ).

*Entrapment.* The Entrapment Scale (Gilbert & Allan, 1998) measures internal entrapment (6-items; one's own thoughts and feelings e.g. 'I feel powerless to change myself') and external entrapment (10-items; external situations e.g. 'I have a strong desire to escape from things in my life') with answers recorded on a 5-point Likert-type scale (from 'Not at all like me' to 'Extremely like me'; score range: 0-40). Higher scores in each of these measures reflected greater sense of entrapment. Both scales were found to have high levels of reliability for both student and clinical populations ( $>0.85$ ; Gilbert & Allan, 1998). Indeed, within the current study, excellent internal consistency was observed for both internal (Cronbach's  $\alpha=0.95$ ) and external subscales (Cronbach's  $\alpha=0.93$ ).

*Coping.* The Brief COPE (Carver, 1997) is a 28-item measure which includes 14 subscales exploring various coping methods (e.g., 'I've been using alcohol or other drugs to make myself feel better' and 'I've been getting emotional support from others'), recorded using a 5-item Likert-type scale (from 'I haven't been doing this at all', to 'I've been doing this a lot'). Coping behaviours are reflected by higher scores in this measure. To identify an appropriate factor structure for this measure, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted on the current study data. However, due to the amount of data available in the current study, a reliable factor model using a splitwise-EFA approach could not be developed. Consequently, existing factor models were systematically screened and tested to identify a model with statistically acceptable model-fit for the current study data (see Appendix 6). This systematic approach resulted in the identification of a 4-factor model published by Nahlén and Saboonchi (2010) and CFA revealed statistically acceptable model fit of this factor structure based on the current study data (see appendix 7.A). Good internal consistency was observed for problem focused coping (Cronbach's  $\alpha=0.83$ , score range 2-8) and socially supported coping (Cronbach's  $\alpha=0.84$ , score range 3-12), while avoidant and emotion-focused coping had fair internal consistency (Cronbach's  $\alpha=0.77$  and  $0.71$  and score range 3-12 and 4-16 respectively) based on current study data. For details of individual coping behaviours of the Brief COPE allocated to each of these coping styles, see Appendix 7.B.

*Social support.* The Enriched Social Support Instrument (ESSI; Mitchell *et al.*, 2003) is a 7-item measure (score range: 7-35) that explores practical, emotional, and informational supports that are available to the participant (e.g., 'Is there someone available to help you with daily chores?'), with responses based on a 5-point Likert-type scale (from 'none of the time' to 'all of the time'). Higher scores reflected greater social support. The measure

has strong psychometric properties (Gottlieb & Bergen, 2010) and strong internal consistency was evidenced in the current study (Cronbach's  $\alpha = 0.90$ )

### 3.3.3 Statistical analysis

Using G-Power software, an a priori multi-linear regression assessment with a moderate effect size (Cohen, 1992) of  $\rho = 0.15$  and power ( $1 - \beta$ ) of 0.8 ( $p < 0.05$ ) determined that a minimum of 114 participants are required to detect an effect with a maximum of 9 predictor measures and one outcome measure (suicidal ideation). Statistical analyses were conducted using SPSS (version 26). Participants were classified according to their reported self-injury history as follows:

- i) no history of ideation or behaviour group (NH) included participants with no history of self-injurious thoughts or self-injurious behaviour;
- ii) history of self-injurious thoughts group (ST) – participants with a history of self-injurious thoughts only but no history of self-injurious behaviour; and
- iii) history of self-injurious behaviour group (SB) – participants with a history of self-injurious behaviour (including suicide attempt) regardless of self-injurious thoughts history.

Demographics were reported by frequency for categorical variables and means and standard deviation ( $\pm$ ) for continuous variables. Between-group differences for continuous demographic variables (i.e., age) were analysed using one-way ANOVAs. Visual inspection showed that the psychometric measures were normally distributed and therefore parametric analyses were used. Initial correlation analyses were conducted to assess the association between all study variables. Collinearity analyses were used to explore similarities between defeat, entrapment and suicidal ideation. Consistent with prior published collinearity assessments (e.g., Kim, 2019), variable inflation factors (VIF) values of  $< 5$  and condition index values of  $< 30$  were indicative of no collinearity and therefore deemed acceptable. Univariate multinomial logistic regressions were used to compare scores between participant groups and are reported using chi-squares ( $\chi^2$ ). Pairwise analyses were employed to identify differences between groups and were reported using odds ratio (OR) and 95% confidence intervals (95% CI). Additionally, multinomial logistic regressions were used to identify which variables remained significant when all other study psychological variables were controlled for and post-hoc pairwise comparisons were explored. Hayes' (2013) PROCESS macro for SPSS was used to conduct mean-centred



moderation analyses to test whether loneliness acted as a moderator between i) defeat and entrapment, and ii) entrapment and suicidal ideation. We then conducted simple slopes analyses to probe at which levels of the variables the moderator had its effect.

### 3.3.4 Missing data

Missing data analysis was conducted for all variables. Following previous research (e.g., Wetherall *et al.*, 2018), a participant's data was excluded from any scale if less than 75% of the scale items were completed. Applying this rule resulted in 4-6 participants (1-1.5%) being excluded for each measure (of which four participants were excluded from the entire study).

Missing data on individual items ranged from 0 to 4.2% per variable. Little's Missing Completely at Random (MCAR) test was non-significant, indicating that these values were missing completely at random. Estimation-Maximisation imputation techniques were applied to the missing data to generate complete datasets for further analysis. Participants who did not answer all self-injury history questions were not included in the logistic regression analyses, as they could not be allocated. However, all participants were included in all correlation and moderation analyses as self-injury history data was not a pre-requisite.

## 3.4 Results

### 3.4.1 Sample characteristics

Participant demographic details are described in Table 3.1. Overall, 400 participants took part in the study (79.1% female, 19.2% male; average age: 35.3 years  $\pm$  13.9, range 18-76,  $n= 393$ ). ANOVA revealed no significant difference in age between the participant groups. 69.4% of participants identified as British. 61% of participants were employed.

### 3.4.2. Correlations between loneliness, suicidal ideation and other variables

Most variables were inter-correlated in the expected directions (see Appendix 8). Suicidal ideation was significantly associated with all study variables except directing behaviour (memory subscale). Loneliness was significantly associated with all variables in the

Table 3.1 Participant demographics by self-reported self-injurious thoughts and behaviour history (n=400)

	<b>Total sample*</b> (n= 400)	<b>NH group</b> (n= 84)	<b>ST group</b> (n= 105)	<b>SB group</b> (n= 204)
<b>Gender n (%)</b>				
Male	77 (19.3)	23 (27.4)	19 (18.1)	34 (16.7)
Female	308 (78.5)	60 (71.4)	84 (80)	164 (80.4)
Other	6 (1.5)	0	1 (1)	5 (2.5)
Missing/ Not stated	3 (0.8)	1 (1.2)	1 (1)	1 (0.5)
<b>Age</b>				
Mean ( <i>sd.</i> ), n	35.27 (13.9) 383	33.68 (13.4) 82	34.51 (14) 103	36.32 (14.1) 198
Missing/ Not stated n, (%)	17 (4.3)	2 (2.4)	2 (1.9)	6 (3)
<b>Nationality n (%)</b>				
British	267 (69.4)	54 (65.5)	67 (62.6)	146 (71.1)
Other	118 (30.3)	27 (32.1)	37 (35.2)	54 (26.5)
Missing/ Not stated	15 (3.75)	3 (3.6)	1 (1.0)	4 (1.9)
<b>Sexuality n (%)</b>				
Straight	284 (71)	71 (84.5)	74 (70.5))	139 (68.1)

Gay	29 (7.3)	5 (6.0)	9 (8.6)	15 (7.4)
Bisexual	54 (13.5)	6 (7.1)	16 (15.2)	32 (15.7)
Other/ Not sure	25 (6.25)	2 (2.4)	6 (5.7)	17 (8.3)
Missing/ not stated	8 (2.0)	0 (0)	0 (0)	1 (0.5)
<b>Employed n (%)</b>				
Yes	244 (61)	56 (66.7)	63 (60)	120 (58.8)
Missing/ not stated	3 (0.8)	1 (1.2)	1 (1)	1 (0.5)

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\*Including participants who could not be allocated to a participant sub-group.

*sd.*= standard deviation; *n*= total number; NH= No history of self-injurious thoughts or behaviour; ST= history of self-injurious thoughts only; SB= history of self-injurious behaviour.

expected direction except for self-continuity (memory subscale) which was not significantly correlated with loneliness, and childhood emotional neglect which was negatively correlated ( $r = -0.41$ ,  $p < 0.01$ ).

### 3.4.3 Test of collinearity

Due to the high correlation between defeat and entrapment identified in the current study ( $r = 0.71$ ,  $p < 0.001$ ), a test of collinearity was conducted. The analysis revealed there was no statistically significant collinearity between defeat (VIF = 2.399, Eigen value = 0.061, condition index = 6.715) and entrapment (VIF = 2.399, eigen value = 0.184, condition index = 3.867) in association with suicidal ideation.

### 3.4.4 Differentiating between participant groups by self-injury history

Univariate multinomial logistic regression (see Appendix 9) indicated that loneliness scores differed significantly between NH, SI and SB groups ( $\chi^2 (2) = 94.797$ ,  $p < 0.001$ ). Additionally, a further 13 of the 18 psychosocial variables were also found to distinguish between the three participant groups. Follow-up pairwise comparisons (see Appendix 10) revealed that self-reported loneliness significantly differed between all participant group pairs (NH group vs SI group; OR: 1.102, 95% CI 1.06, 1.136; NH vs SB; OR: 1.132, 95% CI 1.098, 1.167; SI vs SB; OR: 1.028, 95% CI 1.007, 1.048).

Multivariable multinomial logistic regression (see table 3.2) showed that when all other variables were controlled, loneliness significantly differentiated between NH, SI and SB groups ( $\chi^2 (2) = 8.572$ ,  $p = 0.05$ ). Further between-group differences were identified for emotional abuse ( $\chi^2 (2) = 16.644$ ,  $p < 0.001$ ) and suicidal ideation ( $\chi^2 (2) = 43.667$ ,  $p < 0.001$ ). Pairwise analysis (see table 3.3) revealed that loneliness scores differed between NH and SI participants groups (OR: 1.089, 95% CI 1.026, 1.155), with no differences identified between NH and SB, or SI and SB. Of all the variables within the multivariable multinomial logistic regression, only suicidal ideation differentiated between all pairwise comparisons (NH vs. SI: OR: 1.48, 95% CI 1.214, 1.804; NH vs SB: OR: 1.722, 95% CI 1.409, 2.10; SI vs SB OR: 1.161, 95% CI 1.068, 1.262).

For univariate and multivariate logistic regression summaries adjusted for age and gender, please see Appendix 11.

Table 3.2. Multivariable multinomial logistic regression between NH, SI and SB groups (n= 392, df= 2)

<b>Variable</b>	$\chi^2$	<i>p</i>
<b>Coping</b>		
Avoidant Focused	2.49	ns
Emotion Focused	2.20	ns
Problem Focused	0.44	ns
Socially Supportive	5.88	ns
<b>Defeat</b>	2.27	ns
<b>Entrapment</b>	2.04	ns
<b>Loneliness</b>	<b>8.57</b>	<b>&lt;0.05</b>
<b>Memory</b>		
Directing behaviour	0.13	ns
Self-Continuity	1.24	ns
Social bonding	1.81	ns
<b>Socially Prescribed Perfectionism</b>	0.27	ns
<b>Social Support</b>	0.25	ns
<b>Stress</b>	1.51	ns
<b>Trauma</b>		
Emotional Abuse	<b>16.64</b>	<b>&lt;0.001</b>
Emotional Neglect	2.10	ns
Physical Abuse	1.01	ns
Physical Neglect	0.32	ns
Sexual Abuse	0.60	ns
<b>Suicidal Ideation</b>	<b>43.67</b>	<b>&lt;0.001</b>

X<sup>2</sup>= chi-square, p= p-value; df= degrees of freedom. Values highlighted in bold are statistically significant (p <0.05).

Table 3.3. Pairwise analysis following multivariable multinomial logistic regression by self-injurious thoughts and behaviour history group membership (n = 392)

	NH vs SI <sup>a</sup>					NH vs SB <sup>a</sup>					SI vs SB <sup>b</sup>				
	B	OR	95% CI		<i>p</i>	B	OR	95% CI		<i>p</i>	B	OR	95% CI		<i>p</i>
			Low	High				Low	High				Low	High	
<b>Coping</b>															
Avoidant	0.1	1.105	0.938	1.302	0.232	0.129	1.138	0.964	1.342	0.126	0.026	1.027	0.940	1.121	0.555
Emotion Focused	-0.003	0.997	0.893	1.112	0.955	0.048	1.050	0.939	1.174	0.396	0.051	1.053	0.980	1.130	0.158
Problem Focused	-0.036	0.964	0.822	1.132	0.657	-0.055	0.946	0.802	1.116	0.512	-0.024	0.976	0.876	1.087	0.660
Socially Supported	<b>0.143</b>	<b>1.153</b>	<b>1.021</b>	<b>1.302</b>	<b>0.022</b>	0.083	1.087	0.959	1.231	0.193	-0.060	0.941	0.864	1.026	0.168
<b>Defeat</b>	0.017	1.017	0.959	1.079	0.572	0.039	1.040	0.980	1.104	0.200	0.021	1.021	0.984	1.060	0.267
<b>Entrapment</b>	-0.020	0.980	0.946	1.016	0.268	-0.027	0.974	0.939	1.010	0.153	-0.006	0.994	0.971	1.017	0.616
<b>Loneliness</b>	<b>0.085</b>	<b>1.089</b>	<b>1.026</b>	<b>1.155</b>	<b>0.005</b>	0.056	1.057	0.995	1.124	0.073	-0.029	0.972	0.932	1.013	0.179
<b>Memory</b>															

	NH vs SI <sup>a</sup>					NH vs SB <sup>a</sup>					SI vs SB <sup>b</sup>				
	B	OR	95% CI		<i>p</i>	B	OR	95% CI		<i>p</i>	B	OR	95% CI		<i>p</i>
			Low	High				Low	High				Low	High	
Directing behaviour	-0.005	0.995	0.876	1.130	0.933	-0.019	0.982	0.861	1.119	0.781	-0.013	0.987	0.907	1.073	0.756
Self-Continuity	-0.035	0.965	0.865	1.077	0.528	-0.061	0.941	0.841	1.053	0.289	-0.024	0.976	0.909	1.049	0.515
Social bonding	-0.012	0.988	0.881	1.108	0.839	0.040	1.041	0.925	1.171	0.508	0.050	1.052	0.974	1.135	0.196
<b>Socially Prescribed Perfectionism</b>	0.008	1.008	0.977	1.040	0.617	0.005	1.005	0.974	1.038	0.751	-0.002	0.998	0.978	1.019	0.859
<b>Social Support</b>	0.022	1.022	0.937	1.115	0.623	0.014	1.014	0.928	1.109	0.753	-0.009	0.991	0.933	1.052	0.764
<b>Stress</b>	-0.109	0.897	0.738	1.089	0.271	-0.121	0.886	0.726	1.082	0.236	-0.01	0.990	0.869	1.129	0.883
<b>Trauma</b>															
Emotional Abuse	0.447	1.563	0.888	2.753	0.122	<b>0.949</b>	<b>2.582</b>	<b>1.472</b>	<b>4.528</b>	<b>0.001</b>	<b>0.524</b>	<b>1.688</b>	<b>1.213</b>	<b>2.350</b>	<b>0.002</b>
Emotional Neglect	-0.377	0.686	0.343	1.372	0.287	-0.121	0.886	0.445	1.765	0.731	0.234	1.264	0.849	1.882	0.248
Physical Abuse	-0.338	0.713	0.369	1.381	0.316	-0.260	0.771	0.403	1.476	0.433	0.069	1.071	0.732	1.568	0.723
Physical Neglect	0.143	1.153	0.695	1.915	0.582	0.095	1.100	0.663	1.825	0.713	-0.046	0.955	0.691	1.319	0.779

	NH vs SI <sup>a</sup>					NH vs SB <sup>a</sup>					SI vs SB <sup>b</sup>				
	B	OR	95% CI		<i>p</i>	B	OR	95% CI		<i>p</i>	B	OR	95% CI		<i>p</i>
			Low	High				Low	High				Low	High	
Sexual Abuse	-0.168	0.845	0.550	1.299	0.443	-0.154	0.857	0.559	1.315	0.479	0.011	1.011	0.774	1.322	0.936
<b>Suicidal Ideation</b>	<b>0.392</b>	<b>1.480</b>	<b>1.214</b>	<b>1.804</b>	<b>0.0001</b>	<b>0.543</b>	<b>1.722</b>	<b>1.409</b>	<b>2.104</b>	<b>0.0001</b>	<b>0.149</b>	<b>1.161</b>	<b>1.068</b>	<b>1.262</b>	<b>0.0001</b>

B= Unstandardised beta; OR= Odds Ratio; CI= Confidence Interval; *p*= *p*-value; <sup>a</sup> NH group is reference; <sup>b</sup> SI is reference. Values highlighted in bold are statistically significant (*p* <0.05). NH= No history of self-injurious thoughts or behaviour; SI= history of self-injurious thoughts only; SB= history of self-injurious behaviour.



### 3.4.5 Exploring loneliness within the Motivational Phase of the IMV Model

The role of loneliness as a moderating factor within the motivational phase of the IMV model was investigated separately within the defeat-entrapment, and the entrapment-suicidal ideation statistical models.

#### 3.4.5.1 Defeat and entrapment moderation model

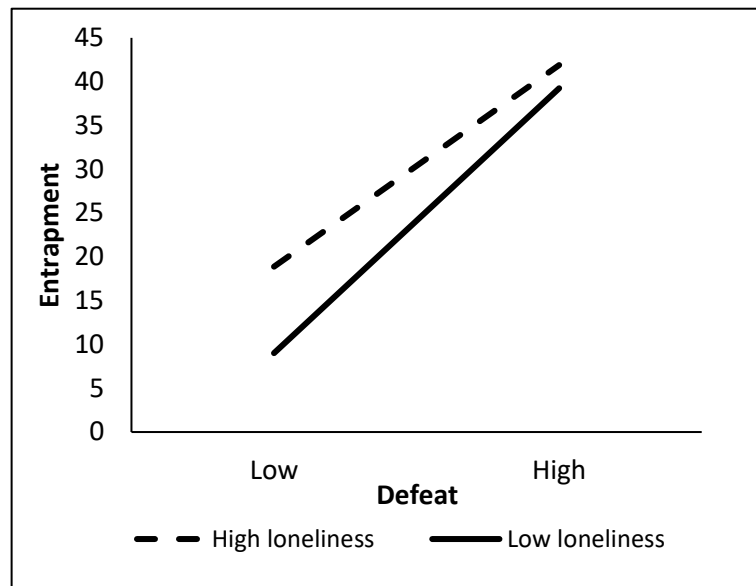
An analysis exploring loneliness as a moderator between defeat and entrapment was conducted. Significant main effects were identified between defeat and entrapment ( $b$ : 1.102,  $SE$ = 0.147,  $t$ = 7.5,  $p$  <0.001, 95% CI 0.813, 1.391) and loneliness and entrapment ( $b$ : 0.465,  $SE$ = 0.108,  $t$ = 4.295,  $p$  <0.001, 95% CI 0.252, 0.677). The overall test of interaction between defeat and loneliness in predicting entrapment was also significant ( $\beta$ : -0.008,  $SE$ =0.0027,  $t$ = -2.8214,  $p$  <0.01, 95% CI -0.0131, -0.0023). This interaction remained significant when social support was controlled for ( $\beta$ : -0.008,  $SE$ =0.003,  $t$ = -2.755,  $p$  <0.01, 95% CI: -0.013, -0.002).

Simple slopes analysis was used to explore loneliness one standard deviation above ('high') and below ('low') the mean (see figure 3.2). Within the defeat-entrapment moderation model both the high ( $b$ : 0.639,  $SE$ = 0.063, 95% CI 0.516, 0.762) and low ( $b$ : 0.84,  $SE$ = 0.07, 95% CI 0.702, 0.978) loneliness slopes were significant. Figure 3.2 illustrates that higher levels of defeat and loneliness were associated with higher levels of entrapment overall, however when defeat scores were low, high levels of loneliness were more strongly associated with higher levels of entrapment compared to those reporting low levels of loneliness. This therefore illustrates that loneliness was a statistically significant moderator between defeat and entrapment, even in those who present with low or no loneliness.

#### 3.4.5.2 Entrapment and suicidal ideation moderation model

Loneliness was also explored as a moderator in the association between entrapment and suicidal ideation. Within the final moderation model, the entrapment to suicidal ideation pathway was not statistically significant ( $b$ :0.017,  $SE$ = 0.045,  $t$ =0.368,  $p$ = NS, 95% CI -0.072, 0.105), however the relationship between loneliness and suicidal ideation was significant ( $b$ : 0.147,  $SE$ =0.03,  $t$ =4.899,  $p$  <0.001, 95% CI 0.0003, 0.004). Additionally, a

Figure 3.2. Loneliness as a moderator between defeat and entrapment



significant moderating effect of loneliness between entrapment and suicidal ideation was evident ( $\beta$ : 0.002, SE=0.0009,  $t$ =-2.367,  $p$  <0.05, 95% CI 0.0003, 0.0037). When social support was controlled for, loneliness as a moderator between entrapment and suicidal probability remained significant ( $\beta$ : 0.002, SE=0.001,  $t$ = 2.392,  $p$ = NS, 95% CI: 0.0001, 0.004)

Simple slopes analysis one standard deviation above and below the mean of loneliness revealed that both the low ( $b$ : 0.086, SE = 0.019, 95% CI 0.048, 0.124) and high ( $b$ : 0.139, SE = 0.017, 95% CI: 0.106, 0.173) loneliness slopes were significantly different from zero. As illustrated in figure 3.3, higher levels of entrapment and higher levels loneliness were associated with higher levels of suicidal ideation. Conversely, those who reported the lowest levels of suicidal ideation reported low levels of entrapment and low levels of loneliness.

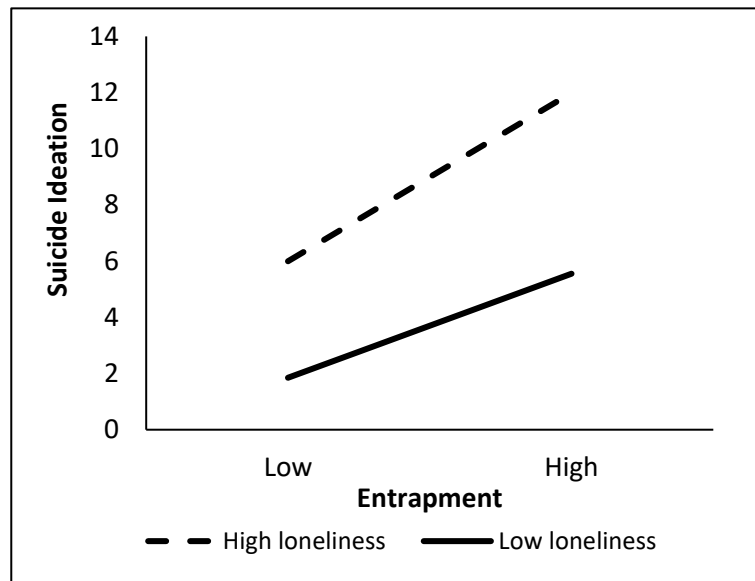
#### 3.4.5.3 The association between coping style, loneliness and suicidal ideation

The moderating effect of loneliness in relation to the association between each individual coping style and suicidal ideation was explored. The findings are summarised below.

##### Problem focused coping

Loneliness significantly moderated between problem-focused coping and suicidal ideation with a negative interaction observed overall ( $b$ = -0.011, SE= 0.005,  $t$ = -2.361, 95% CI: -

Figure 3.3. Loneliness as a moderator between Entrapment and Suicidal Ideation.



0.020, -0.002). Slopes analysis (illustrated in figure 3.4) revealed that loneliness one standard deviation above the mean was significant (high loneliness:  $b = -0.206$ ,  $SE = 0.092$ ,  $t = -2.254$ , 95% CI: -0.286, -0.026) whereas loneliness one standard deviation below the mean was not significant (low loneliness:  $b = 0.082$ ,  $SE = 0.089$ ,  $t = 0.922$ , 95% CI: -0.018, 0.237). This illustrates that high loneliness is significantly associated with suicidal ideation regardless of whether problem-focused coping is high or low, however those who scored high in problem focused coping and loneliness reported lower suicidal ideation than those who reported low problem-focused coping. Overall, suicidal ideation scores were highest in those with low problem-solving coping and high loneliness. Low loneliness did not significantly influence the association between problem-focused coping and suicidal ideation.

#### Avoidant coping

The moderating effect of loneliness in relation to avoidant coping and suicidal ideation was statistically significant and positive ( $b = 0.009$ ,  $SE = 0.004$ ,  $t = 2.414$ , 95% CI: 0.002-0.017). Simple slopes analysis (figure 3.5) revealed that both the lower ( $b = 0.385$ ,  $SE = 0.088$ ,  $t = 4.377$ , 95% CI: 0.212-0.558) and higher ( $b = 0.622$ ,  $SE = 0.059$ ,  $t = 10.527$ , 95% CI: 0.506-0.738) slopes were positive and significant. High loneliness was associated with high suicidal ideation scores, regardless of whether avoidant coping was high or low.

Figure 3.4. Loneliness as a moderator between Problem-Focused Coping and Suicidal Ideation.

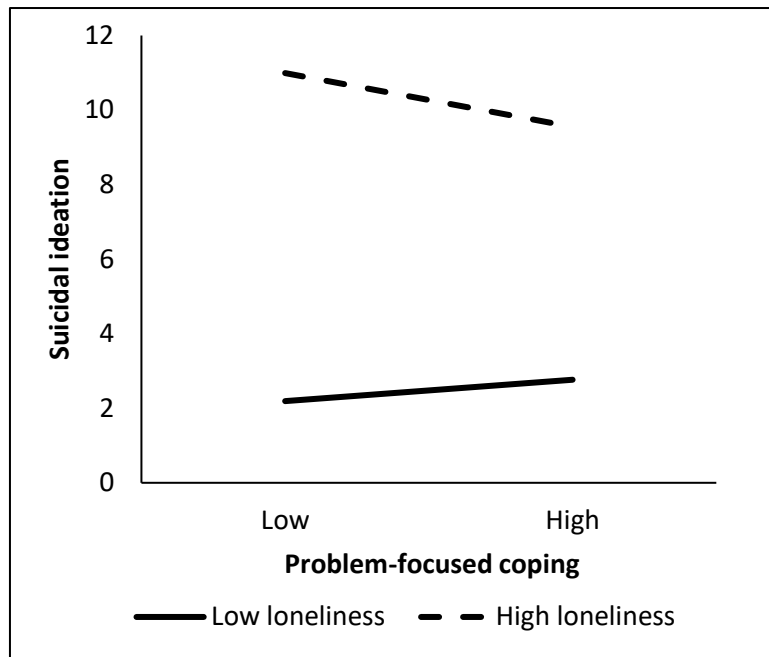
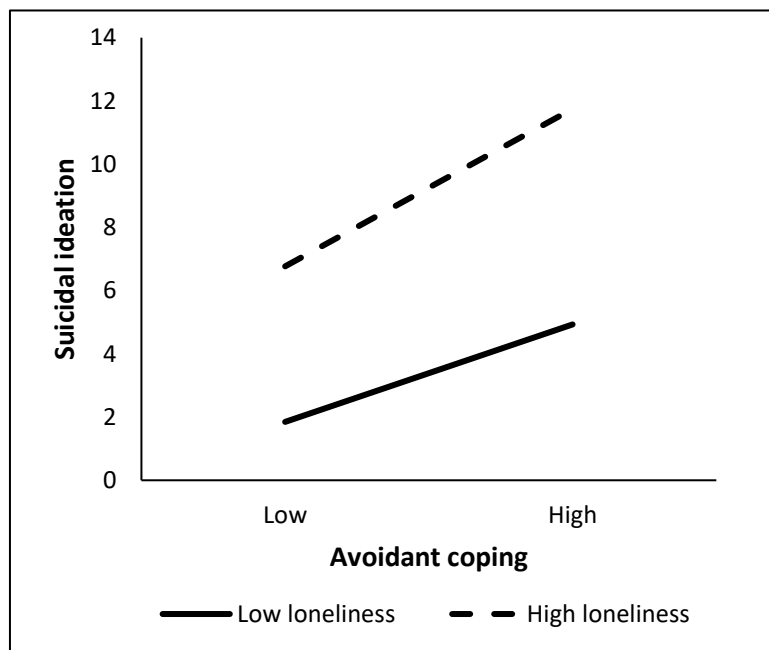


Figure 3.5. Loneliness as a moderator between Avoidant Coping and Suicidal Ideation.

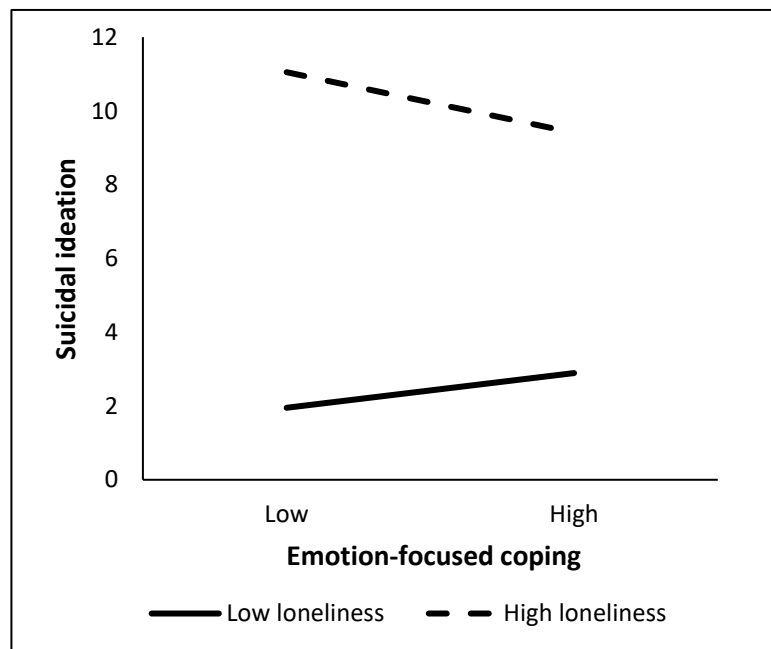


In this model, suicidal ideation was highest in those who scored high on both avoidant coping and loneliness. Equally, lowest suicidal ideation scores were associated with individuals who reported low loneliness and low avoidant coping styles.

### Emotion-focused coping

Loneliness negatively influenced the overall effect between emotion-focused coping and suicidal ideation ( $b = -0.011$ ,  $SE = 0.003$ ,  $t = -3.359$ , 95% CI:  $-0.018$ ,  $-0.005$ ). Simple slopes revealed no significant interactive effect when loneliness was low ( $b = 0.105$ ,  $SE = 0.062$ ,  $t = -1.689$ , 95% CI:  $-0.017$ ,  $0.226$ ), but a significant, negative interaction was observed when loneliness was high ( $b = -0.183$ ,  $SE = 0.065$ ,  $t = -2.798$ , 95% CI:  $-0.311$ ,  $-0.054$ ). Highest suicidal ideation scores were associated with those with high loneliness but low emotion-focused coping but was lowest in those with both low loneliness and low emotion-focused coping styles (see figure 3.6).

Figure 3.6. Loneliness as a moderator between Emotion-Focused Coping and Suicidal Ideation.



### Socially supportive coping

There was no significant interaction between socially supportive coping and loneliness in predicting suicidal ideation.

### 3.4.6 Exploring interactions between pre-motivational factors of suicide behaviour and loneliness in predicting suicidal ideation

#### 3.4.6.1 Loneliness as a mediator between childhood trauma and suicidal ideation

Childhood emotional abuse was significantly associated with loneliness ( $b = 3.344$ ,  $se = 0.489$ ,  $t = 6.844$ ,  $p < 0.001$ , 95% CI: 2.384, 4.304) and loneliness was significantly associated with suicidal ideation ( $b = 0.281$ ,  $se = 0.017$ ,  $t = 16.454$ ,  $p < 0.001$ , 95% CI: 0.247, 0.314; see figure 3.7A). The inclusion of loneliness in the model did not reduce the direct effect to non-significance ( $b = 0.915$ ,  $se = 0.176$ ,  $t = 5.204$ ,  $p < 0.001$ , 95% CI: 0.569, 1.260). As the indirect effect was significant ( $b = 0.938$ ,  $se = 0.152$ , 95% CI: 0.647, 1.235), this suggests that loneliness partially mediated the association between childhood emotional trauma and suicidal ideation.

Childhood emotional neglect was significantly associated with loneliness ( $b = -4.828$ ,  $se = 0.536$ ,  $t = -9.004$ ,  $p < 0.001$ , 95% CI: -5.882, -3.774) and loneliness was significantly associated with suicidal ideation ( $b = 0.291$ ,  $se = 0.018$ ,  $t = 16.025$ ,  $p < 0.001$ , 95% CI: 0.255, 0.327; see figure 3.7B). The inclusion of loneliness in the model did not reduce the direct effect to non-significance ( $b = -0.528$ ,  $se = 0.213$ ,  $t = -2.480$ ,  $p < 0.05$ , 95% CI: -0.947, -0.109). As the indirect effect was significant ( $b = -1.404$ ,  $se = 0.179$ , 95% CI: -1.759, -1.063), this suggests that loneliness partially mediated the association between childhood emotional neglect and suicidal ideation.

Childhood physical abuse was significantly associated with loneliness ( $b = 1.456$ ,  $se = 0.729$ ,  $t = 1.998$ ,  $p < 0.05$ , 95% CI: 0.023, 2.888) and loneliness was significantly associated with suicidal ideation ( $b = 0.304$ ,  $se = 0.017$ ,  $t = 18.396$ ,  $p < 0.001$ , 95% CI: 0.271, 0.336; see figure 3.7C). The inclusion of loneliness in the model did not reduce the direct effect to non-significance ( $b = 0.832$ ,  $se = 0.241$ ,  $t = 3.448$ ,  $p < 0.001$ , 95% CI: 0.358, 1.306). As the indirect effect was not significant ( $b = 0.442$ ,  $se = 0.233$ , 95% CI: -0.011, 0.903), this suggests that loneliness did not mediate the association between childhood physical abuse and suicidal ideation.

Childhood physical neglect was significantly associated with loneliness ( $b = 3.164$ ,  $se = 0.562$ ,  $t = 5.625$ ,  $p < 0.001$ , 95% CI: 2.058, 4.269) and loneliness was significantly associated with suicidal ideation ( $b = 0.299$ ,  $se = 0.017$ ,  $t = 17.379$ ,  $p < 0.001$ , 95% CI: 0.265,

0.333; see figure 3.7D). The inclusion of loneliness in the model did not reduce the direct effect to non-significance ( $b= 0.435$ ,  $se= 0.201$ ,  $t= 2.166$ ,  $p < 0.05$ , 95% CI: 0.040, 0.830). As the indirect effect was significant ( $b= 0.947$ ,  $se= 0.164$ , 95% CI: 0.626, 1.273), this suggests that loneliness partially mediated the association between childhood physical neglect and suicidal ideation.

Childhood sexual abuse was significantly associated with loneliness ( $b= 2.458$ ,  $se= 0.555$ ,  $t= 4.432$ ,  $p < 0.001$ , 95% CI: 1.368, 3.548) and loneliness was significantly associated with suicidal ideation ( $b= 0.296$ ,  $se= 0.017$ ,  $t= 17.617$ ,  $p < 0.001$ , 95% CI: 0.263, 0.329; see figure 3.7E). The inclusion of loneliness in the model did not reduce the direct effect to non-significance ( $b= 0.729$ ,  $se= 0.190$ ,  $t= 3.836$ ,  $p < 0.001$ , 95% CI: 0.355, 1.103). As the indirect effect was significant ( $b= 0.726$ ,  $se= 0.168$ , 95% CI: 0.398, 1.049), this suggests that loneliness partially mediated the association between childhood sexual abuse and suicidal ideation.

#### 3.4.6.2 Loneliness as a moderator between childhood trauma and suicidal ideation

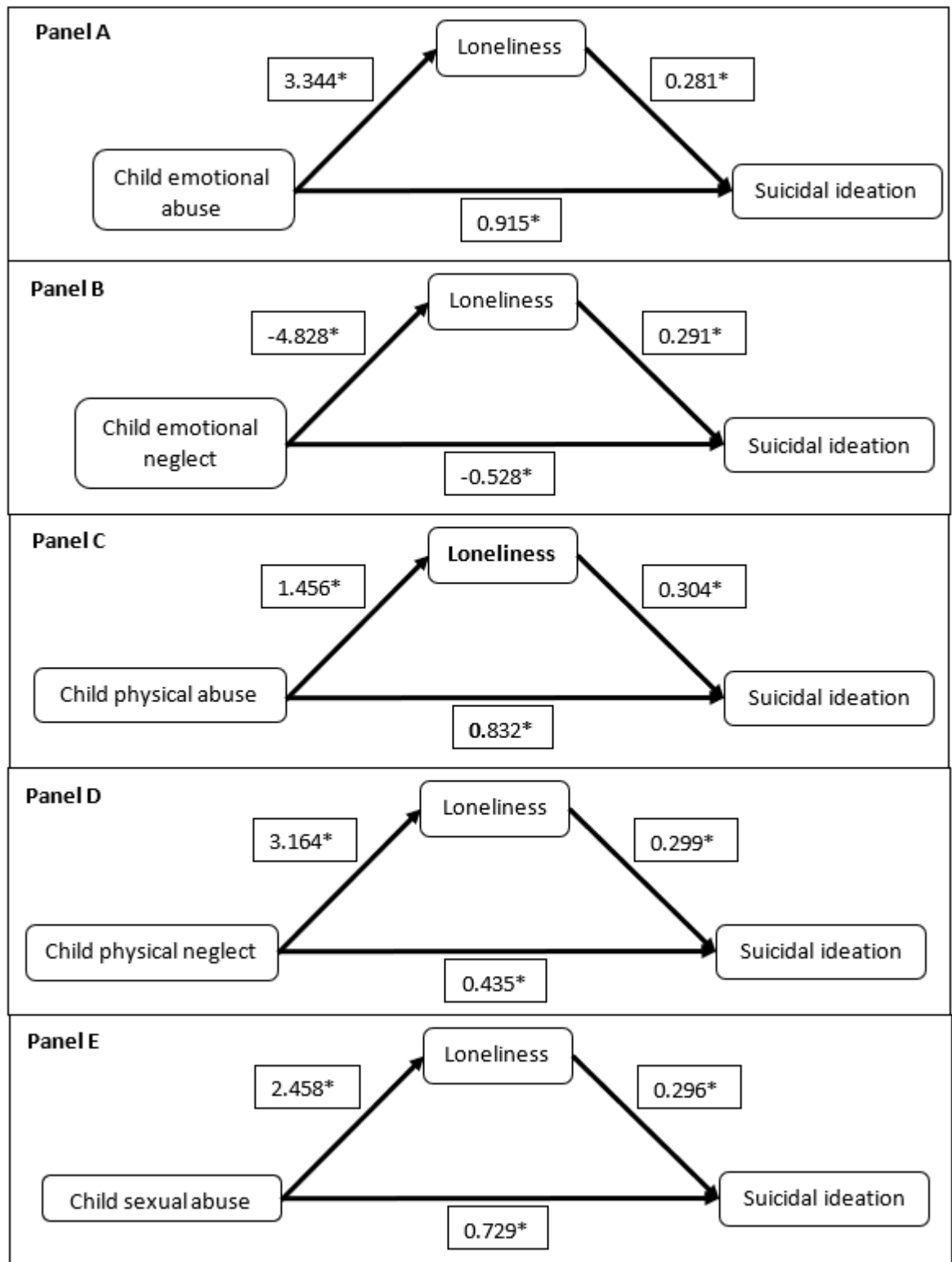
Loneliness was observed to have a significant, positive moderating effect between childhood emotional abuse (CEA) and suicidal ideation ( $b: 0.029$ ,  $SE=0.013$ ,  $t= 2.282$ ,  $p < 0.05$ , 95% CI: 0.004, 0.055). Simple slopes analysis revealed that low loneliness did not significantly interact with CEA ( $b= 0.494$ ,  $SE= 0.254$ ,  $t= 1.947$ , 95% CI: -0.005, 0.994) in association with suicidal ideation scores, however a significant interaction was observed by high loneliness ( $b= 1.258$ ,  $SE= 0.231$ ,  $t= 5.454$ , 95% CI: 0.804, 1.711). Figure 3.8 illustrates that high loneliness was significantly associated with increased reports of suicidal ideation regardless of whether CEA was high or low, with suicidal ideation scores being greatest in those who reported by high CEA and high loneliness.

No other subscales of the Childhood Trauma Questionnaire significantly interacted with loneliness to predict suicidal ideation.

#### 3.4.6.3 Loneliness and socially prescribed perfectionism in association with suicidal ideation

The mediating effect of loneliness between socially prescribed perfectionism (SSP) and suicidal ideation was investigated. Figure 3.9 shows that SPP was significantly associated with loneliness ( $b= 0.399$ ,  $se= 0.031$ ,  $t= 12.721$ ,  $p < 0.001$ , 95% CI: 0.337 – 0.461) and

Figure 3.7. Mediating association between childhood trauma, loneliness and suicidal ideation



N= 400. \* = p <0.001. Unstandardised betas are reported.



Figure 3.8. Loneliness as a moderator between childhood emotional abuse and suicidal ideation

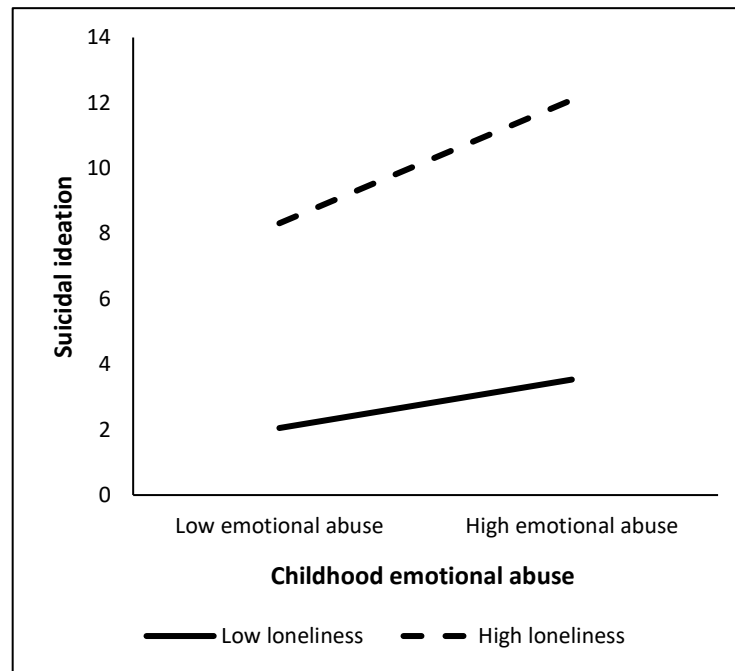
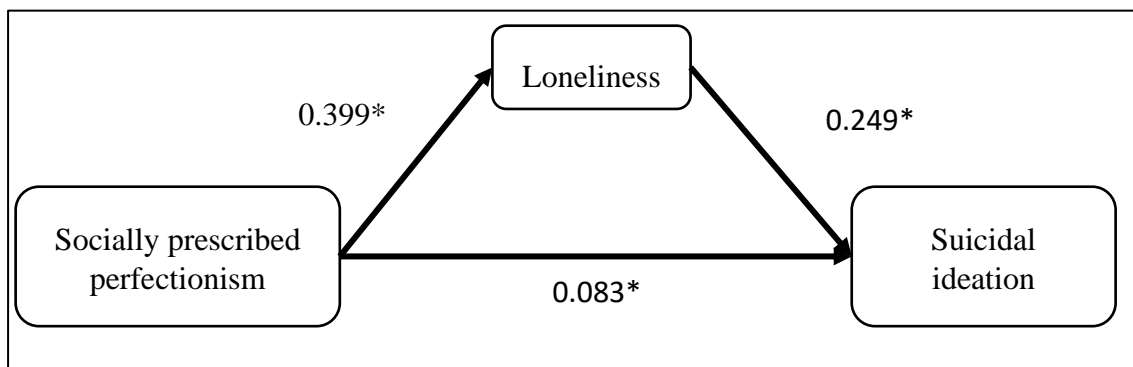


Figure 3.9. Mediating effect of loneliness between socially prescribed perfectionism and suicidal ideation



N= 400. \* =  $p < 0.001$ . Unstandardised betas are reported.

loneliness was significantly associated with suicidal ideation ( $0.249$ ,  $se = 0.019$ ,  $t = 13.150$ ,  $p < 0.001$ , 95% CI:  $0.212-0.287$ ). The inclusion of loneliness in the model did not reduce the direct effect to non-significance ( $b = 0.083$ ,  $se = 0.014$ ,  $t = 5.889$ ,  $p < 0.001$ , 95% CI:  $0.055 - 0.124$ ). As the indirect effect was significant ( $b = 0.100$ ,  $se = 0.012$ , 95% CI:  $0.077 - 0.124$ ), this suggests that loneliness partially mediated the association between socially prescribed perfectionism and suicidal ideation. Controlling for age and gender, the indirect

effect of loneliness mediating between socially prescribed perfectionism and suicidal ideation remained significant ( $b=0.099$ ,  $se= 0.012$ , 95% CI: 0.055 – 0.124).

### **3.5. Discussion**

This study cross-sectionally explored the extent to which loneliness was associated with self-injurious histories. Furthermore, this is the first study to explore where precisely loneliness may fit within a contemporary model of suicidal behaviour. The findings indicated that loneliness was associated with all study variables except for self-continuity (memory subscale). It is posited that this result is due to self-continuity being independent of social relationships (Bluck & Alea, 2018). Conversely all other variables in this study have a social element, including the remaining memory subscales (i.e., social bonding, directing behaviour).

#### **3.5.1 Loneliness and self-injurious thoughts and/ or behaviour**

Multivariate pairwise comparisons across self-harm history groups revealed that loneliness independently distinguished between those with a history of self-injurious thoughts, from those with no history of self-injurious thoughts or behaviours. No further significant pairwise comparisons were identified between loneliness and participant group. In the context of the IMV model, this suggests that loneliness acts as a motivational factor and therefore one would not expect it to differentiate between those with self-injurious thoughts versus self-injurious behaviours. However, it was surprising that loneliness did not differentiate between those no history of self-injurious thoughts or behaviours, and those with a history self-injurious behaviour. A possible explanation for this is that the effects of loneliness are statistically accounted for by other variables within the multivariate analysis (e.g., history of trauma or current suicidal ideation).

#### **3.5.2 Loneliness in the context of the IMV**

Further exploration of loneliness within the current study revealed that loneliness could operate as both a threat-to-self moderator or a motivational moderator, even when social support was controlled for. As no collinearity was identified between defeat and entrapment, this dual function of loneliness is most likely accounted for by the similarities between loneliness and other known threat-to-self moderators and motivational

moderators. For example, threat-to-self moderators encapsulate self-oriented factors which are typically cognitive in nature, such as ruminative processes and social problem solving. Although these factors are distinctive from one another, both have been found to be associated with loneliness (Deckx *et al.*, 2018; Lui *et al.*, 2016; Zawazki *et al.*, 2013; Chang *et al.*, 2020; Dibb & Foster, 2021). In contrast, motivational moderators include socially oriented factors such as thwarted belongingness, social support (see section 1.4), and resilience. Each of these factors have also been shown have strong associations with loneliness (Joiner, 2005; Van Orden *et al.*, 2010; Lee *et al.*, 2020). Based on this existent literature, and the results of the current study, further research is warranted to clarify where loneliness may ‘fit’ within the IMV model. We posit that loneliness is most likely to function as a motivational moderator. This is because the simple slopes analyses of the entrapment-suicidal ideation model indicated loneliness was associated with increased suicidal ideation scores regardless of whether entrapment was high or low. Yet, the same interactive effect was not observed within the defeat-entrapment model. Here, loneliness was only associated with increased entrapment when defeat was absent. These findings therefore prove beneficial when considering loneliness as a contributing factor when one is experiencing entrapment or suicidal ideation.

### 3.5.3 The interaction between loneliness, childhood trauma and suicidal ideation.

The role of loneliness in relation to childhood trauma and suicidal ideation were mixed. As a mediator, loneliness partially mediated between childhood emotional neglect, childhood emotional abuse and childhood sexual abuse individually, in relation to suicidal ideation. As a moderator however, loneliness was observed to significantly interact with childhood emotional abuse in association with suicidal ideation, but not other trauma types. This suggests that regardless of the nature of the association between loneliness and childhood emotional abuse (i.e., either as a moderator or a mediator), the presence of high loneliness is significantly associated with suicidal ideation in those with a history of childhood emotional abuse. The significant association between childhood trauma and loneliness in relation to suicidal ideation is accounted for by Bowlby’s (1982) maternal bonding theory. Bowlby argues that one’s bond with parents is typically applied to all future relationships across the lifespan. We would therefore posit that individuals reporting childhood trauma (except for CPA and CPN) anticipate psychological pain in their

relationships in adulthood and therefore deem their interpersonal relationships as being low quality or unsupportive. Within the context of the IMV model, this expectation of low-quality social support may therefore increase (moderate), or bridge (mediate), the propensity for suicidal ideation.

### 3.5.4 Loneliness, perfectionism and suicidal ideation

Loneliness also partially mediated the relationship between socially prescribed perfectionism (SPP) and suicidal ideation, which corresponds with the Perfectionism Social Disconnection model (Hewitt *et al.* 2006). The Perfectionism Social Disconnection model proposes that maladaptive perfectionism, such as SPP, can lead to perceptions of disrupted social connectivity, including loneliness (Hewitt *et al.*, 2017). As illustrated by the IMV model, those without social support, are more likely to experience suicidal ideation than those with social supports. It may therefore be useful during clinical formulation to explore parental attitudes during the individual's infancy (e.g., recollections of parental criticism, concern over mistakes), which determine one's expectations and attitude to relationships in later life. However, given that loneliness only partially mediated the association between SPP and suicidal ideation, other factors must also be considered which may contribute to presentations of suicidal ideation. Recent literature exploring mediating factors between SPP and suicidal ideation typically relate to factors similar to loneliness, for example interpersonal hopelessness (Moscardini *et al.*, 2011) or self-esteem (Cha, 2016), of which have also been found to partially mediate between SPP and suicide risk.

### 3.5.5 Coping styles in relation to loneliness and self-injurious thoughts and behaviour

An interactive effect between loneliness and problem-focused, emotion-focused and avoidant coping styles (but not socially supportive coping) was observed in relation to suicidal ideation.

High loneliness was observed to have a significant interactive, negative effect with problem-focused and emotion focused coping in relation to suicidal ideation based on separate models of moderation. This suggests that although high loneliness is associated with suicidal ideation, those who utilise planning or active coping strategies (i.e., problem

solving coping styles) or restraint, positive reinterpretation and acceptance (i.e., emotion-focused coping styles) reported lower suicidal ideation scores than those who did not use such coping styles. However these interactive effects were not observed when loneliness was low. In contrast, both high and low loneliness had a significant, positive interactive effect with avoidant coping (e.g., behavioural disengagement, denial, substance use, mental disengagement) in relation to suicidal ideation. Therein, those who present with suicidal ideation and feelings of loneliness, may engage in avoidant coping strategies can contribute to their feelings of distress.

The collective findings of the interactions between loneliness, coping styles and suicidal ideation, suggest that loneliness is associated with various, non-socially oriented coping styles which do not involve socially related coping styles. Specifically, problem-solving and emotion-focused coping tools are recommended for those who present with suicidal ideation and loneliness, especially those who reported engaging in avoiding coping strategies to manage their distress.

### **3.5.6 Other study variables in relation to self-injurious thoughts and/or behaviour**

Multiple variable pairwise analyses of the remaining study variables revealed that, consistent with published literature, socially supportive coping distinguished those with no history of self-injury from those with a history of self-injurious thoughts (Marusic & Goodwin, 2006). Furthermore, childhood emotional abuse distinguished participants with a history of self-injury, from those with a history of self-injurious thoughts or no history of self-injurious thoughts or behaviours (de Araujo & Diogo, 2016). In fact, consistent with similar studies, suicidal ideation was the only measure to distinguish between all participant group pairwise comparisons when all other study variables were controlled for (Khanipour, 2016; Somer *et al.*, 2015). This may be because, according to the IMV model, suicidal ideation immediately precedes volitional factors (e.g., fearlessness about death, mental imagery, planning), which distinguish those who engage in suicidal behaviours from those who experience suicidal ideation. Should any volitional factors have been included in this study, then suicidal ideation would not have been expected to distinguish between self-injurious thoughts and self-injurious behaviour participant groups.

### 3.5.7 Individual factors implications

The results here suggest that the presence of loneliness may significantly enhance the likelihood of suicidal ideation in those with a history or childhood emotional abuse or those with high socially prescribed perfectionism traits. Furthermore, significant pairwise differences between loneliness scores based on self-reported self-harm history was observed to be independent of age and gender. This therefore illustrates that the association between loneliness and self-harm can be detected regardless of age or gender.

### 3.5.8 Clinical implications

The current study found loneliness to be associated with increased self-reported entrapment in those who reported low defeat. This could be helpful when exploring factors which contribute to feelings of entrapment. Specifically, if an individual does not report feeling defeated, clinicians may benefit from investigating feelings of loneliness instead. Exploring these crucial differences and underpinnings of an individual's sense of entrapment, may facilitate more effective treatments and reduce the likelihood of experiencing such distress again. Additionally, those who use socially supportive coping styles are statistically unlikely to report loneliness as a precipitating factor to their thoughts of suicide.

### 3.5.9 Limitations

The main limitation of the current study is the cross-sectional design which makes inferences around cause and effect impossible. Additionally, participants were recruited using opportunity sampling and this resulted in over-representation of females, as well as the age range being skewed towards younger adults. A further limitation of the data collection methodology was that participants were required to click 'finish' on the final page of survey to submit their responses. This requisite of the survey platform prevented the collection of partially complete data which could have been included in some of the analyses of this study. Participants were grouped based on their life-time history of self-injurious thoughts and behaviours, with no consideration given to the recency or severity of their experiences. Additionally, no distinction was made between those who had a history of engaging in self-injurious behaviour with suicidal intent, compared to those who engaged in self-injurious behaviour where the motives are not suicidal. During the

analysis, we did not correct for multiple testing, which increases the risk of type I errors, but reduces the risk of type II errors in the context of having planned, hypothesis-driven analyses. Furthermore, analyses of the interactions between loneliness and other established correlates with self-injurious thoughts and behaviours were only tested within the confines of the IMV model. In the current study loneliness was tested solely as a moderator. Therefore other ways in which loneliness could function as a mechanism of self-injurious thoughts and behaviours were not explored. Finally, as highlighted in the discussion, factors which may differentiate between self-injurious thoughts and self-injurious behaviours, were not included in this study. Therefore the extent to which some study variables independently distinguished between self-harm groups was not fully explored.

### 3.5.10 Future research

Few peer-reviewed studies have explored the relationship between childhood emotional abuse and adulthood loneliness, therefore further investigation of this relationship is required to better understand the nature of this relationship. It may also prove helpful to understand this within the context of parental attachment style. Although it was beyond the scope of the present study, research has shown that loneliness is also associated with suicidal ideation prospectively (McClelland *et al.*, 2020). However, loneliness leading to later suicidal ideation may be influenced by the duration or intensity of loneliness experienced. Consideration of such an approach has already been developed by Cacioppo *et al.* (2006a) who suggests that loneliness can be protective as well as deleterious. Specifically, Cacioppo *et al.* (2006a) argues that loneliness may be helpful in the short-term by prompting an individual to seek-out further relationships or reinforce existing ones and thereby ensure the security of their social surroundings. In doing so, short-term loneliness may be quickly resolved and can ultimately be helpful in maintaining an individual's wellbeing through improved quality or quantity of social bonds (Qualter *et al.*, 2015). Furthermore, Cacioppo and colleagues argue that longer-term loneliness, or 'chronic loneliness', can lead to increased social safety concerns. Indeed, it is posited that loneliness has an evolutionary role which prompts hunter-gathers to return to their social groups to protect and nurture their lineage. Without loneliness, it is argued that offspring would have been less likely to survive to maturity. As such, loneliness may be innate and, if left unresolved, may lead to other safety concerns including perceived burdensomeness (van Orden *et al.*, 2010) and stress; both contributory factors of the distress that precedes

self-injurious behaviour. Loneliness may therefore have both adaptive and maladaptive properties. Future work should investigate what characteristics of loneliness (duration, intensity, co-occurrence with other risk factors) are associated with defeat, entrapment and suicidal ideation. Furthermore, loneliness in association with self-injurious thoughts and behaviour should be explored longitudinally in tandem with other psychological factors (e.g., depression). This will allow us to better understand the nature and extent of the impact of loneliness on psychological wellbeing including risk of self-destructive behaviours.

### 3.5.11 Conclusions

The current study has found evidence to suggest that loneliness distinguishes between those with and without a history of self-injurious thoughts. Within the context of the IMV model, loneliness was found to significantly moderate between both defeat to entrapment, and entrapment and suicidal ideation and is likely to operate as a motivational moderator overall. These associations were found to remain even when objective social support was controlled for. Furthermore, loneliness significantly moderated between childhood emotional abuse and suicidal ideation and significantly mediated between socially prescribed perfectionism and suicidal ideation. Problem- and emotion- focused coping styles were found to weaken the association between loneliness and suicidal ideation, while avoidant-focused coping was observed to have the opposite effect. Overall, this suggests that loneliness exasperates emotive, interpersonal factors from childhood, as well as negative affective states in the present. Future research would benefit from using a longitudinal design to investigate the role of loneliness in the development of self-injurious thoughts and behaviours where intensity and duration of these affect relationships are assessed. Overall, this study highlights the importance of social connection factors in the emergence of self-injurious thoughts.



# Chapter 4: Exploring the experiences and perceptions of interpersonal relationships and connectedness prior to attempting suicide in young adults: an interpretative phenomenological analysis

## 4.1 Abstract

*Background:* Suicide is a leading public health concern. Research studies have identified significant associations between loneliness and suicidal ideation/behaviour both cross-sectionally and prospectively. Despite this, research specifically focusing on identifying the nature of loneliness experienced prior to suicide, and the role it has in association with other preceding factors, has not been fully explored.

*Methods:* The current study recruited ten participants with a history of attempting suicide (5 female, 4 male, 1 non-binary; mean age: 22.5, range: 20-25 years) to take part in a one-to-one, mixed methods study to explore participants experiences of social support and loneliness prior to suicide attempt. Narrative accounts of events and interpersonal supports/absences prior to suicide were collected using semi-structured interview techniques and analysed using Interpretative Phenomenological Analysis. To capture participant characteristics, quantitative data relating to domains of social connectivity were collected via self-reported psychometric assessments via an online survey.

*Results:* Several aspects of loneliness, present prior to participants' suicide attempt, emerged as important themes in the current study. Additional themes identified were; patterns of social support, personality traits, emotional secrecy and social transition.

*Limitations:* The participant sample comprised young adults, therefore may not be applicable to other age groups.

*Conclusions:* Evidence suggests that a positive relationship with parents, knowing someone with similar experiences of distress to their own (i.e., mental illness, loneliness), or having membership of more than one friendship group, may reduce feelings of loneliness and/or intentions to die. This research makes an important contribution to understanding the role of loneliness in relation to suicide attempts. The findings here

highlight the importance of friends and family being emotionally available to those experiencing distress.

## 4.2 Introduction

Suicide is the fourth leading global cause of death for 15–29-year-olds in 2019 (WHO, 2021c). However, the aetiology of suicide is both multi-faceted and complex. In recent years there has been increased focus on the psychological determinants of suicide risk (O'Connor & Nock, 2014). To this end, one such factor which is receiving growing recognition is loneliness (Stravynski & Boyer, 2001; Tiwari, 2013; Richard *et al.*, 2017; McClelland *et al.*, 2020). However, not everyone who is lonely attempts suicide, and not all who become suicidal are lonely. Therefore, it is important to better understand the role of loneliness in suicide behaviour.

Loneliness is acknowledged as an important factor within Joiner's Interpersonal Theory of Suicide (IPT; van Orden *et al.* 2010). Within the IPT, loneliness is considered a component of thwarted belongingness and, when both thwarted belongingness and perceived burdensomeness occur at high levels, Van Orden *et al.* (2010) argue that suicidal ideation is likely to emerge. Similarly, the Integrated Motivational-Volitional model (IMV; O'Connor, 2011; O'Connor & Kirtley, 2018) includes thwarted belongingness, in addition to other socially oriented contextual (e.g., social support) and predispositional (e.g., perfectionism) factors, in a multifaceted, biopsychosocial model of suicidal behaviour. In doing so, the IMV model considers both the individual's past and present experiences and perceptions when predicting suicidal behaviour. Unlike the IPT however, the IMV model does not currently explicitly include loneliness within its model although it does include belongingness and social support.

Loneliness is a broad construct (Rosedale, 2007), but a widely accepted definition is that it reflects a discord between the quality or quantity of relationships an individual has, and those that they want (Perlman & Peplau, 1982). Furthermore, Weiss (1973) proposed that social loneliness (social integration, e.g., friendships) is distinct from emotional loneliness (e.g., attachment with romantic partners or family). The health risks associated with loneliness are addressed by Cacioppo and Hawkleys (2009) evolutionary approach. Cacioppo and Hawkley posit that short-term loneliness can be helpful in prompting lonely individuals to seek-out new bonds or reinforce existing ones. In contrast, long-term

loneliness is posited to lead to physical and psychological vulnerability including possible depression and death (Cacioppo, Cacioppo, & Boomsma, 2014). Evidence to support this was found in a systematic review and meta-analysis by McClelland *et al.* (2020) where loneliness was associated with suicidal ideation and behaviour between 10 weeks and 5 years after reports of loneliness. Furthermore, the review found this association was strongest in young adults and female participants. Although this review helped to identify at-risk populations who may be particularly susceptible to developing suicidal ideation and behaviour following loneliness, it did not identify which aspects of loneliness contribute to suicidal behaviour. The present study therefore used a qualitative research methodology, to examine which aspects of loneliness are most influential in driving suicidal ideation/behaviour.

Qualitative research can provide valuable insights into human behaviour. For example, Interpretative Phenomenological Analysis (IPA) uses an idiographic approach to conduct in-depth analyses of a specific event based on first-hand accounts (Smith & Osborne, 2015). Such approaches can help to understand the significance individuals attach to events (Flowers, Larkin & Smith 2009) and therefore common themes can be identified between narrative accounts.

To our knowledge, no published, peer-reviewed studies have used IPA to explore loneliness prior to suicidal behaviour. However, research by Lee, Vasileiou and Barnett (2019) identified a variety of aspects of loneliness in new mothers, including unfavourable self-comparisons, social isolation and unempathetic relationships. This demonstrates that using IPA is an effective approach to exploring loneliness in relation to significant life events. IPA may provide valuable insights into understanding how loneliness may be a factor in those who later choose to take their own lives. Doing so may help improve clinical and community guidance for suicide prevention.

#### 4.2.1 Current research

The current study adopted a mixed methods approach to explore loneliness in individuals prior to suicide attempt. IPA was implemented to explore narrative lived experience accounts of the process that lead to participants' decision to attempt suicide, and the social supports participants believe they had available prior to their attempt. The study also explored participants' experiences of loneliness and whether the latter was a factor in their

decision to end their life. To that end, the study addressed the following two research questions:

1. What role, if any, does the availability and quality of social supports have on wellbeing prior to suicide attempt?
2. What role, if any, does loneliness have on one's decision to attempt suicide?

The study also included quantitative self-report measures of participants' current perceptions of their social supports. The aim of this research was to improve the understanding of the role of loneliness in suicidal ideation and behaviour, thereby informing the development of suicide prevention strategies.

## **4.3 Method**

### **4.3.1 Procedure and Interview**

Ethical approval was granted by the University of Glasgow's College of Medical, Veterinary and Life Sciences ethics committee (reference no.: 200190125). Screening, recruitment and all participant interviews took place between September and December 2020. Study advertisements were circulated via the University of Glasgow participants pool, on social media sites and snowball advertising strategies were applied. Prospective participants contacted the lead researcher via email or telephone call to register their interest in taking part. All prospective participants were required to complete a screening telephone interview (see appendix 12) to ensure participants' eligibility.

Eligible participants for this study were: at least 18 years of age; had made a suicide attempt within the last five years, had sufficient proficiency in English to complete the interview and had access to a computer microphone. Participants were excluded if they indicated they had a cognitive impairment or had experienced symptoms of psychosis within the last two weeks.

Eligible participants were invited to the study interview, with the date and time of the interview arranged during the screening call. Study interviews were conducted via video conferencing (Zoom, Microsoft Teams or Skype, chosen by participants). Interviews were

conducted by the lead researcher and participant experiences followed a four-part structure:

- i. Review of the participant information sheet, privacy notice and consent form. Consent was audio recorded.
- ii. Socio-demographic information and health history data (see section 4.3.2) were collected verbally by the first author and recorded onto an Excel database by the researcher.
- iii. Audio-recorded semi-structured interview.
- iv. Online completion of psychometric assessments (using University of Glasgow Online Survey Systems).

Webcams were not required for this study but could be used at the participants' discretion. Seven of the ten participants elected to use their webcams. The researchers webcam remained on throughout the interaction, but the researcher invited participants to advise if they preferred the camera to be turned off ( $n=0$ ). Participant semi-structured interviews lasted between 17-52 minutes and video conferencing continued between the researcher and participant to resolve any queries or issues during the online survey. Each participant was compensated with a £25 Amazon voucher for their time. All data were stored on a password-protected computer server held at the University of Glasgow. Participant interviews were transcribed using a third-party transcription service. Following standardised transcription-to-written formats, audio files of the semi-structured interviews were permanently deleted.

### 4.3.2 Measures

*Demographics.* Participants' age, education history, relationship status, sexual orientation, living status, mental health history and suicidal behaviour history were collected.

*Semi-structured interview.* The interview items can be found in Table 4.1. Follow-up questions were asked to explore responses in greater detail, where appropriate. The final interview question ('Many people feel lonely within their lives, are there any times you

Table 4.1 Semi-structured interview questions

Open question	Probing question
<p><b>1. With your last suicide attempt in mind, can you describe what going on in your life?</b></p>	<ul style="list-style-type: none"> <li>• What patterns or triggers do you associate with any thoughts of suicidal ideation or behaviour you experienced at the time?</li> <li>• Why do you think you started to experience suicidal ideation/ engage in suicidal behaviour?</li> <li>• Did you notice any patterns which you felt were linked to your suicide behaviours? These could be thoughts or feelings you had, behaviours or certain situations.</li> <li>• What did you want to achieve by dying?</li> </ul>
<p><b>2. How do you remember feeling about your friends and family at the time?</b></p>	<ul style="list-style-type: none"> <li>• Who would you turn to when you were feeling down or wanted to talk about your thoughts of suicide?</li> <li>• Did your thoughts of friends and family influence your want to die in anyway?</li> </ul>
<p><b>(The following questions are to be asked only if the participant has not mentioned loneliness within their previous answers)</b></p>	
<p><b>3. Many people feel lonely within their lives, are there any times you have left particularly lonely?</b></p>	<ul style="list-style-type: none"> <li>• Does this relate to your experiences of suicide in any way?</li> </ul>

have felt particularly lonely?’) was only posed if the participant had not mentioned loneliness in their previous interview responses.

*Burdensomeness and thwarted belongingness.* The Interpersonal needs questionnaire (INQ; van Orden *et al.* 2012) measures both burdensomeness (7-items, e.g., ‘These days I think I have failed the people in my life.’  $\alpha = 0.93$ ) and thwarted belongingness (5 items, e.g., ‘These days, other people care about me.’  $\alpha = 0.85$ ), with responses recorded using a seven item Likert-type scale ranging from 1 (‘not at all true for me’) to 7 (‘very true for me’).

*Loneliness.* The UCLA loneliness Scale – Revised (UCLA-LS; Russell *et al.*, 1980): 20-item measure of loneliness (e.g., ‘I lack companionship’  $\alpha = 0.89$ ) recorded on a 4-point Likert-type scale ranging from 0 (‘never’) to 3 (‘often’).

*Social support.* The Enriched Social Support Instrument (ESSI; Lett *et al.*, 2007) is a seven-item (e.g., ‘Are you currently married or living with a partner?’  $\alpha = 0.73$ ) measure that captures responses on a five-point scale from 1 (‘none of the time’) to 5 (‘all of the time’).

Psychometric measures were completed at the end of the interview. Due to the small sample sizes, psychometric properties of the measures were not based on the current study sample.

### 4.3.3 Research Team

The lead researcher has two years’ experience of qualitative data analysis. This study was supervised by two named authors of the study who are professors in the field of clinical and health psychology

### 4.3.4 Data analysis

#### 4.3.4.1 Qualitative analysis:

Interpretative Phenomenological Analysis (IPA) allows detailed analysis of lived accounts of a specific event and affords insight into a person’s interpretation of that event, with exploration of the significance that the individual places on that event. Consistent with Creswell (2013, pg., 161), ten participants are considered a sufficient number for studies of

this nature. Following Smith and Shinebourne (2021), a line-by-line analysis of the interview transcripts was conducted to identify themes. These themes were then grouped to identify superordinate themes which were reviewed by all research authors for accuracy and applicability.

#### 4.3.4.2 Quantitative analysis:

Quantitative data were stored using Excel and analysed using SPSS (version 26). Categorical data are described using frequencies, while continuous data are reported using means and standard deviations.

### 4.3.5 Participant recruitment and demographics

32 participants submitted notes of interest in the study. The first 14 potential participants completed the screening call, of which 10 completed the study interview. Ineligible participants (n=4) identified during the screening call were excluded due to; experiences of psychosis in the last two weeks (n= 2), no history of suicide attempt (n=1) and insufficient proficiency in English (n= 1).

All participants were allocated pseudonyms to protect their identities. Participant socio-demographic characteristics are summarised in Table 4.2. In summary, half of participants were female (n=5) and most were White (n=8), bisexual (n=6), single (n=9) and lived with flatmates (n=8). All participants were young adults (age range at time of interview: 20 to 25 years). On average, participants' last suicide attempt was 2.46 (sd. 1.47) years prior to their participation in the study.

Psychological profiles of individuals' perceptions of interpersonal relationships at the time of the interview are summarised in Table 4.3. Higher scores reflect greater experiences of that affect being assessed. Although the researchers did not see these data until after IPA analysis was complete, they provide an insight into participants' perceptions of their social relationships which may have influenced their accounts.



Table 4.2 Participant socio-demographic characteristics

	<b>Aoife</b>	<b>Trevor</b>	<b>Chloe</b>	<b>Elsie</b>	<b>Rachel</b>	<b>Margaret</b>	<b>Alice</b>	<b>Aidan</b>	<b>Taj</b>	<b>Mohammad</b>
<i>Gender</i>	Female	Male	Female	Female	Non-binary	Female	Female	Male	Male	Male
<i>Age</i>	24	22	23	21	20	25	24	20	21	25
<i>Ethnicity</i>	White	White	White	White	White	White	White	White	Asian	Asian
<i>Sexuality</i>	Bisexual	Heterosexual	Bisexual	Bisexual	Pansexual	Bisexual	Bi-sexual	Bi-sexual	Heterosexual	Heterosexual
<i>Romantic status</i>	Single	Single	Single	Single	Single	In a relationship	Single	Single	Single	Single

	<b>Aoife</b>	<b>Trevor</b>	<b>Chloe</b>	<b>Elsie</b>	<b>Rachel</b>	<b>Margaret</b>	<b>Alice</b>	<b>Aidan</b>	<b>Taj</b>	<b>Mohammad</b>
<i>Living arrangement</i>	Lives alone	Flatmate(s)	Flatmate(s)	Flatmate(s)	Flatmate(s)	Live with partner	Flatmate(s)	Flatmate(s)	Flatmate(s)	Flatmate(s)
<i>Most likely to confide in</i>	Friend(s)	No one	Cousin	Friend(s)	Mother	Friend(s)	Friend(s)	Friend(s)	Friend(s)	No one
<i>No. suicide attempts</i>	15	5	2	'Too many to count'	1	3	4	3	2	2
<i>Nature of latest attempt</i>	Impulsive	Planned	Impulsive	Impulsive	Planned	Impulsive	Impulsive	Unclear	Planned	Planned

Table 4.3 Participant scores on measures of interpersonal characteristics

	Aoife	Trevor	Chloe	Elsie	Rachel	Margaret	Alice	Aidan	Taj	Mohammad	Mean (sd.)	Max score range
<i>Burdensomeness</i>	21	19	13	36	10	18	14	15	15	6	16.70 (8.06)	7 – 49
<i>Thwarted belongingness</i>	10	15	5	16	6	6	8	6	17	1	9.00 (5.4)	5 – 35
<i>Loneliness</i>	30	29	24	44	21	34	31	25	44	16	29.80 (9.11)	20 – 80
<i>Social support</i>	19	19	24	19	29	24	24	21	20	30	22.90 (4.07)	7 – 35

N= 10; sd.= standard deviation

## 4.4 Results

### 4.4.1 Quantitative results

One participant scored over one standard deviation greater than the group average ( $16.70 \pm 8.06$ ) for burdensomeness. For thwarted belongingness ( $9.00 \pm 5.4$ ), three participants scored one standard deviation above than the group average and one participant scored one standard deviation below. Two participants scored one standard deviation above the group mean for loneliness ( $29.80 \pm 9.11$ ) and social support ( $22.90 \pm 4.07$ ). Mohammad was the only participant to score beyond one standard deviation of the group average for all psychological measures.

### 4.4.2 Qualitative results

Five superordinate themes and ten sub-themes were identified across the ten interviews in this study (see Table 4.4). An explanation of the attributed theme name and excerpts from transcripts reflecting the theme are provided under each heading below.

#### 4.4.2.1 Patterns of social support for self-worth

All participants talked about their experiences of seeking social support prior to their suicide attempt. Three sub-themes were identified: participants describing their relationship with their parent(s); a preference for non-familial support; and a strong reliance on one person.

#### Relationship with parent(s)

Seven participants indicated a difficult relationship with a parent prior to their suicide attempt. Below, Rachel outlines how her relationship with her mother influenced her belief about all other relationships she had, which in turn, influenced her self-worth prior to her attempt.

‘... It obviously did have a big impact, and it’s kind of, it affects all your other relationships because the one person who’s meant to accept you for everything and care about you or whatever, just wasn’t there. It’s kind of like, if she doesn’t care about me, why would anybody else?’ (Rachel, 20 years)

Table 4.4 Themes and subthemes identified

<b>Theme</b>	<b>Sub-theme</b>		
<i>Patterns of social support for self-worth</i>	Relationship with parent(s)	Preference for non-familial support	Strong reliance on one person
<i>Aspects of loneliness</i>	Social isolation	Lack of emotional connectedness	Lack of feeling understood
<i>Emotional secrecy</i>	Anticipated stigma	Autonomy	
<i>Personality traits</i>	Socially prescribed perfectionism	Anxious disposition	
<i>Social transition</i>			

Rachel describes how the lack of their mother's care and affection led them to believe that no one else would care about them, thereby alluding to feelings of despair, defeat and diminished sense of belonging. All participants who indicated having a negative relationship with their parent(s), indicated that these experiences adversely affected their psychological wellbeing.

In contrast to Rachel's account of generalising her negative relationship with her mother to other social relationships, Aidan described how the impact of the lack of support that his mother offered directly affected his mood.

“...If you expressed any kind of emotional suffering, she would just like either get angry at you or make a joke out of it. Um and, yea, just like a really not supportive person at that time.” (Aidan, 20 years)

Aidan describes how dismissive his mother was of his feelings and how this made him feel unsupported. Instead of support and reassurance, Aidan illustrates how his mother discredited or invalidated Aidan's feelings. In the above quote, Aidan stressed that he was particularly aware of his mother's behaviour in the lead-up to his suicide attempt.

In contrast to negative relationships with parents, the following quote by Chloe, describes a positive relationship with her parents and how this protected her wellbeing.

“...I would be thinking of them as sort of like an anchor rather than something that makes the situation worse.” (Chloe, 23 years)

Chloe described how she viewed her relationship with her parents as an asset during stressful situations. She compares her parents to an anchor, possibly grounding her and reminding her of her value. As such, this suggests that positive relationships may not be sufficient for individuals contemplating suicide. This may be especially true for those who want to maintain a positive outward image to others (see section 4.4.2.4 personality traits – socially prescribed perfectionism)

#### *Preference for non-familial support*

Six participants stated that they were more likely to share, or allude to, their challenges with their mental health, to a friend rather than a family member, as summarised by Aoife below:

‘...I feel close to my friends. I’m quite close with my mum but I don’t talk to her about my mental health.’ (Aoife, 24 years)

Aoife explains that she censors her disclosures to her mother, while she did not mention any caveats about what she would potentially discuss with friends. This suggests a possible preference for support from friends instead of family. This explicit preference to confide in friends instead of family when in psychological distress, was present in other interviews, for example Taj below.

‘... I’m not particularly close to my family and I’m an only child as well. I don’t have siblings, so I’ve always relied...for as long as I can remember, always relied on the friends that I choose to, sort of, be my family and be my, sort of, support structure ... As far as I can remember I’ve always relied on my friends to, sort of, be my support structure as opposed to my parents’. (Taj, 21 years)

Above, Taj explains his preference for friends when seeking emotional and psychological support. Taj explains that this is due to an absence of having siblings to confide in, which may suggest a preference for support from those of a similar age or stage to himself. He also states having a lack of emotional closeness with his family as a reason not to confide in his relatives. Therefore, it may be that Taj relies on the support of his friends as a last resort, as opposed to an initial preference.

#### Strong reliance on one person

Six participants indicated they were particularly reliant on one individual (e.g., parent, romantic partner). Take Trevor’s experience:

‘.... My first girlfriend, I put everything into it, and when I put everything into it, I distanced myself from other people. So, when the connection wasn’t perfect between both partners, that inspires a real sense of loneliness, that this person should get me.’  
(Trevor, 22 years)

Trevor reflects how, by focusing on his romantic relationship, his bonds with other social networks were weakened through neglect. When his romantic relationship became strained, Trevor described how this led to feelings of loneliness. In Trevor’s case, the absence of the perceived support of his significant other (parent or romantic partner) may have strengthened the association between stress and suicidal behaviour, leading to suicide

attempt. This could be because there was nobody else he could rely on for support or due to romantic loneliness. This is further illustrated by Margaret below.

“...Like, when we broke up, losing that support I think is probably what kind of tipped me over the edge a little bit, because I didn’t really know who to tell... And I didn’t realise at the time how much I, like, how much I needed the support of a partner and then I didn’t have that and I just had all this stuff on”. (Margaret, 25 years)

The shortcomings of relying heavily on one person is made salient by Margaret (25 years). Here, Margaret does not indicate any sadness or longing for her partner specifically, but instead, the role that ‘a partner’ played in supporting her wellbeing and acting as a confidante. Through the absence of her former partner, Margaret became aware of a lack of sources to seek support from, which she describes as a contributing factor to tipping her ‘over the edge’, preceding her decision to attempt suicide.

#### 4.4.2.2 Aspects of loneliness

All ten participants indicated that at least one aspect of loneliness contributed to their decision to die. Therefore, all themes of loneliness are discussed below with sub-theme names based on those identified by Rosedale (2007) which were considered to fit well with themes described by participants.

##### Social isolation

Isolation, both voluntary and involuntary, was described in six interviews, for example, the quote by Chloe below:

‘... I came to uni and sort of like, you know, it was like a restart button like I again, felt very isolated, I guess. Yes, I guess talking about loneliness, in the first year [of university], the first couple of months I didn’t know anybody, I didn’t get on with the flatmates and being in a different country and just a new city and everything.’ (Chloe, 23 years)

Here, Chloe describes enthusiasm to build friendships in her new environment. However, she had been unsuccessful in befriending her flatmates which led to involuntary social isolation. As stated by Cacioppo and Hawkley (2009), short-term loneliness can incentivise people to strengthen bonds, but if unresolved, they can lead to mental illness in the long-term. This is further illustrated by Aidan below.



“...So my support network wasn’t that strong. I did have quite a few friends in Ireland, but I’d moved away from Ireland, like I was the only one in my school that did move to a different country. And also, one of the people I was closest with, he passed away on the final day of my leaving cert examinations. So I was...like it shook the nature of friendship for me... I had built a foundation with him.” (Aidan, 20 years)

Here Aidan describes social separation in two forms; moving away from home and the death of a friend. Both events happened in quick succession and both diminished opportunities for Aidan to socialise with establishing social networks. Aidan states that due to moving from home, his support network was weak, thereby suggesting that he believed the strength of his support network was dependent on physical proximity. Furthermore, he describes the pain of the death of his friend, ‘I had built a foundation with him’, which suggest a fundamental social support for Aidan was gone.

#### Lack of emotional connectedness

Emotional connectedness describes the individual’s belief they have an emotional, reciprocal bond with those within their social network. This subtheme was identified in seven interviews, though Mohammad’s account was most salient of all:

‘... I wasn’t feeling that greatly connected at that point in time. So it all added more fuel to me, you know? ‘Cause even as I was planning to... I was not, you know, so much attached to them, no matter how attached and how warm they were to me.’ (Mohammad, 25 years)

Mohammad suggests that he was aware of his family’s affection for him, however he felt unable to reciprocate this prior to his suicide attempt. Mohammad expresses that this experience ‘added more fuel’ for his suicide attempt. This suggests that a lack of connectedness was a particular risk factor for suicide for Mohammad. This emotional disconnectedness is further illustrated by Alice below.

“...I have a good group of friends, like, quite a few different groups of friends. I have a good relationship with my family. But in those instances, and those periods of my life, I felt that I was very detached from them.” (Alice, 24 years)

Alice describes a shift in their sense of social connectedness towards their friends and family. They describe how they felt connected before and after their desire to die, but during this time, this connectedness was lost and they felt ‘detached’.

### Lack of feeling understood

Five participants reported not feeling understood by those around them, with this negatively affecting their wellbeing. Taj illustrates this below:

‘... I was always surrounded by people but I thought they never really, sort of, understood me and that would’ve contributed to, sort of, the feeling of helplessness or, you know, I don’t fit in here kind of thing.’ (Taj 21 years)

Taj expressed that his experience of not feeling understood by those around him was a contributing factor to his feeling of helplessness. The subsequent feelings of helplessness that Taj described are not dissimilar to entrapment, a factor strongly associated with suicide. This is further illustrated by Alice below.

“...I felt very misunderstood, because I think people, although I admit to myself that I was sort of acting out being self-destructive, acting selfishly, it wasn’t ‘cause I really had any choice. I think if you’re in that situation, you feel so bad about yourself, that that’s what kind of, it isn’t about other people, ‘cause other people are like, ‘well didn’t you think about how we feel, how your mum feels?’ And I’m like... but if you’ve never felt that way, you can’t see beyond you and your own existence.” (Alice, 24 years)

Above, Alice describes how, during her crisis, people queried why she did not consider the emotional impact her actions took on those around her, who cared for her. Alice explains that these questions indicated to her that people did not recognise her mindset at the time, which contributed to her feelings of being misunderstood by others. In her interview, Alice indicates a belief that she was alone in the feelings she was experiencing. This may have contributed to a sense of feeling unsupported.

### 4.4.2.3 Emotional secrecy

Emotional secrecy is the deliberate concealment of emotion from others (Finkenauer & Rimé, 1998) and includes sub-themes of anticipated stigma and autonomy. Emotional secrecy arose in seven interviews. Margaret’s example is below:

‘... I remember my parents would call me and be like, ‘oh how are you doing, are you okay?’ And I’d sit there in tears and be, like, yes I’m absolutely fine, Uni is going really well, everything is great.’ (Margaret, 25 years)

Margaret acknowledges the emotional distress she was feeling at the time of her suicide attempt and that despite being in acute distress, she refused to make her parents aware of her emotional state. Instead, it was more important to Margaret for her parents to believe she was happy and to do so, she overcompensated for her distress to ensure her parents believed she was thriving ('everything is great'). The non-disclosure of her distress prevented Margaret from getting the emotional, and potentially instrumental, support she needed at the time to maintain her safety. This conscious concealment of emotion is further illustrated by Aidan below.

'...I think I would say that I always played it down and always...If... So I would either hide it completely and just keep it to myself or if I did tell people then I would play it down a lot.' (Aidan, 20 years)

The effort Aidan made to conceal his distress is apparent in the quote above, where Aidan describes that he would either conceal his distress or hide its severity. As those around him did not know the extent of his suffering, Aidan would have gained little or no social support for his emotional turmoil, which may have increased his risk of suicide.

### Anticipated stigma

Anticipated stigma was a prevalent sub-theme in six interviews. Below, Chloe describes her anticipation of negative stigma from others, should she disclose her mental health difficulties to her friends.

'I did feel that I couldn't really, really talk with anyone about it because I was scared to let them see this part of me and for them to know that this is how I actually am. I felt like I was a fraud and if they found out, they would leave me so I didn't want to be like abandoned, I guess, by them.' (Chloe, 23 years)

Chloe's anticipation of her friends' reaction to her mental health challenges invoked fear that she may become a pariah. This suggests Chloe believed that losing her social network would be more painful than the distress she was feeling already which illustrates that mental health stigma prevented Chloe from gaining help from those around her. This theme is also demonstrated by Margaret below.

'... I knew I had lots of people that I spent time with, and that there were people that I could rely on to text and be, like, do you want to go to the pub, let's grab a drink, let's go

and do this. But I didn't feel like they were people that would necessarily stay my friend if they knew that I had mental health problems or if they knew I was suicidal.' (Margaret, 25 years)

Despite having an established and dependable network to socialise with, Margaret describes how she felt these friendships would not withstand her disclosure of poor mental health. Margaret does not justify why she had these beliefs of negative stigma, instead this appears to be an assumption she has made about her friends.

### Autonomy

Concern for autonomy has consistently been associated with avoidance or disengagement with health services and increased the propensity for suicide (Hill & Pettit, 2013). Five participants indicated a need for autonomy as illustrated by Elsie below:

'... I might have told people that weren't living with me [that I was feeling suicidal] 'cause, as I say, it's the people that are living with me that could have intervened more. So, if they could have intervened, I wouldn't have told them [what I was doing/ planning].'  
(Elsie, 21 years)

Elsie illustrates that disclosing her distress to others was determined by logistics and she may have considered telling people who would not have been able to hinder her intentions. This suggests that although Elsie may have wanted to make others aware of her suffering, at that point her intention to die was strong and she was not looking to be saved. Below, Margaret also describes a need for autonomy and explicitly states this.

"...I was really concerned that if I went [to hospital], they'd try and section me or I'd lose my autonomy over my own decisions and I'd have this, like, freedom of being able to be at Uni taken away from me. So, I just, I just kind of stayed in my room with my friend and we, like, plastered up my arm [laughter]." (Margaret, 25 years)

Margaret describes concern of being admitted to hospital if she sought professional medical help. Given the self-described extent of Margaret's injuries, this concern for maintaining her autonomy over-ruled seeking help for her physical safety. Instead, Margaret is focused on life remaining unchanged following her suicide attempt, where she still has the freedom to make choices and attend university. This suggests that Margaret

potentially believed that attending hospital would have a significant, negative, long-term impact on her life.

#### 4.4.2.4 Personality traits

Personality characteristics influence how individuals navigate, and respond to, social interactions (Asendorpf & Wilpers, 1998). Descriptions consistent with two personality factors were detected in these interviews: socially prescribed perfectionism and an anxious disposition.

#### Socially prescribed perfectionism

Socially prescribed perfectionism (SPP) is the need to meet the real or perceived unreasonably high expectations an individual believes others have for them (Hewitt & Flett, 1991). SPP was evidenced in half of the interviews (n= 5), including in Aidan's interview below.

‘... It was partly like even though I was doing well in school, I didn't see that, I didn't perceive that because like my mum was telling me that I wasn't ... I was a big perfectionist because of that so I felt like everything I did, if it wasn't absolutely perfect then it wasn't, then it was awful and I was a failure.’ (Aidan, 20 years)

Aidan described his mother as being critical and having high expectations of his academic achievements. Despite his own beliefs, it appears from this quote that Aidan may have internalised his mother's views and therefore, when Aidan ‘wasn't absolutely perfect’, he automatically criticised himself (‘I was a failure’) and perpetuated his mothers' standards from within. SPP adds an extra element of stress beyond the typical daily stressors and is therefore consistently associated with suicidal ideation and behaviour.

Similar to Aidan, below Chloe also describes SPP in relation to her academic ability, and consequential concern about her family's perceptions of her.

‘...I've always felt like I need to perform really well and that my value is derived from my work or from physical [ability] that I can do good things I still would feel that like they view me a certain way because I do certain things and if I don't manage to do that then, I guess other times my perception was that they will stop bothering me or they will give up on me or they will be disappointed and I don't want to disappoint them.’ (Chloe, 23)

Chloe illustrates thinking patterns that are characteristic of individuals with SPP; the need to meet the impossibly high, real or perceived expectations one believes someone else has of them. When discussing her family, Chloe describes her belief that her worth to others is contingent on her abilities; that there is an expectation from others that she must ‘do good things’. Chloe also shows some concern about losing these relationships (‘they will stop bothering with me’). This not only suggests that Chloe feels she has disappointed or failed her family in the past, but also that they have not forgiven her for her perceived past shortcomings and their love for her is limited (‘they will give up on me’). As such, Chloe demonstrates here that her capability of doing well in her work is imperative in order to keep those she cares about in her life, or else be abandoned by them.

### Anxious disposition

Anxiety can occur when someone is overly concerned with their welfare, to the point that it impedes their day-to-day living in some way. Seven participants indicated an anxious disposition, which was commonly linked with academia, as illustrated by Chloe below.

‘... I got the results from university that I was progressing and it was a relief but it was also like it caused me to be even more anxious because I was thinking, if I struggled for this year, how am I going to manage the next year?’ (Chloe, 23 years)

Chloe describes an automatic dismissal of her achievements and instead fixated on the potential for failure the following year. This illustrates Chloe’s ingrained anxiety which decreases one’s ability to manage additional stress and consequently increases the opportunity for defeat and potential later suicidal behaviour. The theme of anxiety is further illustrated by Alice below.

‘...By the August point I knew I had to have that year out, and I was a little bit worried, ‘cause I’d never been in the situation before where a doctor’s just said to you, you’re not going back to uni, like, you can’t, you can’t live your life, you’re not fit to do it.’

(Alice, 24 years)

Alice describes the fear of the unknown here and the insecurity instilled by her doctor. The various statements Alice recalls the doctor saying when informing her she would not be returning to university that year may reflect the level of distress she felt in the situation and feelings of uncertainty of what she was ‘fit’ to do.

#### 4.4.2.5 Social transition

Instances of social transitions were identified in five interviews including moving away from home to begin university (n= 4), and, in Rachels' case below, changing schools within the same geographic area:

'...2016 was a weird year because the first eight months were probably like the best time for ages. I was like, you know, confident, obviously I was doing GCSEs then, things were going pretty well. Then I moved to sixth form [college] and I think things just kind of reverted back to anxiety, depression, all this stuff.' (Rachel, 20 years)

Rachel recalls a marked deterioration in her mental health as she began sixth form, with her new surroundings preceding negative affective states associated with increased risk in suicide. Social transitions can lead to stress as one adjusts to their new surroundings, which often co-occurs with a loss or reduction in social supports. These additional stressors can make daily hassles more difficult to manage and increase the potential for suicidal behaviour. Below, Aidan describes the difficulty of being distanced from his romantic partner, while also trying to build his social network in his new hometown:

'...Any time she showed some emotional distress, I would [visit her], I'd spend the night, and this was in the initial days of my first year at university, at the time when you do make connections. So I was building a slight rapport with my flatmates at the time, but I was mainly removing myself from the situation by calling to any request she had.'

(Aidan, 20 years)

Aidan describes how instead of helping himself assimilate into his new environment at university, he focused on supporting his partner instead. He acknowledges that this period of time was critical in forging new relationships and indicates some frustration in his actions.

## **4.5. Discussion**

This is the first study to use IPA to investigate experiences of social support and loneliness prior to a suicide attempt. Although individual differences were identified across the interviews, three aspects of loneliness were identified from the participant sample: social isolation, lack of emotional connectedness and not feeling understood. Four additional

overarching themes were discovered: patterns of social support, emotional secrecy, personality characteristics and social transition. Most participants reported a detachment from those around them (e.g., lack of emotional connectedness, social isolation) prior to their suicide attempts and most indicated they would, or did, prefer to speak to their friends about their mental health, instead of their family members.

The findings suggest that those who had a strong reliance on one person for social support, may have felt loneliness more acutely than those who maintained broader social networks. All participants who relied on one person, often a romantic partner, reported that their wider support networks did not compensate for the loss or absence of this specific bond. This is consistent with Weiss's (1973) theory of loneliness. Weiss argued that emotional loneliness, which arises through the absence of close bonds, cannot be overcome by presence of other social supports. Indeed, romantic partners are argued to border both emotional loneliness and social loneliness, due their role of providing both emotional and instrumental support on a regular basis (Sawir & Marginson, 2008)

The findings also fit with both the IMV model of suicidal behaviour (O'Connor & Kirtley, 2018) and the IPT (van Orden *et al.* 2010). The IMV model posits that the absence of social support can increase the likelihood of entrapment giving rise to suicidal ideation. Research has shown that loneliness may operate in a similar fashion where, within the context of the IMV, the presence of loneliness may increase the likelihood that people who feel trapped become suicidal (McClelland *et al.*, 2021). Equally, the IPT suggests that loneliness contributes to feelings of thwarted belongingness which, in the presence of perceived burdensomeness, is also posited to lead to suicidal ideation. Indeed, Bell *et al.* (2018) found evidence to suggest that perceived burdensomeness may be a more influential factor than social support when predicting suicidal risk. Based on the findings of the current study, the same may be true for loneliness, where certain aspects of loneliness may have more of a bearing on mental health than the number of social supports available to them.

Aspects of loneliness, as identified within the current study, are consistent with findings by Sjöberg *et al.* (2018). Specifically, when exploring feelings of loneliness in older adults with a history of suicide attempt, Sjöberg *et al.* (2018) suggested that loneliness commonly stemmed from feeling disconnected or alienated from significant people in their lives (i.e.,



romantic loneliness), or a lack of feeling understood. Although these themes also arose in the current study, the origins of loneliness were not explored here.

Another theme to develop from the current study was the participants' relationship with their parent(s). The interviews indicated that the quality of one's current relationship with their parent(s) affected their mental health, as participants would generalise their parental relationship to other relationships. This is consistent with research based on attachment theory (Bowlby, 1969) where parental relationship style and quality both past and present are significantly associated with mental health (Canetti *et al.*, 1997; Oldfield *et al.*, 2018; Zortea, Gray & O'Connor, 2021). This was indicated by the first-hand accounts of the young adult group of the current study.

The potential effect of parental attitudes on wellbeing was evident in the context of the SPP theme. This fits with Hewitt and Flett (1990) who found that early life experiences (e.g., parental expectations and concern over mistakes) can lead to the manifestation of perfectionistic behaviours in children where they are driven to meet the real or perceived expectations that they believe others hold for them (this may be further reinforced by the trend in the current study of many participants preferring to confide in friends instead of family). Due to their belief that their relationships are superficial, individuals may perceive their key relationships as being insecure (Flett, Hewitt & De Rosa, 1996) and thereby potentially instil a sense of loneliness (Blynova *et al.*, 2021; Harper, Eddington & Silvia, 2020). Equally, emotional secrecy was described frequently during the interviews, which perhaps serves to support their need to maintain a persona of perfection, else risk being rejected by their friends or family. Those who are able to maintain a persona of perfection, may develop superficial relationships which leads to feelings of loneliness to arise as they do not assume social acceptance (O'Connor & O'Connor, 2003; Stoeber, 2012). This is consistent with the Perfectionistic Social Disconnection Model (Hewitt *et al.*, 2006) which posits that high perfectionism is associated with a sense of not belonging and social disconnection (among interpersonal complications; Barnett and Johnson, 2016).

The findings also reinforce Perlman and Paplau's (1982) argument that the quality, not just the quantity, of one's connections must be considered when assessing loneliness. Social support networks are consistently posited to protect against suicide risk; however, this is often based on quantity or existence of connections (e.g., marital status, number of children, number of flatmates), therefore overlooking whether these contacts are people the

individual would choose to reach out to (Perlman & Peplau, 1982; Rojas, 2012). This is illustrated by the sub-theme of ‘relationship with parent(s)’ in the current study. Individual differences, including personality traits, quality of parental relationships and patterns of support must be considered when attempting to identify whether one’s social support network mitigates from suicide.

This research highlights the distinction between perceived loneliness (i.e., loneliness as a psychological state) and actual loneliness (as a consequence of the interpersonal or social environment), as illustrated by the sub-themes of social isolation and lack of emotional connectedness (Holt-Lunstad, 2015). Despite similarities between the themes of emotional loneliness and social isolation, it is possible to experience one without the other, or conversely, one may induce the other (e.g., feelings of loneliness leading to social withdrawal and self-imposed isolation). However, how these may differ in their impact on suicide risk warrants further exploration. Indeed, the current study also identified the theme of anticipated stigma, however how this compares to public stigma (i.e., stigmatising views explicitly declared by those around the individual) in the manifestation of suicidal behaviour also warrants investigation.

#### 4.5.1 Implications for theory

The findings of the current study support Joiner and van Orden’s IPT by explicitly highlighting the adverse role loneliness can potentially have on the development of thwarted belongingness, and possible suicidal ideation. Equally, the IMV model also includes thwarted belongingness as an antecedent of suicidal ideation. However, the findings of the current study indicate the potentially distinctive role romantic loneliness might have above other forms of social support or marital status. Furthermore, factors associated with emotional secrecy are not highlighted in either model. Despite social norms being included in the IMV model, neither framework explicitly addresses the role of stigma or autonomy. Such factors however, are well-established correlates of mental wellbeing.

#### 4.5.2 Limitations

All interviews were conducted online due to the social distancing requirements imposed in the UK during the COVID-19 pandemic. The online administration directly affected the

flow of conversation of two of the participant interviews which were disrupted due to internet connection difficulties. The sample was comprised exclusively of young adults and as such the findings cannot be generalised to middle or older age groups. Equally, over half of the participant group was bisexual, which is not representative of the general population. Another consideration is that although romantic relationships ended for several participants around the time prior to their suicide attempts, the romantic status (or quality of relationship) was not explored in the remaining participants. The quantitative data collected in the study provides the opportunity to empirically compare participant characteristics at the time of interview. Although this may be beneficial for future studies, given the small sample size, the means and standard deviation of the group should be interpreted with caution. Finally, the current study did not explore when loneliness manifests in relation to suicidal ideation or suicide attempt. Given this overlap, further in-depth investigation is required, to help to disentangle any cause-and-effect relationships between the themes identified here and suicide at-tempts.

### 4.5.3 Future work

This is the first peer-reviewed publication to use IPA to investigate the association between interpersonal factors (specifically loneliness) and a suicide attempt, drawing from accounts of individuals with lived experience. The findings from this study, however, provide the basis for further investigation into the relationship between romantic loneliness, parental relationship (both past and present) and suicidal behaviour. Future work would also benefit from exploring differences between anticipated and public stigma.

### 4.5.3 Conclusion

In conclusion, this is the first study to use IPA to explore experiences of social support and loneliness prior to suicide attempt. Several aspects of loneliness were identified. In addition to other interpersonal factors such as emotional secrecy and patterns of support, was identified as significant, in young people. The evidence here suggests that that acceptance, especially from significant others (e.g., parents, romantic partners) may play a pivotal role in mental wellbeing. These findings offer preliminary qualitative evidence that is consistent with the IMV model and IPT where the quality of one's social supports and feelings of belongingness are influential in the manifestation of suicidal behaviour. Future

research may benefit from exploring the role of parental attachment style and romantic loneliness in the pathways to suicide attempt longitudinally.

# Chapter 5: The Association of Family, Social and Romantic Loneliness in Relation to Suicidal Ideation and Behaviour

## 5.1 Abstract

*Background:* Globally, one person dies by suicide approximately every 40 seconds. Remaining unidentified predictors of suicide are widely believed to be psychological in nature. In recent years, the association between loneliness and self-injurious thoughts and behaviours has received increasing attention, with a significant link consistently being identified. However, the extent to which different types of loneliness impact on physical and mental health remains under-researched.

*Aim:* Based on findings from existing theory-driven research, this study aimed to explore i) how sensitivity to different forms of loneliness might be associated with self-injury, and ii) how predispositions might lead to people having particular sensitivity to loneliness from specific sources of social support.

*Methods:* This cross-sectional online study investigated four types of loneliness (family, romantic, social and global) and other interpersonal factors (socially prescribed perfectionism, current parental attachment) in relation to suicidal ideation and several variables associated with suicidal ideation (stress, defeat, entrapment and depression). 582 participants (aged 18-70 years) completed the survey between May and October 2021.

*Results:* All forms of loneliness were associated with suicidal ideation, and all loneliness measures significantly and independently moderated the association between entrapment and suicidal ideation. Depression significantly mediated between all forms of loneliness and suicidal ideation, though statistically significant variability was observed between mediating models. Stress fully mediated between socially prescribed perfectionism and romantic loneliness, and partially mediated between socially prescribed perfectionism and family, social and global loneliness. Perceived paternal relationship quality was negatively associated with suicidal ideation. However no significant association was observed between maternal relationship quality and suicidal ideation.

*Conclusions:* All forms of loneliness may independently influence the transition from entrapment to suicidal ideation. Therefore, the quality and/ or quantity of family, romantic and social relationships should be explored individually when considering loneliness as a possible risk factor for suicidal ideation. Furthermore, depression mediated between all forms of loneliness and suicidal ideation, suggesting that all forms of loneliness may have a significant impact on mental and physical health. Future work would benefit from replicating these findings longitudinally.

## 5.2 Introduction

Despite the utility of theory-driven approaches to guide suicidal behaviour research in recent years, many suicide deaths occur with little or no warning (Klonsky & May, 2010). Leading factors associated with suicide death include exposure to suicidal behaviour, namely, having a close friend or relative die, or attempt to die, by suicide (Wetherall *et al.*, 2018). However, the pathways to suicide are complex, involving many risk factors, with calls to focus on extant psychological factors to better understand the emergence of suicidal ideation and behaviour (O'Connor & Nock, 2014). One risk factor which has gained increasing attention in public health, including to understand suicide risk, is loneliness. Although there is evidence to suggest that there is an independent prospective association between loneliness and self-injurious thoughts, and loneliness and self-injurious behaviours (McClelland *et al.*, 2020), which dimensions of loneliness (e.g., family, friend or romantic loneliness) are most associated with these separate outcomes remains under-researched.

### 5.2.1 Loneliness in theories of suicide risk

To explore the association between loneliness and suicide, two leading models of suicidal behaviour need to be considered. Both the Interpersonal Theory of Suicide (IPT; Joiner, 2005; van Orden *et al.*, 2010) and Integrated Motivational-Volitional Model of suicidal behaviour (IMV; O'Connor, 2011; O'Connor and Kirtley, 2018) suggest that loneliness is an antecedent of suicidal ideation, working similarly to social support. Although this is only expressly stated in the IPT, the IMV model not only incorporates similar key drivers of the IPT in predicting suicidal behaviour (i.e., thwarted belongingness, perceived burdensomeness, desire for death), but also considers predispositional factors (e.g., perfectionistic traits, attachment style, genetics) associated with suicide (see sections 1.8.4

and 1.9). Due to the broader, biopsychosocial approach of the IMV model, this model shall be used to guide the current study.

### 5.2.2 Summary of the IMV Model

A detailed description of the IMV is located in section 1.9. However, in brief, the IMV model groups risk and protective factors of suicide into three overarching phases; i) the Pre-Motivational Phase comprising of factors which span from pre-birth through to adulthood, ii) the Motivational Phase which focuses on contextual factors in the present, including key drivers of suicide (i.e., defeat, entrapment, suicidal ideation; Williams, 2001) and contextual factors, and, iii) the Volitional Phase which determines the transition from self-injurious thoughts to self-injurious behaviour. Although loneliness is not explicitly mentioned within the IMV model, a recent study found that loneliness was most likely to operate similarly to social support and thwarted belongingness; moderating the relationship between entrapment and suicidal ideation (McClelland *et al.*, 2021). This ‘positioning’ of loneliness within the IMV model is also consistent with the IPT, which argues that thwarted belongingness (which encapsulates loneliness), in combination with burdensomeness, can give rise to self-injurious thoughts. Therefore loneliness is likely to be associated with entrapment and suicidal ideation.

### 5.2.3 The development of loneliness

Loneliness is a mismatch between the quantity or quality of relationships one has compared to those desired (Perlman & Peplau, 1982). As such, it is possible to feel lonely without being physically alone. Evidence has indicated that not only is there an association between loneliness and later self-harm (see Chapter 2; McClelland *et al.*, 2020) and depression (Wang *et al.* 2018), but there are also predisposing factors which can influence vulnerability to loneliness. Wiseman, Mayseless and Shranbany (2006) found that a secure attachment during infancy, was negatively correlated with loneliness in adulthood during the first year of university. This is consistent with Bowlby’s theory of attachment (as cited in Bretherton, 1992), where early life experiences can shape ones relationship style and interpersonal needs and expectations in later life. Similarly, socially prescribed perfectionism (SPP), a personality trait consistently associated with increased risk for suicide (Smith *et al.*, 2018), is also associated with early life interpersonal experiences. SPP is posited to be shaped from childhood experiences of parental criticism, parental

expectations and concern for mistakes, and is defined by the intrinsic need to meet the impossibly high expectations believed to be held by others (Flett *et al.*, 2022).

Characteristics of SPP include avoidance of help-seeking and the need to project an image of perfection. Flett *et al.* (2016) found that compared to those with low SPP traits, those with high SPP traits are more prone to stress reactivity triggered by perceived, negative social evaluation. This illustrates that those with high SPP traits are more sensitive to negative feedback from others (which causes stress), and therefore have a heightened propensity to loneliness and stress. However, whether this association between SPP, stress and loneliness varies between different forms of loneliness has yet to be established.

A stress-diathesis framework is included within the IMV model of suicidal behaviour (see section 1.9.2.3). Therefore, stress would be expected to mediate the association between SPP and loneliness. Stress is argued to highlight the shortcomings of maladaptive coping strategies, of which include using interpersonal relationships for support, distraction and reassurance seeking. Therefore, those who are already feeling dissatisfied or insecure with the quality or quantity of their existing relationships (e.g., those with high traits of SPP), may feel this to a greater extent when stressed. However, whether this association is observed in all social groups (friends, family, romantic) has yet to be established.

#### 5.2.4 The association between forms of loneliness and mental health

Weiss (1973) argues that there are two forms of loneliness: social and emotional.

Emotional loneliness pertains to deficiencies in an 'intimate tie' (Sawir *et al.*, 2008), such as bonds with a romantic partner or parent, while social loneliness relates to social integration, such as friendships or involvement with communities. Research has found that different forms of loneliness can have differing implications for physical and mental wellbeing. For example, in a nationally representative study of American high-school students, Lasgaard *et al.* (2011) found that social and family loneliness were significantly associated with poorer mental wellbeing (i.e., depression and suicidal ideation). In contrast, social and romantic loneliness were more strongly associated with eating disorders and self-harm. This therefore highlights that the focus of different forms of loneliness can have differing implications on health and wellbeing. By identifying which form(s) of loneliness are most associated with self-harm, and identifying the factors which influence these associations, are critical to guiding effective suicide prevention strategies.



The potential for different forms of loneliness to be associated with self-harm is supported by the study summarised in Chapter 4. Chapter 4 describes a recent qualitative study exploring interpersonal factors prior to a suicide attempt. Both romantic (i.e., over-reliance on one person) and family loneliness (i.e., current difficult relationship with parent(s)) were common themes in this study. Although there is considerable research exploring loneliness in relation to friends and romantic partners in relation to suicide risk, there is a dearth of research exploring the quality of relationship with parents of adults in relation to self-harm. Therefore, this gap in the research base warrants exploration.

Research indicates that the University of California Los Angeles Loneliness Scale (UCLA-LS; Russell, Peplau & Ferguson, 1978), or versions thereof, is one of the most widely utilised instruments for assessing loneliness (McClelland *et al.*, 2020; Cole *et al.*, 2021). However, this instrument measures loneliness as a unidimensional construct, described by Mund *et al.* (2022) as ‘global loneliness’. In a recent systematic review, McClelland *et al.* (2020) found that 14 of the 18 studies to use a form of the UCLA-LS, identified a significant association between loneliness and self-injurious thoughts and behaviour (see section 2.4.5.3). Comparing how the association between global loneliness compares to specific forms of loneliness in relation to self-injury would be beneficial in the advancement of effective suicide intervention suicide behaviour research.

### 5.2.5 Current study aims

The key aims of this study were to:

1. Investigate the associations between personality traits and different forms of loneliness
2. Explore different forms of loneliness (family, romantic, social and global) in relation to self-injurious thoughts and behaviours.

The findings of this research could inform the development of more nuanced suicide prevention strategies to support the mental wellbeing of those at risk of self-injury. To address the current aim, six research questions were addressed:

1. To what extent are interpersonal factors and affective states associated with suicidal ideation?

2. Which psychological factors distinguish between those with; no history of self-injurious thoughts or behaviours, a history of self-injurious thoughts only, and those with a history of self-injurious behaviour?
3. To what extent does stress mediate the association between socially prescribed perfectionism and each form of loneliness?
4. Which, if any, forms of loneliness moderate the relationship between defeat and entrapment, and between entrapment and suicidal ideation?
5. Does depression mediate the relationship between any form of loneliness and suicidal ideation, and if so, does the level of mediation vary?

Based on the extant research, our hypotheses were the following:

1. Negative affective states (i.e., depression, defeat, entrapment, stress) and interpersonal factors (i.e., socially prescribed perfectionism and all forms of loneliness) would be positively associated with suicidal ideation. Parental relationship quality would be negatively associated with suicidal ideation.
2. Suicidal ideation would distinguish between those with no history of self-injurious thoughts or behaviours, a history of self-injurious thoughts only and with a history of self-injurious behaviours.
3. Global and family loneliness would distinguish between those with a history of self-injurious thoughts and those without a history of self-injurious thoughts or behaviours. Romantic loneliness would distinguish between those with and without a history of self-injurious behaviour.
4. Stress would mediate between socially prescribed perfectionism and all forms of loneliness.
5. Loneliness would be a stronger moderator of the relationship between entrapment and suicidal ideation than between defeat and entrapment.
6. Of all forms of loneliness investigated, global and family loneliness would be the strongest moderators of entrapment and suicidal ideation
7. Depression would mediate between global loneliness and suicidal ideation.
8. Mediation models exploring the effect of stress in relation to socially prescribed perfectionism and loneliness would significantly differ between differing forms of loneliness.

## 5.3 Methods

### 5.3.1 Procedure

The study follows a format similar to that of Chapter 3. Data were collected via Online Survey Systems from 1<sup>st</sup> July to 24<sup>th</sup> November 2021. Anyone aged  $\geq 18$  years with sufficient understanding of the written English language was eligible to participate in the study. The study advert was placed on University of Glasgow research webpages, as well as personal and professional social media profiles of the study authors (e.g., Twitter, Facebook). The advert summarised the study aims, eligibility and a link to the survey website. The study website included study documents (e.g., participant information sheet, privacy notice) and consent form before directing participants to the study measures. Upon completion of the study, participants were presented with a second weblink which provided the opportunity to enter a prize draw to win high street vouchers to the value of £200 as compensation for their participation. The link between the survey webpage and prize draw was broken so that contact details entered in the prize draw could not be associated with survey responses. Raw study data were downloaded from the survey platform via Excel files which were then encrypted and stored on the University of Glasgow computing domain. Ethical approval was granted by the University of Glasgow Medical, Veterinary and Life Sciences Ethics committee (ref. no.: 200200138).

### 5.3.2 Measures

All study measures are listed below. Internal consistency was assessed using Cronbach's alpha ( $\alpha$ ) and is provided for each measure based on the current study sample.

*Demographics.* This included participants' age, gender, nationality, living arrangements (e.g., cohabitation), relationship status and sexual orientation.

*Self-injury history:* Consistent with NICE (2013) guidelines, self-harm was defined as 'any act of self-poisoning or self-injury carried out by an individual irrespective of motivation' including suicide, suicide attempt and non-suicidal self-injury. Self-reported histories of self-harm thoughts and behaviours were replicated from self-injury history measures used by McClelland *et al.* (2021; see appendix 5 for all measure items). These items were

developed based on those used by the Adult Psychiatric Morbidity Survey (McManus *et al.*, 2007).

*Suicidal ideation.* The Suicide Probability Scale (Cull & Gill, 1989) comprises of eight statements (e.g., ‘I think of things too bad to share with others’) assessing thoughts and behaviours to measure participants experiences of suicidal ideation in the last two weeks. This tool has proven to be a reliable and valid measure of suicidal ideation in young people and young adults (Akca, Yuncu & Aydin, 2018). Responses were recorded using a four-item Likert type scale from ‘none or little of the time’ (1) to ‘most or all of the time’ (4) with subscale scores ranging from 8 to 24 ( $\alpha = 0.90$ ).

*University of California Los Angeles Loneliness Scale version 3 (UCLA-LS).* The UCLA-LS (Russell *et al.* 1990) is a widely used measure of self-reported loneliness. The scale assesses the frequency and intensity of loneliness and social isolation (e.g., ‘I feel isolated from others’) as a unidimensional construct (Engel, 2017). Responses to this 20-item measure were answered using a four-point Likert-type scale ranging from ‘never’ (1) to ‘often’ (4). This measure is indicated to be a valid and reliable instrument across a range of populations (Durak & Senol-Durak, 2010). Total measure scores range from 20 to 80 ( $\alpha = 0.93$ ).

*Social and Emotional Loneliness Scale (SELSA).* The Social and Emotional Loneliness Scale (abbreviated version) for Adults (SELSA; DiTommaso & Spinner, 1993) measures multiple dimensions of loneliness (Cramer & Barry, 1999). The three subscales of the SELSA are; family (SELSA-Family; five-items, e.g., ‘I really belong in my family’; scale range: 5 – 35;  $\alpha = 0.94$ ), romantic (SELSA-Romantic; six-item e.g., ‘I have an unmet need for a close romantic relationship’; scale range: 6 – 42;  $\alpha = 0.95$ ) and social (SELSA-Social; four-items e.g., ‘I can depend upon my friends for help’; scale range: 4 – 28,  $\alpha = 0.95$ ). All items were assessed using a 7-item Likert type scale from ‘strongly disagree’ (1) to ‘strongly agree’ (7) and the measure is a valid and reliable measure of loneliness in adult populations (Jowkar, 2012).

*Depression.* The Patient Health Questionnaire-9 (PHQ-9; Kroenke *et al.*, 2001) is a nine-item self-report measure of depressive symptoms within the last two weeks (e.g., ‘little interest or pleasure in doing things’). Wang *et al.* (2014) demonstrated that the PHQ-9 was a reliable and valid measure of depression within the general population. Responses are

captured using a four-item Likert scale from ‘not at all’ (1) to ‘nearly every day’ (4). Total measure scores ranged from 9 to 36 ( $\alpha = 0.90$ ).

*Defeat.* The Defeat Scale (Gilbert & Allan, 1998) is a 16-item measure which assesses feelings of defeat within the last seven days (e.g., ‘I feel powerless’) with responses recorded using a five-item Likert type scale ranging from ‘never’ (0) to ‘always’ (4). The measure has been shown to be a reliable and valid instrument (Akin *et al.*, 2013) with scores ranging between 0 to 64 ( $\alpha = 0.96$ ).

*Entrapment.* The Entrapment Scale by Gilbert and Allan (1998) is a 16-item measure which evaluates participants’ feelings of being trapped by either internal or external factors (e.g., ‘I feel powerless to change myself’ versus ‘I am in a relationship I can’t get out of’). Answers are recorded using a five-item Likert type scale from ‘not at all like me’ (1) to ‘extremely like me’ (5). The measure has established good reliability and validity (Panagioti *et al.*, 2015) and total scores range from 16 to 80 ( $\alpha = 0.96$ ).

*Continued Attachment Scale (CAS).* Brief measures of parental attachment style in adult offspring are limited. The CAS (Berman *et al.* 1994) was identified as the most appropriate due to its brevity, reliability and validity (Ravitz *et al.*, 2010). The CAS includes two 6-item subscales measuring cognitive and emotional components of adult offspring’s quality of attachment with their mother (CAS-Mother) and father (CAS-Father) or equivalent figures whether these figures are present in the individual’s life or not (e.g., ‘How often have you thought about your mother/ father?’). Answers were recorded on a five-point Likert-type scale with scale criteria varying between items and subscale scores ranging from 6 to 30. Both CAS subscales were found to have good validity and reliability in American college students (Berman *et al.*, 1994;  $\alpha$ : CAS-Mother = 0.85, CAS-Father = 0.89).

*Socially Prescribed Perfectionism (SPP).* Traits of SPP are measured using 15 items (e.g., ‘others will like me even if I don’t excel at everything’) from the Multidimensional Perfectionism Scale (Hewitt *et al.*, 1991). SPP is measured using a seven-point Likert-type scale from ‘strongly disagree’ (1) to ‘strongly agree’ (7). The measure has good validity and reliability (Hewitt *et al.*, 1991), with scores ranging from 15 to 105 ( $\alpha = 0.89$ ).

*Stress.* Perceived Stress Scale – Short Form (Cohen & Williamson, 1988) is a four-item measure assessing thoughts and feelings of stress within the last month. Items (e.g., ‘In the

last month, have often have you felt that things were going your way?') are measured using a four-item Likert-type scale ranging from 'never' (1) to 'very often' (4). The measure has proven to have good reliability Lee, (2012) with total scores ranging from 4 to 16 ( $\alpha = 0.82$ ).

### 5.3.3 Statistical analysis

A priori g-power analysis based on the nine predictor variables and one dependent variable (suicidal ideation) indicated that at least 110 participants would be required for the data analysis of this study. Statistical analyses were conducted using SPSS (version 27). Based on self-injury history, participants were allocated to one of three possible participant groups: i) no history of self-injurious thoughts or behaviour group (NH group); ii) a history of self-injurious thoughts but no history of self-injurious behaviour (SI group); and iii) a history of self-injurious behaviour (including suicide attempt), regardless of any history of self-injurious thoughts (SB group). Demographics were reported by group totals and percentages, except for age which was reported using means and standard deviation ( $\pm$ ). Between-group age differences were tested using a one-way ANOVA. Visual inspection showed that total scores on each study measure were normally distributed. Bivariate correlation analyses were conducted to initially assess the association between all study variables. Similarities between all loneliness variables were explored using collinearity assessments. Consistent with Chapter 3 of this thesis, the acceptability criteria by Kim (2019) were adopted for this assessment (variable inflation factor (VIF)  $<5$  indicated no collinearity). Total variable scores between self-injury history participant groups were compared using univariate and multiple variable multinomial logistic regressions (reported using chi-square;  $\chi^2$ ), followed by pairwise analyses reported using group means and standard deviations followed by odds ratios (OR) and 95% confidence intervals (95% CI). Hayes (2013) PROCESS macro for SPSS was used to compare UCLA-LS and SELSA subscales within the following moderation models; i) defeat and entrapment, and ii) entrapment and suicidal ideation. These were conducted using unadjusted models, with follow-up analysis where the models were explored while controlling for demographics (age, gender) and depression. These models were then further repeated controlling for all other loneliness scales to identify which was most influential. Furthermore, two mediation analyses were conducted. Stress was explored as a mediator between SPP and different forms of loneliness (without controlling for any confounding variables). Also, depression

was explored as a mediator between each form of loneliness individually in relation to suicidal ideation, controlling for age and gender.

### 5.3.4 Missing data

Consistent with published studies (Wetherall *et al.*, 2018; McClelland *et al.*, 2021), any participant who completed less than 75% of the overall survey was removed from the study entirely, which resulted in four participants being excluded from the dataset (n= 582). Equally, participants' data were removed from an individual variable if less than 75% of the measure items were completed. Applying this rule resulted in 4 – 11 participants (0.6-1.9%) being excluded for each measure which is reflected by the different participant totals (n) summarised in Appendix 13. Remaining missing data of individual items ranged from 0 to 4.2% per variable. Little's Missing Completely at Random (MCAR) test was non-significant for most variables, indicating that these values were missing completely at random and no further adjustments to data were required. However, data for depression were not missing completely at random. However, as less than 1% of data were missing per item, the MCAR result was likely due to the high correlation between items 1 and 2 of the measure and therefore Little's output was dismissed.

To create complete datasets for further analysis, estimation-maximisation imputation techniques were applied to generate statistically likely data to fill the missing data responses of the study measures. However, participants who did not answer all self-injury history questions could not be allocated to a self-injury history group and were not included in the logistic regression analyses. All participants were included in all correlation and moderation analyses as self-injury history data was not a pre-requisite.

## 5.4. Results

### 5.4.1 Participant summary

582 participants took part in the study. Participant demographics, including age, gender and sexuality are summarised below (see Table 5.1). Females represented 73.39% of the total participant sample though the gender ratio varied between participant groups. Participant ages ranged from 18 to 70 years (mean:  $26.96 \pm 9.79$ ). 60.16% of participants were heterosexual/ straight and were most commonly British (49.8%), followed by Indian

Table 5.1. Participant demographic characteristics (n= 582)

<b>Variable</b>	<b>Total sample <sup>a</sup></b> (n= 582)	<b>NH</b> (n= 106)	<b>SI</b> (n= 74)	<b>SB</b> (n= 400)	<b>ANOVA</b> F (df)
<b>Gender n (%)</b>					
Male	131 (22.51)	33 (31.13)	22 (29.73)	76 (19.00)	
Female	422 (72.51)	69 (65.09)	49 (66.22)	304 (76.00)	
Other	22 (3.78)	3 (2.83)	3 (4.05)	16 (4.00)	
Unknown/ prefer not to say	7 (1.20)	1 (0.94)	0 (0)	4 (1.00)	
Total	582	106	74	400	
<b>Age</b>					
Mean	26.93	27.50	27.72	26.63	F (2)= 0.60, p = ns



<b>Variable</b>	<b>Total sample <sup>a</sup></b> (n= 582)	<b>NH</b> (n= 106)	<b>SI</b> (n= 74)	<b>SB</b> (n= 400)	<b>ANOVA</b> F (df)
Std. Deviation	9.79	10.68	9.98	9.52	
Range	18 – 70	18 – 67	18 – 60	18 – 70	
Unknown/ prefer not to say	6 (1.03)	1 (0.94)	0 (0)	3 (0.75)	
<b>Nationality n (%)</b>					
British	290 (50.00)	54 (50.94)	32 (43.24)	204 (51.0)	
Mixed	11 (1.90)	2 (1.89)	0 (0)	9 (2.25)	
Other	270 (46.55)	48 (45.28)	42 (56.76)	180 (45.00)	
Unknown/ prefer not to say	11 (1.90)	2 (1.89)	0 (0)	7 (1.75)	
N	582	106	74	400	

<b>Variable</b>	<b>Total sample <sup>a</sup></b> (n= 582)	<b>NH</b> (n= 106)	<b>SI</b> (n= 74)	<b>SB</b> (n= 400)	<b>ANOVA</b> F (df)
<b>Sexuality n (%)</b>					
Heterosexual	346 (59.45)	74 (69.81)	53 (71.62)	219 (54.75)	
Gay/ Lesbian	24 (4.12)	4 (3.77)	3 (4.05)	17 (4.25)	
Bisexual	135 (23.20)	12 (11.32)	12 (16.22)	111 (27.75)	
Asexual	20 (3.44)	3 (2.83)	0 (0)	17 (4.25)	
Not sure	36 (6.19)	8 (7.55)	4 (5.41)	24 (6.00)	
Other	13 (2.23)	3 (2.83)	1 (1.35)	9 (2.25)	
Unknown/ prefer not to say	8 (1.37)	2 (1.89)	1 (1.35)	3 (0.75)	
N	582	106	74	400	

N = total number; sd. = standard deviation; % = percentage based on allocated self-injurious history group; ns= not significant; NH= no history of self-injurious thoughts or behaviour group; SI= history of self-injurious thoughts but no history of self-injurious behaviour; SB= history of self-injurious behaviour (including suicide attempt), regardless of any history of self-injurious thoughts.

\*582 participants were included in the total sample, however as two participants did not sufficiently answer the self-injury history questions the total number of participants allocated a self-injury history group is 580.

(4.30%) or American/USA (3.9%). An ANOVA revealed no significant difference in age between groups and no significant between-group variations were observed based on the remaining demographic characteristics.

#### 5.4.2 Correlations between variables

The correlations between all study variables are summarised in appendix 13. Suicidal ideation was significantly associated with all study variables in the expected direction with the exception of CAS-Mother where no significant association was observed. Both CAS-Mother and CAS-Father were negatively associated with SELSA-Family, SELSA-Social and UCLA-LS. No association was observed between CAS subscales and SELSA-Romantic. UCLA-LS, SELSA-family and SELSA-Social were significantly, positively associated with all other study variables whereas SELSA-Romantic was associated with all study variables except defeat.

#### 5.4.3 Collinearity tests

VIF scores for each loneliness scale in the current study were: SELSA-Family= 1.40, SELSA-Romantic= 1.121, SELSA-Social= 2.31 and UCLA-LS= 2.89.

#### 5.4.4 Distinguishing between self-injury history

Table 5.2 summarises univariate and multiple variable multinomial logistic regressions based on participant groups (NH, SI and SB).

##### 5.4.4.1 Univariate logistic regression

To univariately investigate differences in scores of study measures based on history of self-harm, univariate logistic regression analyses were conducted. Of the four loneliness measures, only UCLA-LS ( $\chi^2 = 7.15$ ,  $df = 2$ ,  $p < 0.05$ ) and SELSA-Family ( $\chi^2 = 7.66$ ,  $df = 2$ ,  $p < 0.05$ ) distinguished between self-injury participant groups. SPP, depression, defeat, entrapment, and suicidal ideation also significantly differentiated between groups (see table 5.2). CAS-Mother, CAS-Father and SELSA-Social did not distinguish between the participant groups based on history of self-injury.

Table 5.2. Univariate and multiple variable multinomial logistic regression (n= 586, df= 2)

Variable	Univariate		Multivariate	
	$\chi^2$	<i>p</i>	$\chi^2$	<i>p</i>
<b>Attachment</b>				
Mother	0.05	ns	3.53	ns
Father	3.41	ns	0.39	ns
<b>Perfectionism</b>	<b>10.59</b>	<b>&lt;0.01</b>	3.95	ns
<b>SELSA</b>				
Family	<b>7.66</b>	<b>&lt;0.05</b>	0.29	ns
Romantic	4.86	ns	<b>8.94</b>	<b>&lt;0.05</b>
Social	2.43	ns	2.63	ns
<b>UCLA-LS</b>	7.15	<0.05	<b>7.05</b>	<b>&lt;0.05</b>
<b>Stress</b>	<b>17.71</b>	<b>&lt;0.001</b>	1.62	ns
<b>Depression</b>	<b>35.93</b>	<b>&lt;0.001</b>	<b>6.16</b>	<b>&lt;0.05</b>
<b>Defeat</b>	<b>55.55</b>	<b>&lt;0.001</b>	0.33	ns
<b>Entrapment</b>	<b>27.14</b>	<b>&lt;0.001</b>	0.98	ns
<b>Suicidal Ideation</b>	<b>45.32</b>	<b>&lt;0.001</b>	<b>45.91</b>	<b>&lt;0.001</b>

$\chi^2$ = chi-square, *p*= p-value, ns= not significant; *p*= p-value; df= degrees of freedom.

Values highlighted in bold are statistically significant (*p*<0.05).

Pairwise post-hoc analysis revealed significant differences between NH and SI for SELSA-Romantic ( $25.92 \pm 13.02$  and  $25.92 \pm 13.04$  respectively; OR= 1.02, 95% CI:1.00 – 1.05) and between NH and SB for SELSA-Family ( $12.05 \pm 7.49$  and  $14.40 \pm 8.39$  respectively; OR=1.04, 95% CI: 1.01 – 1.07), SELSA-Romantic ( $25.92 \pm 13.02$  and  $24.39 \pm 13.61$  respectively; OR= 1.02, 95% CI: 1.00 – 1.03) and UCLA-LS ( $42.89 \pm 12.35$  and  $46.43 \pm 12.06$  respectively; OR= 1.02, 95% CI: 1.01 – 1.04). No significant differences were identified between SI and SB for any loneliness measures. SPP scores differed significantly between NH and SB participant groups only ( $56.06 \pm 15.45$  and  $59.19 \pm 14.95$  respectively; OR= 1.02, 95% CI: 1.01 – 1.04).

Suicidal ideation was the only variable to significantly differentiate between all pairwise comparisons (NH vs SI:  $11.42 \pm 3.94$  and  $12.99 \pm 4.73$  respectively, OR= 1.12, 95% CI: 1.03 – 1.22; NH vs SB:  $11.42 \pm 3.94$  and  $14.57 \pm 4.83$  respectively, OR= 1.21, 95% CI: 1.13 – 1.29; SI vs SB:  $12.99 \pm 4.73$  and  $14.57 \pm 4.83$  respectively, OR= 1.08, 95% CI: 1.02 – 1.14). Further univariate pairwise comparisons are summarised in appendix 14.

#### 5.4.4.2 Multiple variable logistic regression

To identify whether the significant differences observed within the univariate logistic regression analysis remained once all other study variables were controlled for, the data was re-analysed using a multiple variable multinomial logistic regression. The analysis revealed that SELSA-Romantic ( $\chi^2= 6.945$ ,  $p<0.05$ ), UCLA-LS ( $\chi^2= 7.05$ ,  $p <0.05$ ), depression ( $\chi^2= 6.16$ ,  $p <0.05$ ) and suicidal ideation ( $\chi^2= 42.225$ ,  $p<0.001$ ) independently distinguished between participants based on self-injury history when controlling for all other study variables.

Post-hoc pairwise analysis revealed significant differences in SELSA-Romantic scores between SI and SB groups ( $25.92 \pm 13.04$  and  $24.39 \pm 13.61$  respectively; OR: 0.94, 95% CI: 0.91 - 0.98) and differences in depression scores between NH and SI ( $16.22 \pm 5.82$  and  $18.54 \pm 6.02$  respectively; OR= 1.21, 95% CI: 1.01 – 1.46) and NH and SB groups ( $16.22 \pm 5.82$  and  $20.38 \pm 6.84$  respectively; OR: 1.19, 95% CI: 1.02 – 1.38). Suicidal ideation significantly distinguished between NH and SB groups ( $11.42 \pm 3.94$  and  $14.57 \pm 4.83$  respectively; OR: 1.59, 95% CI: 1.59 – 2.88) and SI and SB groups ( $12.99 \pm 4.73$  and  $14.57 \pm 4.83$  respectively; OR: 1.61, 95% CI: 1.25 – 2.08) but not between NH and SI groups ( $11.42 \pm 3.94$  and  $12.99 \pm 4.73$  respectively; OR: 1.33, 95% CI: 0.97 – 1.83). Further pairwise comparisons are summarised in appendix 15.

## 5.4.5 Stress as a mediator between perfectionism and loneliness

### 5.4.5.1 SELSA-Family

SPP was significantly associated with stress ( $b = 0.106$ ,  $se = 0.007$ ,  $t = 14.600$ ,  $p < 0.001$ , 95% CI: 0.091, 0.120) and the association between stress and SELSA-Family was also significant ( $b = 0.471$ ,  $se = 0.118$ ,  $t = 3.987$ ,  $p < 0.001$ , 95% CI: 0.239, 0.703; see figure 5.1, panel A). The inclusion of stress did not reduce the direct effect of SPP on SELSA-Family to non-significance ( $b = 0.128$ ,  $se = 0.024$ ,  $t = 5.347$ ,  $p < 0.001$ , 95% CI: 0.081, 0.175). However, as the indirect effect was significant, this suggests that stress partially mediated the association between SPP and SELSA-Family ( $\beta = 0.050$ ,  $se = 0.014$ , 95% CI: 0.022 – 0.077).

### 5.4.5.2 SELSA-Romantic

SPP was significantly associated with stress ( $b = 0.106$ ,  $se = 0.007$ ,  $t = 14.626$ ,  $p < 0.001$ , 95% CI: 0.092, 0.120) and stress was also significantly associated with SELSA-Romantic ( $b = 0.783$ ,  $se = 0.204$ ,  $t = 3.849$ ,  $p < 0.001$ , 95% CI: 0.384, 1.183; see figure 5.1, panel B). The inclusion of stress reduced the direct effect of SPP on SELSA-Romantic to non-significance ( $b = 0.010$ ,  $se = 0.041$ ,  $t = 0.251$ ,  $p = 0.802$ , 95% CI: -0.071, 0.092) indicating that stress fully mediated the association between SPP and SELSA-Romantic.

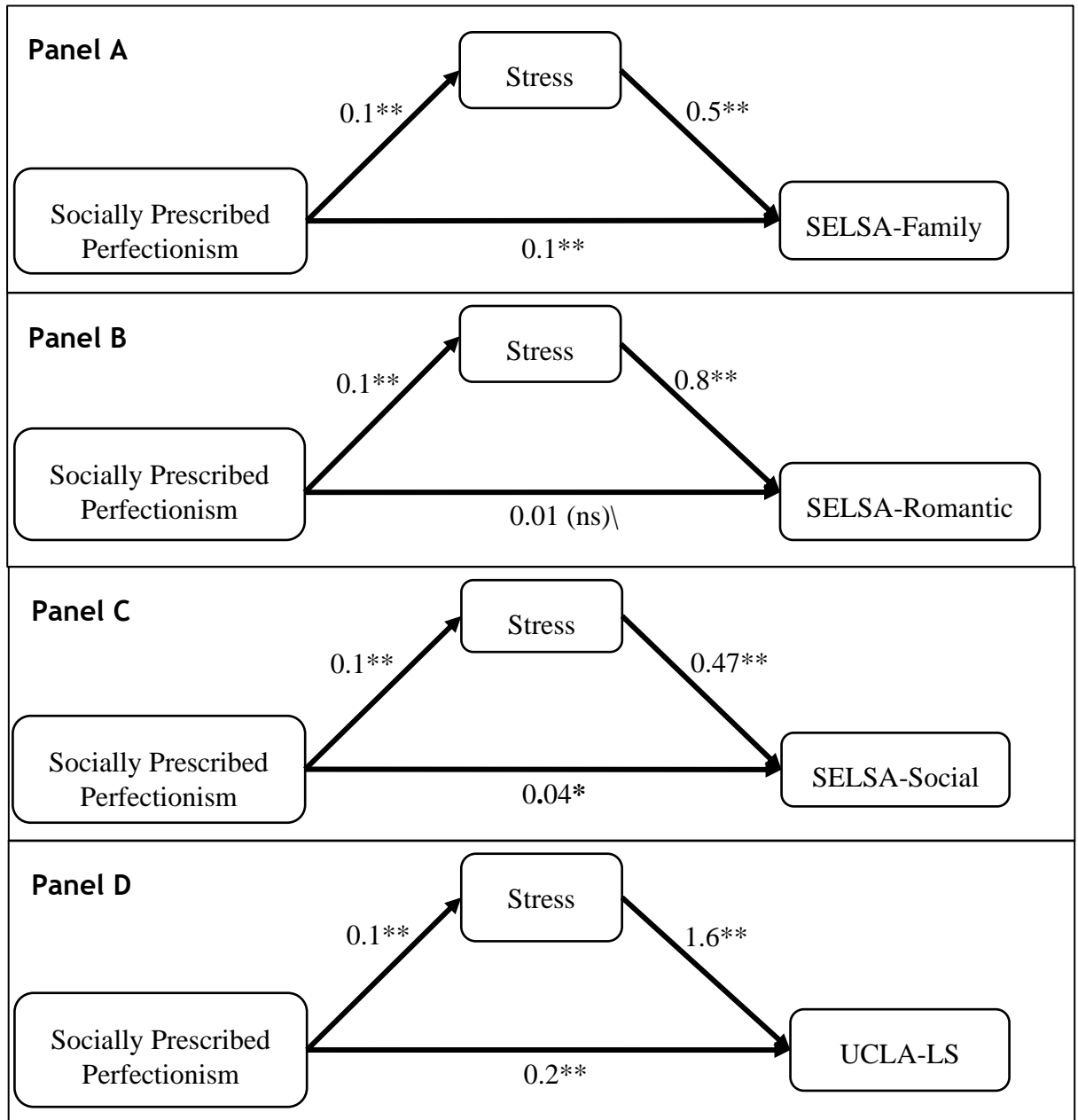
### 5.4.5.3 SELSA-Social

SPP was significantly associated with stress ( $b = 0.106$ ,  $se = 0.007$ ,  $t = 14.583$ ,  $p < 0.001$ , 95% CI: 0.091, 0.120), as was the association between stress and SELSA-Social ( $b = 0.670$ ,  $se = 0.094$ ,  $t = 7.154$ ,  $p < 0.001$ , 95% CI: 0.486, 0.855; see figure 5.1, panel C). The inclusion of stress did not reduce the direct effect of SPP on SELSA-Social to non-significance ( $b = 0.044$ ,  $se = 0.019$ ,  $t = 2.310$ ,  $p < 0.05$ , 95% CI: 0.007, 0.081). However, as the indirect effect was significant, this suggests that stress partially mediated the association between SPP and SELSA-Social ( $\beta = 0.071$ ,  $se = 0.012$ , 95% CI: 0.047 – 0.095).

### 5.4.5.4 UCLA-LS

SPP was significantly associated with stress ( $b = 0.106$ ,  $se = 0.007$ ,  $t = 14.588$ ,  $p < 0.001$ , 95% CI: 0.091, 0.120) and the association between stress and UCLA-LS was also significant ( $b = 1.648$ ,  $se = 0.154$ ,  $t = 10.692$ ,  $p < 0.001$ , 95% CI: 1.345, 1.950; see figure 5.1, panel D). The inclusion of stress did not reduce the direct effect of SPP on UCLA-LS to

Figure 5.1 Mediating effects of stress between socially prescribed perfectionism and different forms of loneliness (n= 577)



\* p<0.05; p<0.001

non-significance (b= 0.159, se= 0.031, t= 5.079, p<0.001, 95% CI: 0.097, 0.220).

However, as the indirect effect was significant, this suggests that stress partially mediated the association between SPP and SELSA- Social ( $\beta = 0.174$ , se= 0.022, 95% CI: 0.133 – 0.217).



## 5.4.6 Loneliness as a moderator between defeat and entrapment

No forms of loneliness significantly moderated between defeat and entrapment (see appendix 16 for results).

## 5.4.7 Loneliness as a moderator between entrapment and suicidal ideation relationship

### 5.4.7.1 Unadjusted models

SELSA-Family ( $b= 0.002$ ,  $se= 0.001$ ,  $t= 2.364$ ,  $p<0.05$ , 95% CI: 0.0004 – 0.0040), SELSA-Romantic ( $b= 0.001$ ,  $se= 0.001$ ,  $t= 2.148$ ,  $p<0.05$ , 95% CI: 0.0001 – 0.0024) and UCLA-LS ( $b= 0.002$ ,  $se= 0.001$ ,  $t= 2.953$ ,  $p<0.01$ , 95% CI: 0.001 – 0.003) significantly moderated between entrapment and suicidal ideation. No significant moderating effect was observed between SELSA-Social in relation to entrapment and suicidal ideation.

### 5.4.7.2 Adjusted moderation models

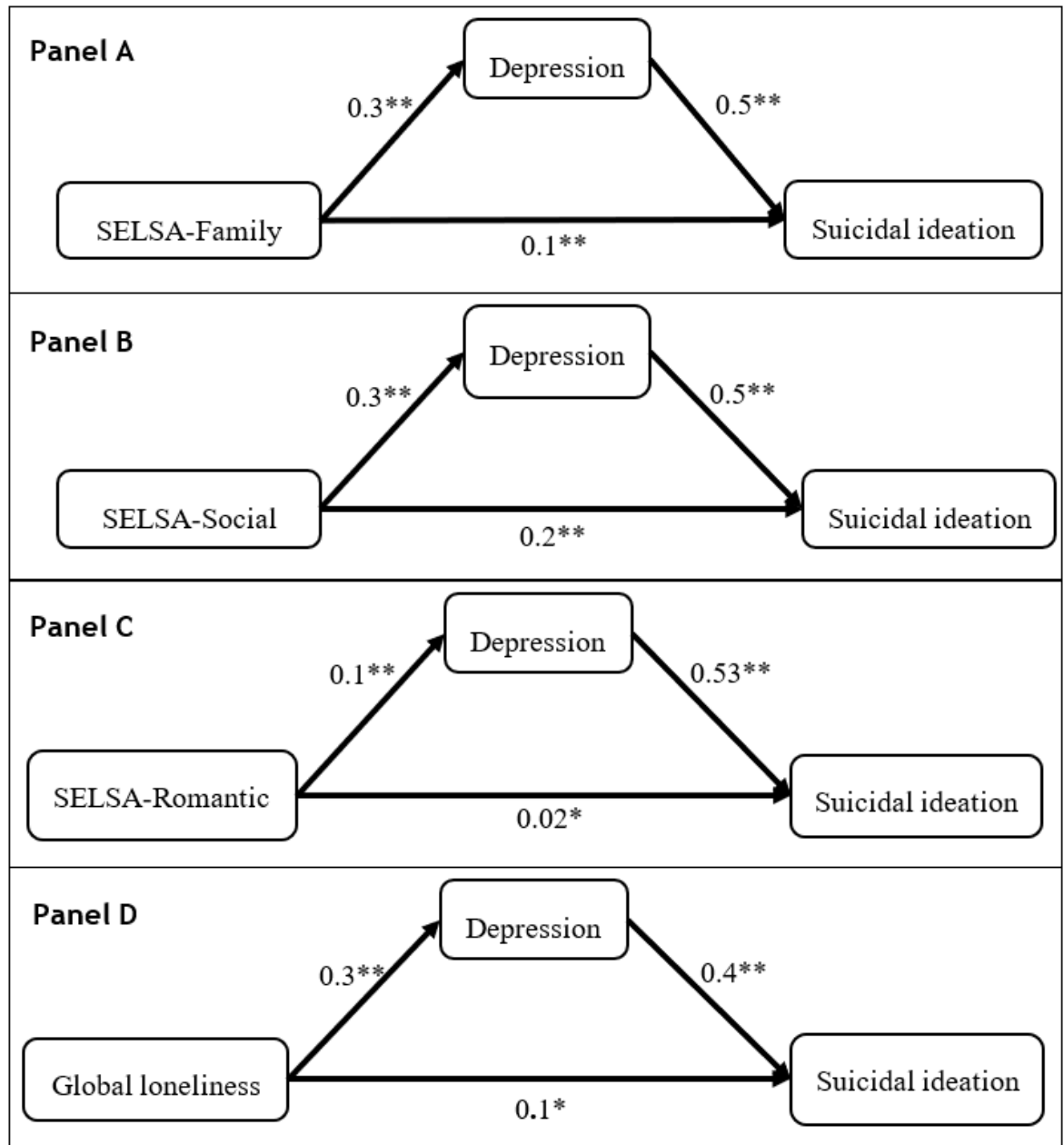
Of the significant unadjusted moderation models summarised in section 5.4.7.1, gender and age were found to have no significant interactive effect within the adjusted models, whereas depression was significantly correlated with each loneliness scale (SELSA-Family:  $\beta= 0.003$ ,  $se= 0.001$ ,  $t= 2.893$ ,  $p<0.01$ , 95% CI: 0.001 – 0.004; SELSA-Romantic:  $\beta= 0.001$ ,  $se= 0.001$ ,  $t= 2.318$ ,  $p<0.05$ , 95% CI: 0.0002 – 0.0023; UCLA-LS:  $\beta= 0.002$ ,  $se= 0.001$ ,  $t= -2.852$ ,  $p<0.01$ , 95% CI: 0.001 – 0.003). These models also remained significant when controlling for all other forms of loneliness (SELSA-Family:  $\beta= 0.002$ ,  $se= 0.001$ ,  $t= 2.765$ ,  $p<0.01$ , 95% CI: 0.001 – 0.004; SELSA-Romantic:  $\beta= 0.001$ ,  $se= 0.001$ ,  $t= 2.162$ ,  $p<0.05$ , 95% CI: 0.000 – 0.002; UCLA-LS:  $\beta= 0.001$ ,  $se= 0.001$ ,  $t= 2.508$ ,  $p<0.05$ , 95% CI: 0.000 – 0.003)

## 5.4.8 Depression as a mediator between loneliness and suicidal ideation (adjusted models)

Full mediation analysis summaries are in appendix 17. In brief, after controlling for age and gender, depression was observed to partially mediate between SELSA-Social ( $\beta= 0.180$ ,  $se= 0.023$ , 95% CI: 0.136 – 0.226), SELSA-Family ( $\beta= 0.143$ ,  $se= 0.018$ , 95% CI:

0.109 – 0.178) and ULCA-LS ( $\beta = 0.126$ ,  $se = 0.012$ , 95% CI: 0.104 – 0.149) in relation to suicidal ideation, with no statistically significant difference between the three models. A partial mediating effect of depression between SELSA-Romantic and suicidal ideation ( $\beta = 0.051$ ,  $se = 0.011$ , 95% CI: 0.030 – 0.73) was also observed, however based on confidence intervals, the effect of depression within this mediation model was significantly smaller than the other three mediation models (see figure 5.2, Panels A - D respectively).

Figure 5.2. Mediating effect of depression between loneliness and suicidal ideation



\*  $p < 0.05$ ; \*\*  $p < 0.001$

## 5.5 Discussion

The aim of this study was to investigate the associations between predispositional factors and forms of loneliness, and to explore the association between different forms of loneliness (family, romantic, social and global) and self-injurious thoughts and behaviours. To this end, five research questions were posed and are discussed individually below.

### 5.5.1 Interpersonal factors and affective states associated with suicidal ideation

As expected, correlation analyses revealed that all negative affective states (i.e., depression, defeat, entrapment, stress, loneliness, SPP) were positively associated with suicidal ideation. CAS-Father was the only interpersonal factor to be negatively associated with suicidal ideation. No significant association was identified between CAS-Mother and suicidal ideation, therefore our first hypothesis was partially supported.

### 5.5.2 Psychological factors distinguish between participants based on their self-injury history

Multiple variable multinomial logistic regression revealed that suicidal ideation significantly differentiated between participant groups based on their experience (or lack) of self-injury, thereby supporting our second hypothesis. Despite this, an unexpected result was observed following multivariate pairwise comparisons. Based on suicidal ideation scores, no significant difference was observed between participants with no history of self-injurious thoughts or behaviour, compared to participants with a history of self-injurious thoughts only. As the Suicide Probability Scale is used to assess recent suicidal ideation, we posit that most participants in the self-injurious thoughts only group had not experienced suicidal ideation recently. Therefore, the Suicide Probability Scale was not sensitive enough to detect these between-group differences. In future when classifying participant groups based on their experience of self-injurious thoughts or behaviours, a life-time approach may not be appropriate. Indeed, many suicidal ideation measures limit these experiences to the last 12 months or less (Suh *et al.*, 2012).

The same research question also guided the exploration of differences in loneliness scores between self-harm participant groups. Following multiple variable multinomial logistic regression analysis, SELSA-Romantic and UCLA-LS were observed to significantly differentiate between participant groups. UCLA-LS scores differentiated between participants with a history of self-injurious behaviour and those in the self-injurious thoughts only, as well as between participants with a history of self-injurious behaviour compared to participants with no history of self-injurious thoughts or behaviour. SELSA-Social and SELSA-Family revealed no pairwise differences between any participant groups. Therefore our third hypothesis was only partially supported.

These findings contradict previous research by, for example, Lasgaard *et al.* (2011) where global and family loneliness, but not romantic loneliness, were found to be significantly more likely to be associated with suicidal ideation than self-harm. An explanation for this may be that although both Lasgaard *et al.* (2011) and the current study used a 15-item abbreviated version of the SELSA questionnaire, there were some differences in the phrasing of some questions. This arose because the version of the SELSA used in the current study was based on the measure developed by diTommaso and Spinner (1993) and the factor model proposed by Cramer, Ofori and Barry (2000). In contrast, the version adopted by Lasgaard *et al.* (2011) was based on a revised SELSA measure (di Tommaso, Brannen & Best, 2004). Specific differences between these two versions (e.g., ‘I really belong in my family’ versus ‘I feel part of my family’) could have given rise to different interpretations of the questions. Although both are validated measures of loneliness, given the wide interpretations available for loneliness (e.g., emotionally connectivity, belongingness, see Rosedale, 2007), it may be that the two versions of the SELSA measure may not assess the same construct.

SELSA-Romantic was found to significantly differentiate between participant groups within the multiple variable multinomial logistic regression, but not within the univariate multinomial logistic regression. Post-hoc pairwise comparisons following the multiple variable logistic regression indicated that this significant result was likely to be due to a suppressor effect. The only statistically significant difference between SELSA-Romantic scores within the multiple variable pairwise comparison was between those with a history of self-injurious thoughts only compared to those with a history of self-injurious behaviour.

In addition to the results from the SELSA measure, the findings from the UCLA-LS must also be addressed. UCLA-LS was found to distinguish between participants with a history of self-injurious thoughts only, compared to participants with a history of self-injurious behaviours. Within the context of the IMV model, global loneliness would therefore be argued to be a volitional factor (distinguishing between those with thoughts of suicidal ideation compared to suicidal enactment), which conflicts with findings of similar pairwise comparisons using the same measure (see section 3.5.1). However, differences in variables which were controlled within the analyses of these two studies may account for this discrepancy.

### 5.5.3 Stress as a mediator between perfectionism and loneliness

A mediating effect of stress was observed between socially prescribed perfectionism (SPP) in relation to all forms of loneliness, thereby supporting our fourth hypothesis. Stress was found to partially mediate between SPP and SELSA-Family, SELSA-Social and UCLA-LS and fully mediate between SPP and SELSA-Romantic. This indicates that stress is a significant contributory factor to feelings of loneliness from all social domains tested, in those with high SPP traits. Based on confidence intervals, statistically significant variability was observed between these models with evidence to suggest that stress partially mediated between SPP and UCLA-LS to a greater extent than the SELSA-Family and SELSA-Social models. However, as stress was observed to fully mediate the association between SPP and romantic loneliness (SELSA-Romantic), this suggests that when stressed, those with SPP traits are considerably more likely to feel the absence or insufficiency of a romantic partner, than that of family or friends. This is consistent with research discussed earlier in this chapter, with those reporting high SPP traits being more likely to interpret interpersonal interactions negatively (Hewit *et al.*, 2006). Indeed, based on dyads of romantic partners, research by Stoeber (2012) found that partner-specific SPP was negatively associated with participants' own relationship satisfaction. Therefore the finding of this study fits with existing literature that those with high SPP are more likely to feel romantically lonely during times of stress.

#### 5.5.4 Different forms of loneliness as moderators between defeat and entrapment, and entrapment and suicidal ideation

As predicted, all forms of loneliness were significant, independent moderators between entrapment and suicidal ideation, but not between defeat and entrapment. Therefore our fifth hypothesis was supported. However, based on confidence intervals, there was no statistically significant difference in the level of moderation between the different forms of loneliness within the entrapment-suicidal ideation moderation models. This finding has some support from existing literature (McClelland *et al.*, 2021). However, McClelland *et al.* (2021) found that there was also evidence to suggest loneliness was a significant moderator between defeat and entrapment. Therefore, further research is required to identify the reliability of these findings.

#### 5.5.5 Depression as a mediator between different forms of loneliness and suicidal ideation

It was expected that depression would mediate between global loneliness and suicidal ideation; this hypothesis was supported. Furthermore, the results showed that depression significantly mediated between all other forms of loneliness and suicidal ideation, though following comparison of the models based on confidence intervals of the indirect effects, this mediating effect was significantly weaker in the romantic loneliness model. This would suggest that negative affect is more influential to those experiencing family or social loneliness in leading to suicidal ideation, whereas romantic affect appears to be associated with suicidal ideation without the presence of depression. Although Weiss (1973) argues that social and emotional loneliness cannot compensate for one-another, we posit, that more nuanced forms of loneliness (e.g., family, romantic and social loneliness) may be detrimental to one's physical and mental wellbeing, with the association between family and social loneliness being less distinctive than current literature suggests.

#### 5.5.6 Implications of findings

The evidence here suggests that all forms of loneliness operate as motivational moderators within the context of the IMV model; moderating the association between entrapment and suicidal ideation. As each form of loneliness was found to independently moderate

between entrapment and suicidal ideation, this supports arguments by Weiss (1973) that social and emotional loneliness, operate separately of one-another. However, it also indicates that forms of emotional loneliness (family and romantic) may also have differing roles in the manifestation of self-harm. Based on these findings, suicide prevention interventions which focus on loneliness strategies may benefit from considering the multifaceted nature of loneliness. Indeed, academic research commonly evaluates loneliness as a singular construct, for example, as marital status or presence of close friends. Equally, individuals who present with low mood, especially those who disclose thoughts of suicide, may benefit from an evaluation that covers all of the four domains of loneliness explored here. By exploring ways to improve the quality of social, family and romantic relationships, we may reduce risk of mental illness, including depression and suicidal ideation (Heinrich & Gullone, 2006). Based on the findings of the current study, to appropriately assess presence of loneliness, multiple relationships must be considered, including family, social and romantic. Those who report feelings of romantic loneliness may benefit from reflecting on their current experiences of stress, or factors thinking styles patterns associated with socially prescribed perfectionism.

### 5.5.7 Limitations

The findings of this study must be interpreted within the context of their limitations. The cross-sectional design of this study prevented inferences relating to cause and effect. The participant sample was overrepresented by females and young adults and therefore the findings may not be applicable to other populations. Although leading forms of loneliness were investigated in this study, cultural loneliness was not assessed (Sawir, *et al.*, 2008). Both mediation analyses did not control for other forms of loneliness when investigating the interactive effects entered into the analysis models. Therefore, the independent role of each form of loneliness in relation to the other model variables (stress, SPP, depression and suicidal ideation) was not identified. Finally, due to the common co-occurrence of loneliness and social isolation, it would have been advantageous for social isolation to be included as a covariate in the analyses conducted here.

### 5.5.8 Conclusions

In conclusion, family, romantic and global loneliness each univariately distinguished between individuals as a function of their history of self-injurious thoughts and/ or

behaviours. SELSA-Social was the only measure where scores did not significantly differ between any pairwise participant comparisons. Family, romantic and global but not social loneliness moderated the association between entrapment and suicidal ideation. Depression significantly mediated between all types of loneliness and suicidal ideation however evidence of mediation was less in the romantic loneliness model when other forms of loneliness were controlled for. Each domain of loneliness may have an adverse impact on mental wellbeing independently of other forms of loneliness. Therefore, the multifaceted nature of loneliness must be considered in research and clinical contexts. Future work would benefit from further replications of this study using a prospective approach, as well as controlling for social isolation.



## Chapter 6: General discussion

The following chapter outlines the main findings of this thesis in the context of the three research questions stated in Chapter 1. The implications of these findings on clinical practice and policymaking are then discussed, in addition to a critical evaluation of the studies conducted here. Following this, suggestions for future research, personal reflections of the doctoral experience and the implications of COVID-19 and social distancing on the research is summarised. The chapter finishes with concluding remarks regarding the overall findings of the research presented within this thesis.

### 6.1 Main findings

The interpersonal factors discussed in the current section refer to loneliness, socially prescribed perfectionism (SPP), childhood trauma, parental attachment in adulthood and social support. These interpersonal factors are discussed in relation to established drivers of suicide risk (i.e., defeat, entrapment and suicidal ideation). Results from Studies 1 and 3 (see Chapters 3 and 5) are based on adjusted model findings (e.g., multiple variable multinomial logistic regressions), thereby discussing the independent association of these factors in relation to self-injurious ideation and/ or behaviours (SIB).

#### 6.1.1 Research Question 1: With a particular focus on loneliness, which interpersonal factors are associated with risk of self-injurious thoughts and behaviours?

This thesis has demonstrated that there is a significant association between loneliness and SIB both prospectively (Chapters 2 and 4) and cross-sectionally (Chapters 3 and 5). Ratings of global loneliness (using the UCLA-LS; Russell *et al.*, 1980) were significantly higher in those with a history of self-injurious behaviour (SB, Chapter 5), or history of self-injurious thoughts only (SI, Chapter 3), than those with no history of self-injurious thoughts or behaviours (NH). The association between loneliness and SIB remained significant after controlling for other interpersonal factors (including other forms of loneliness) and key drivers of suicide, thereby highlighting the perniciousness of loneliness on physical and mental wellbeing.

Although Study 2 exclusively recruited SB participants (see Chapter 4), themes of ‘patterns of social support for self-worth’ (e.g., relationship with parent(s)), ‘emotional secrecy’ and ‘personality traits’ (e.g., SPP, anxiety) were identified as leading themes following interviews with participants recalling events prior to a suicide attempt. These qualitative findings echo the empirical findings of Studies 1 and 3, where childhood emotional abuse, current attachment with parents, SPP and depression were significantly associated with suicidal ideation. Furthermore these factors distinguished between NH and SIB participant groups. Together, these quantitative and qualitative findings indicate that distressing, psychological interpersonal experiences, both past (e.g., childhood emotional abuse) and present (e.g., loneliness or suicidal ideation in the last two weeks), are significantly associated with self-injurious thoughts and/or behaviours. Indeed, these factors were found to significantly differentiate NH and SIB participant groups.

In contrast however, more outwardly observable interpersonal factors (e.g., physical abuse, isolation) did not distinguish between participant groups based on their history of SIB. This is consistent with countless research reviews, such as Rodante *et al.* (2019) and Tham *et al.* (2020). Therein, populations with adverse psychological experiences are more likely to have a history of SIB, and in turn have a propensity for self-injurious thoughts or behaviours again in the future.

Although the differences between parental relationship quality was not investigated in Study 2, Study 3 found that perceived quality of attachment with a father-figure, but not a mother-figure, was significantly, negatively associated with suicidal ideation cross-sectionally. This thereby suggests that a positive relationship with one’s father-figure may be protective against the emergence of suicidal ideation. This association between parental relationship and suicidal ideation has been reflected in published literature based on young adolescents (12-13 years; Fotti *et al.*, 2006), however based on the inconsistent findings of Studies 2 and 3, whether this remains the case for adults requires further investigation.

### 6.1.2. Research question 2: Which interpersonal factors differentiate between those who have a history of self-injurious behaviours, history of self-injurious thoughts only, and no history of self-injurious thoughts or behaviours?

Based on SIB history, several factors were found to independently distinguish between the three participant groups explored in Chapters 3 and 5 (NH, SI, and SB). Romantic and global loneliness (but not family or social loneliness) significantly distinguished between SIB participant groups, with romantic loneliness found to be significantly higher in the SI group than the SB group.

Childhood emotional abuse differentiated between SB and NH, and SB and SI participant groups, but not between NH and SI participant groups (Chapter 3). In Chapter 3, suicidal ideation scores significantly differed between all participant groups, however in Chapter 5 no significant difference was observed between NH and SI participant groups. As posited in Chapter 5, an explanation for this may be due to suicidal ideation scores being based on thoughts experienced in recent weeks, whereas those in the SI group may have had these thoughts less recently.

Global loneliness distinguished between NH and SI participant groups in Chapter 3, whereas significant differences between NH and SI, and NH and SB groups were observed using the same measure in Chapter 5. Chapter 4 was the only study within this thesis to qualitatively investigate interpersonal factors in relation to SB and exclusively recruited participants with a history of suicide attempt. Therefore, it was not possible to identify any themes which distinguished between SI and SB participant groups within the qualitative study.

### 6.1.3 Research question 3: What does an in-depth exploration reveal about the role of loneliness in relation to self-injurious thoughts or behaviours?

Within this thesis, loneliness was explored as a unidimensional (referred to here as global loneliness) and multi-dimensional construct (including romantic, family and social loneliness). Findings showed that loneliness was consistently associated with both self-

injurious thoughts and behaviours, both cross-sectionally and prospectively. Furthermore, loneliness was associated with suicidal ideation independent of social support (Chapter 3 and Chapter 4) among other factors. This therefore highlights the importance of recognising the unique role loneliness has in the association with SIB. In the following section, findings of the association between loneliness and SIB are summarised in the context of the following factors: participant demographics, loneliness as a multi-faceted construct, loneliness within the IMV model, depression, childhood trauma, socially prescribed perfectionism, parental relationships and coping styles.

#### 6.1.3.1 Demographics

Findings from the narrative synthesis (Chapter 2) exploring age, indicated a U-shaped relationship, where loneliness was more likely to be associated with later SIB in those of adolescent to young adulthood (13-22 years) or retirement age ( $\leq 54$  years), when compared to other age groups. Additionally, the review also indicated that ‘lonely’ females were more likely to report SIB at follow-up than ‘lonely’ males. Despite this, a meta-analysis of a sub-set of the studies included in the narrative review did not uphold these conclusions. However this may be due the meta-analysis exploring the *linear* moderating relationship of age, therefore failing to accommodate the possibly bimodal association of age in relation to loneliness and SIB. Furthermore, compared to predominantly female studies, there were significantly fewer studies which recruited predominantly male participants. This difference may have contributed to the comparatively wider confidence intervals for the overall effect size of predominantly male studies in relation to loneliness and later SIB. Despite this, Chapters 2 and 3 both indicated that the loneliness-SIB relationship remained significant for both male and female genders. Furthermore, Chapter 3 also showed this relationship remained significant when controlling for age and gender. Such findings highlight the harmful link between loneliness and SIB irrespective of age and gender.

#### 6.1.3.2 Loneliness as a multi-faceted construct

Qualitative and quantitative findings (Chapters 4 and 5) add to extant literature highlighting that loneliness is multi-faceted (Russell, 1982 p. 88; Landmann & Rohmann, 2021). Participant interviews from Study 2 indicated that loneliness could emerge from family, social or romantic sources. Study 3 showed that global and romantic loneliness significantly distinguished between SIB participant groups, whereas family and social

loneliness did not. Specifically, global and romantic loneliness both distinguished between participants with SI and SB histories, and global loneliness significantly differentiated between NH and SB participant groups. Despite the significant differences detected by global loneliness, this finding adds to existing literature (Mund, *et al.*, 2022) that unidimensional assessments of loneliness (such as the UCLA-LS) may not be suitable for in-depth explorations of loneliness. Recognition of the multifaceted nature of loneliness is therefore critical in understanding its implications on mental wellbeing and suicide.

#### 6.1.3.3 Loneliness within the IMV model

Before addressing how loneliness interacted with other interpersonal factors, this thesis first explored loneliness in relation to established factors associated with suicidal behaviour. As outlined in section 1.9, within the IMV model (O'Connor, 2011; O'Connor and Kirtley, 2018), these factors were: defeat, entrapment and suicidal ideation. Findings from Studies 1 and 3 were consistent, specifically that loneliness appears to act as a motivational moderator; strengthening the association between entrapment and suicidal ideation. The only exception to this was social loneliness which, when controlling for age, gender and depression, no longer significantly moderated between entrapment and suicidal ideation.

#### 6.1.3.4 Depression

The meta-analysis in Chapter 2 revealed that depression was a likely partial mediator between loneliness and later SIB. This was further validated by cross-sectional research (Chapter 5) where this partial mediating effect remained significant for each form of loneliness (family, romantic and social) and suicidal ideation, even after controlling for age, gender and all other types of loneliness. This indicates that loneliness is significantly associated with depression, as well as the latter playing an important role in the manifestation of SIB in those who report loneliness. The mediating effect of depression between romantic loneliness and suicidal ideation however, was significantly smaller than the mediated effect of depression in relation to family, social or global loneliness and suicidal ideation. This suggests that the occurrence of suicidal ideation in those experiencing romantic loneliness, may be less contingent on depression than those experiencing family or social loneliness.

#### 6.1.3.5 Childhood trauma

Loneliness partially mediated between all types of childhood trauma except for childhood physical abuse, (as assessed by the Childhood Trauma Questionnaire) reported in Chapter 3, and suicidal ideation. In contrast, loneliness as a moderator was associated with strengthening link between childhood emotional abuse (CEA) and suicidal ideation, but no other forms of childhood trauma. This indicates that numerous forms of childhood trauma are associated with loneliness and suicidal ideation in adulthood, but perhaps the most malign of all is CEA. Examples of CEA include overt declarations of disdain (e.g., name calling) and instilling a sense of rejection which one may be particularly sensitive to in adulthood. Therein, those with a history of CEA may be particularly vulnerable to feelings of loneliness in adulthood, leading to greater experiences of suicidal ideation.

#### 6.1.3.6 Socially prescribed perfectionism

As described in earlier chapters (Chapters 1 & 3), socially prescribed perfectionism (SPP) is argued to develop as a consequence of parental criticism, parental expectations and concern over mistakes in childhood. Falling short of these real or perceived standards the individual believes others hold for them, induces an anticipation of ‘rejection or social disapproval’ (Flett *et al.*, 2022). Similar to that of the childhood emotional abuse, mediation analysis findings from Chapter 3 showed that loneliness partially mediated between SPP and suicidal ideation, even after controlling for demographics (age and gender; see Chapter 3). The role of SPP in relation to self-injurious behaviour was also identified as a sub-theme in Chapter 4, when exploring personal narratives about interpersonal factors prior suicide attempt. It was identified that maintaining an outward image of perfectionism was a contributing factor to the distress experienced at the time. An investigation into the association between SPP and loneliness revealed that stress partially mediated between SPP and family, social and global loneliness, and fully mediated between SPP and romantic loneliness (Chapter 5).

The association between SPP, stress and loneliness, and between SPP, loneliness and suicidal ideation, fits with Hewitt *et al.*'s (2006) Perfectionism Social Disconnection model. In this model, it is posited that individuals with high levels of SPP may be predisposed to focus on short-term goals which demonstrate their achievements and capabilities, rather than fostering meaningful relationships. This lack of nurturing of social supports may lead to relationships being superficial, the shortcomings of which become

especially apparent during times of stress. Without the ‘buffer’ of social supports (therein, leading to feelings of loneliness, especially that of a romantic partner), thoughts and feelings of suicide may occur or increase.

#### 6.1.3.7 Parental relationships

‘Relationship with parents’ was a sub-theme identified across the interviews reported in Chapter 4, with most participants reported having a poor relationship with their parents as a significant factor prior to their suicide attempt. This is consistent with existing research (Majorano *et al.*, 2017), that the relationship one has with their parent(s) is typically a bedrock of one’s core sense of self-worth, and subsequent wellbeing. However, Study 3 revealed that current attachment with the ones Mother and Father did not distinguish between the participant groups based on self-harm history. Therefore, one’s relationship quality with parents may be more influential to individuals’ wellbeing during childhood – shaping one’s personality and core beliefs – than having an immediate impact on one’s wellbeing in adulthood. Further themes identified in Chapter 4 also indicated that prior to a suicide attempt, participants typically preferred to seek-out support from non-familial sources. This is consistent with Taylor *et al.* (2016), who found that adolescents and young adults reported greater confidence, psychological support and security after disclosing their distress to their friends and peers, rather than their family.

#### 6.1.3.8 Coping styles

Chapter 3 revealed that global loneliness significantly moderated the association between all non-socially oriented coping styles (i.e., problem-focused, emotion-focused and avoidant coping) in relation to suicidal ideation. Published research investigating similar interactions are limited. For example, in relation to loneliness and suicidal ideation, John, Solomon and Crapaz-Kaey (2021) explored one’s ability to ‘cope well’, while Xiao *et al.* (2022) investigated adaptive and maladaptive coping styles. Although the findings by John *et al.* (2022) and Xiao *et al.* (2021) were broadly consistent with those of this thesis (e.g., avoidant coping is considered a maladaptive coping style; Sica *et al.*, 2021), this highlights a gap in literature exploring specific coping styles in relation to loneliness and self-injurious thoughts and/or behaviours. In contrast, there is greater literature exploring depression as an outcome measure. For example, in relation to loneliness and depression, de la Fuente *et al.* (2018) found a significant, negative interaction with problem-solving

coping styles, but a positive interaction with avoidant coping styles. Alternative coping styles, such as emotion-focused or socially supported coping were not investigated.

## 6.2 Overall findings

This thesis adds to existing literature which highlights the significant, influential role of several interpersonal factors in relation to self-injurious thoughts and behaviours. The unique findings uncovered by the research of this thesis are summarised in Table 6.1 and, in the context of published research, are discussed in greater detail below.

Findings from the systematic review (Chapter 2), are consistent the Evolutionary Theory of Loneliness (Cacioppo & Hawkley, 2003). As described in section 1.7.1, Cacioppo and Cacioppo (2018) posit that short-term loneliness can motivate behaviour change to reinforce existing bonds or seek out additional ones. Long-term loneliness, on the other hand, has been shown to lead to adverse physical and mental health outcomes, namely depression, self-injurious thoughts and self-injurious behaviours, as investigated in this thesis. This evolutionary explanation of loneliness is consistent with the IMV model, which argues that prolonged feelings of defeat may give way to entrapment and, in extreme cases, self-injurious behaviour. Chapter 3 indicated that loneliness operated as a motivational moderator; moderating the association between entrapment and suicidal ideation. In this context, following a stressful event where attempts to relieve any emergent feelings of loneliness have been thwarted, the individual may feel trapped by their distress and therein, suicidal ideation may manifest. However, this is not to say that continuous social contact is imperative to mental health. For example, social isolation can sometimes give the opportunity for self-reflection, self-care and self-development (Leavitt *et al.* 2021, p. 340; Long.& Averill, 2003). This is reflected by Chapter 2 where loneliness was less likely to be predictive of later self-injurious thoughts and/ or behaviours within ten weeks of baseline loneliness.

The finding that depression mediated the association between loneliness and later self-injurious thoughts and behaviour (see Chapter 2) is also consistent with evolutionary theory. Cacioppo and Cacioppo (2018) suggest that depression acts as a means to encourage others to attend and care for the individual – as opposed to the individual seeking-out social bonds themselves and putting themselves at risk of rejection (Cacioppo *et al.*, 2006b).



Table 6.1 Novel findings of the thesis research

Chapter	Study	Novel findings
2	Systematic review and meta-analysis	<ul style="list-style-type: none"> <li>• Loneliness was a significant prospective predictor of both later self-injurious thoughts and self-injurious behaviours.</li> <li>• Depression was a significant mediator between loneliness and later self-injurious thoughts and behaviours.</li> </ul>
3	Cross-sectional empirical study (Study 1)	<ul style="list-style-type: none"> <li>• Loneliness moderates between entrapment and suicidal ideation, therefore, loneliness acts as a motivational moderator within the IMV model.</li> <li>• Loneliness moderates between problem focused, avoidant and emotion focused coping, but not socially supported coping, in relation to suicidal ideation.</li> <li>• Loneliness both mediated and moderated between childhood emotional abuse and suicidal ideation.</li> </ul>
4	Qualitative semi-structured study (Study 2)	<ul style="list-style-type: none"> <li>• Most participants preferred to disclose their distress to friends instead of family</li> <li>• Emotional disconnection and feeling misunderstood preceded most suicide attempts.</li> </ul>

- 5 Cross-sectional empirical study (Study 3)
- When stressed, those with high SPP traits are considerably more likely to feel the absence or insufficiency of a romantic partner, than that of family or friends.
  - Depression significantly mediated between all forms of loneliness investigated and suicidal ideation, though this was to a lesser extent for romantic loneliness.
-

Findings from Study 3 indicated that, compared to family and social loneliness, romantic loneliness may have a particularly pernicious association with self-injurious thoughts and/or behaviours. Weiss (1973) argued that emotional loneliness (i.e., romantic and family loneliness) and social loneliness (i.e., friendships, social integration) are distinct states which cannot compensate for one another. However, we posit that in the context of self-injurious thoughts and behaviours, romantic and family loneliness may be distinct from one another as well. Indeed, research by Sawir *et al.* (2008) indicates that additional forms of loneliness must also be considered. Based on a study of Australian university students, Sawir and colleagues posited that cultural loneliness may account for feelings of loneliness in those who have ‘adequate’ emotional and social supports, yet still report loneliness. Despite this observation, no measure of cultural loneliness has been developed. The findings of this thesis, in conjunction with published literature, therefore highlight that not only should loneliness be measured in a variety of domains, but also that these differing forms of loneliness may operate differently from one another in terms of implications on one’s wellbeing.

### 6.2.1 Loneliness and social sensitivity

Overall, the findings here indicate that loneliness is a significant factor associated with suicidal ideation. However, published research suggests loneliness can develop through either individual differences or wider cultural factors (Heu, Zomerren & Hansen, 2018). On the individual level, loneliness may be linked to ingrained early life experiences of social rejection (Ohtsubo *et al.*, 2021). As summarised in section 6.1.3.6 based on the Social Disconnection Model, parental attitudes in early life may lead to a vulnerability to loneliness in adulthood (Hewitt *et al.*, 2006). This therefore may account for sensitivity to loneliness on the individual level. In contrast, loneliness may emerge more passively through cultural norms and expectations, such as having lesser freedom of choice regarding who one can socialise with (Heu, Hansen & Zomerren, 2021).

### 6.2.2 Social support vs socially supported coping; a critique of measures

Both the socially supported coping measure, based on the Brief COPE (see appendix 7), and the ENRICHD Social Support Inventory (ESSI), assessed emotional support, instrumental support and venting in Study 1. Socially supported coping was significantly

higher in participants with no history of self-injurious thoughts or behaviours when compared to those with a history of self-injurious thoughts only. In contrast, the ESSI found no significant pairwise differences between those with a history of self-injurious behaviour, self-injurious thoughts, or no history of self-injurious thoughts or behaviour.

A distinction between the socially supported coping measure and the ESSI, is that (in addition to the aforementioned items) the ESSI measures frequency of contact with social supports, and marital status. It is perhaps this distinction between the measures which explains why the ESSI did not detect a significant difference between participants with a history of self-injurious thoughts only, when compared to participants with no history of self-injurious thoughts or behaviours. Specifically, the question of marital status may not have been applicable to much of the participant group given their young adult age. We therefore posit that though the ESSI may be a reliable measure of social support (Mitchell *et al.*, 2003; McClelland *et al.*, 2021), it may not be a valid tool for measuring social support in young adult populations. However, no peer-reviewed studies have been identified which compares scores between the ESSI and socially supported coping styles based on self-injury history in a young adult population, therefore this requires further investigation.

## **6.3 Implications of the research**

The findings of this thesis have implications on research theory, clinical practice and policy making. These are discussed separately below.

### **6.3.1 Implications for models of suicidal behaviour**

Descriptions of the Interpersonal Theory of Suicidal Behaviour (IPT; Joiner, 2005; van Orden *et al.*, 2010) and Integrated Motivational-Volitional (IMV) model (O'Connor 2011; O'Connor & Kirtley, 2018) are summarised in Chapter 1 (see sections 1.8.4 and 1.9 respectively), as are the rationales for focusing on these models (especially the IMV model) to guide research development and to contextualise the findings.

The finding that loneliness operates as a contributory factor to suicidal ideation supports both the IMV model and IPT of suicidal behaviour. Within the context of the IMV model, loneliness would be defined as a motivational moderator within the motivational phase.

This is to be expected given that social isolation and thwarted belongingness both appear in this phase of the IMV model and are both associated with loneliness. Equally, van Orden (2010) posits that loneliness contributes to thwarted belongingness which is a key factor in the aetiology of suicidal ideation, therein, consistent with the IPT.

Thwarted belongingness, as defined by the IPT (see figure 6.1), comprises of loneliness and reciprocal care. Van Oden *et al.* (2010) argues that ‘social isolation is arguably the strongest and most reliable predictor of suicidal ideation, attempts, and lethal suicidal behaviour’. This is reflected within the IPT where examples of ‘objective aloneness’ (e.g., marriage, number of children) outweigh examples of ‘perceived aloneness’ (e.g., ‘self-reported loneliness’). However, research has shown that loneliness may be just as detrimental to physical (Valtorta *et al.*, 2016) and mental (McClelland *et al.*, 2022) health, as social isolation, if not more so. This, in relation to the multi-faceted nature of loneliness (as discussed in this chapter), may indicate that the IPT may need to be updated.

Alternatively, the IMV model overcomes this distinction (to an extent) by listing thwarted belongingness and social support as separate motivational moderators. However, as discussed in Chapter 1, loneliness is not explicitly stated within the IMV model, with growing arguments in published literature that thwarted belongingness should not be mistaken for loneliness (Asher & Weeks, 2013; Badcock, *et al.*, 2022)

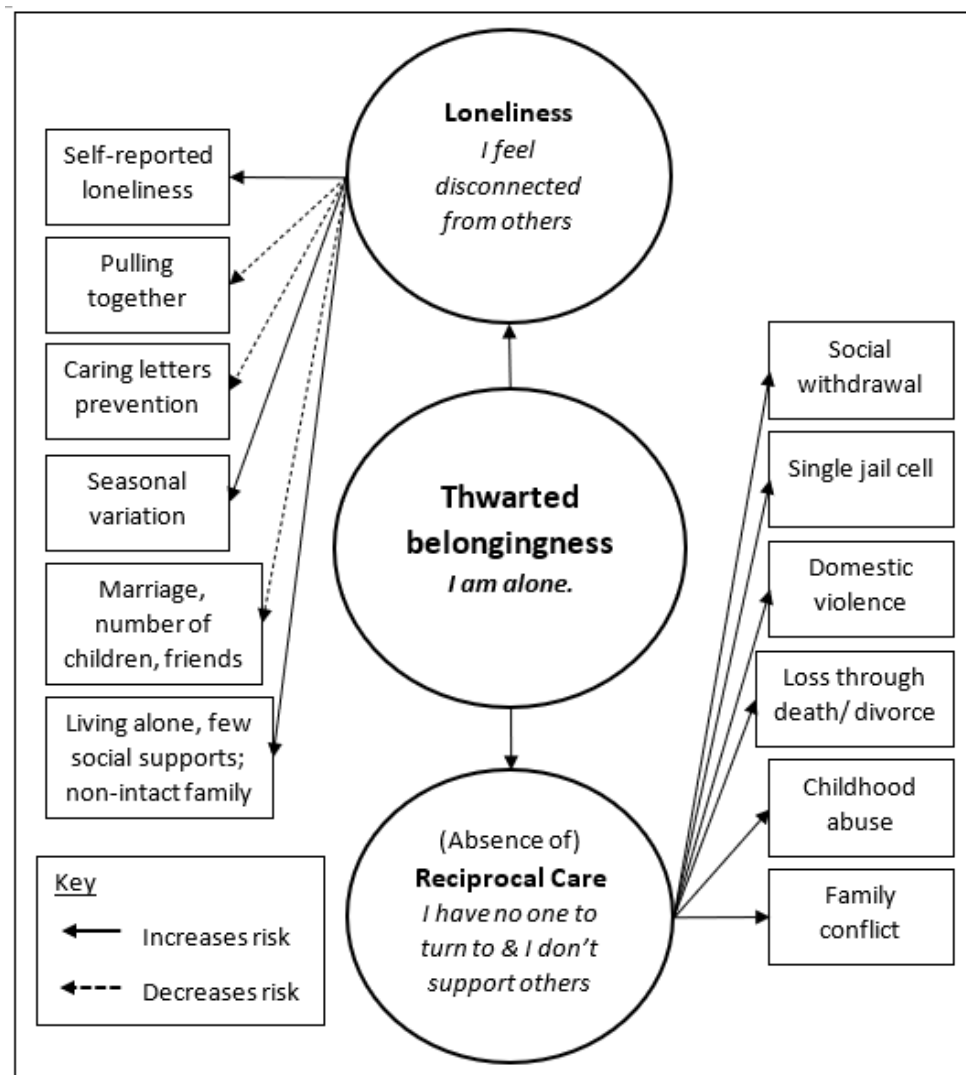
Finally, unlike the IMV model, the IPT does not explicitly address the role of past experiences (e.g., early life events). Despite this, evidence of the role of early life experiences on later suicide behaviour, as captured in this thesis, offers support for both the IMV model and IPT when tested in relation to key drivers of suicide.

### 6.3.2 Clinical implications

The clinical recommendations derived from each study included in this thesis are summarised in table 6.2. These recommendations may operate as a guide to aid clinical assessment, formulation and treatment of various interpersonal factors in relation to self-injurious thoughts and behaviour.

Existing research has identified numerous factors associated with self-injurious thoughts and behaviour (SIB; Batty *et al.*, 2018), however some of these are non-modifiable, such as demographics. Such non-modifiable factors can instead act as indicators which highlight

Figure 6.1. Facets of thwarted belongingness as illustrated by the IPT



those who are at increased vulnerability of SIB. For example, those age between adolescent and young adult years, or of retirement age, who report feeling lonely, may be at particular risk of later experiencing SIB in the future. In addition, several psychological factors explored in this thesis can be modified and therein potentially reduce the likelihood of SIB. Such factors include loneliness, socially prescribed perfectionism and childhood trauma.

Clinician and patient preference for drug treatment has been substantially replaced by talking therapies in recent decades (Hanson *et al.*, 2016). Furthermore, group-based interventions, as opposed to individual therapy, have shown to be effective treatment

Table 6.2 clinical recommendations following thesis findings

<b>Chapter</b>	<b>Study</b>	<b>Recommendation</b>
2	Systematic review and meta-analysis	In those who present with suicidal ideation or behaviour, who disclose loneliness as a contributing factor, the age and gender of the individual should be considered (high-risk groups: 13-22 years old, females) as well as the duration of loneliness (at-risk duration: ten weeks to five years after loneliness onset).
3	Cross-sectional, online, empirical study (Study 1)	In the absence of defeat, loneliness should be explored as a possible contributing factor in those who present with entrapment. Exploring loneliness as an alternative contributing factor to entrapment, may facilitate more effective treatments
4	Qualitative, online, semi-structured study (Study 2)	Various forms of loneliness should be investigated in those at risk of suicide attempt, and the quality of these relationships, not just the availability of them, must be explored. Vulnerable dispositions (e.g., SPP) and current affect (anxiety) should be considered when exploring vulnerability of suicide attempt.
5	Cross-sectional, online, empirical study (Study 3)	In the context of suicidal ideation, negative affect is more deleterious in those experiencing family or friend loneliness. It is important to consider each type of loneliness independently. However, those reporting romantic loneliness may be at greater vulnerability to SIB than those reporting other forms of loneliness.

strategies for the treatment of interpersonal difficulties (Cattan *et al.*, 2005). Additionally, the benefits of peer-lead support for mental wellbeing has also been gaining recognition (Curley & Johnston, 2014; Phillips *et al.*, 2021). Individual and group therapy provide a sense of emotional support and understanding, which help individuals cope with distressing thoughts and feelings, without the negative side-effects often associated with mood-stabilising medications (Bhagat *et al.*, 2019). Such interventions can help normalise one's experiences, thereby easing distress. Most interventions targeting interpersonal factors, especially loneliness, focus on improving emotional intelligence or social skills, with both shown to have equal effect on improving self-reported loneliness (Eccles & Qualter, 2020). Such interventions can improve one's ability to recognise and understand their emotions, as well as helping them to communicate their feelings more effectively. At present, such interventions are typically offered as group interventions in controlled environments, often to students in school or higher education (Cantero, Banuls & Vigue, 2020). Furthermore, for many, unless one is in imminent crisis, or has the means to pay for private therapy, access to such treatments can be challenging (Gilat & Shahar, 2009).

However, making these interventions readily accessible to those in need in the general population (and across the lifespan) may mitigate the occurrence of later SIB. Beyond the availability of current strategies, a further limitation is time. Unlike social isolation which can be quickly remedied, those experiencing loneliness require time to develop feelings of belonging and acceptance with those they are connecting with (Guthrie-Gower & Wilson-Menzfeld, 2022). Therefore, a time commitment, and the individual's willingness, ability and self-belief can also pose challenges for intervention engagement. Furthermore, for interventions to be effective, they must be relevant to the individual.

Romantic loneliness was indicated to be one of the most detrimental interpersonal factors investigated in this thesis. However, it may also be the most difficult to address. Those experiencing romantic loneliness may not be comfortable disclosing what romantic loneliness means to them, for fear of judgement from others (e.g., dissatisfaction with sexual intimacy, lack of attention from partner). As demonstrated in Chapter 4, anticipated stigma was a common experience for many participants prior to a suicide attempt. Therefore, further strategies to tackle loneliness stigma (for example, England's loneliness strategy; HM Government, 2018) may be advantageous so that individuals feel more confident in communicating their distress and improve help-seeking behaviour (Henderson, Evans-Lacko & Thornicroft, 2013). Based on the findings of this thesis, early-



life (i.e., pre-adulthood age) interventions may also be beneficial to mental wellbeing and mitigate suicide risk. Reducing or preventing childhood trauma (especially emotional abuse) or socially prescribed perfectionism, may be important in improving one's ability to respond to stress and to create a sense of belonging. Such early intervention strategies therein have the potential to reduce one's sensitivity to stress and loneliness, and therein, propensity to reduce the emergence of SIB. However, the key limitation of such early-life interventions is financial investment. Development for tailored interventions, resources and materials relevant to service user needs (Bartlett & Smith, 2019) are required to potentially offset SIB later in life, while still supporting those who are currently experiencing SIB now.

### 6.3.3 Implications for national policy

To reduce suicide on a national level requires substantial changes in public attitude and service provisions. This requires active involvement from both public (e.g., access to government funded healthcare) and private sectors (e.g., prisons), as well as the general population (readiness to support others in distress). Doing so would shift cultural norms to facilitate free discussion of mental health and improve help-seeking behaviour. Such adjustments would not only be beneficial to ones wellbeing (and to that of their loved ones), but would also have economic advantages through reducing the burden on frontline services and improving the workforce.

Compared to other mental health initiatives, suicide prevention and intervention strategies are relatively cheap (WHO, 2021d). Most national strategies and policies to prevent suicide acknowledge the importance of specifically targeting high-risk groups (e.g., unmarried men, those bereaved by suicide; Department of Health, 2012; Scottish Government, 2018). Current suicide prevention strategies also recognise interpersonal factors across the life-course as predictive for later self-injury. For example, the suicide prevention strategy for England (Department of Health, 2012) highlights the following high-risk groups; children and young people with disrupted family attachments (e.g., in the youth justice system or foster care) or experiencing bullying, and adults experiencing interpersonal difficulties (divorce, family problems) or social isolation.

However, self-injurious behaviour is complex, with no single factor determining suicide outcomes. As not all who are divorced or bullied go on to die by suicide, further indicators

for suicide must be included in these strategies. The current thesis has highlighted that, when controlling for a series of interpersonal factors (e.g., childhood emotional abuse or physical neglect), loneliness, but not social isolation, significantly distinguished between participant groups based on history of self-injury. This indicates that loneliness is a significant factor associated with self-injury. However, to date, loneliness has not yet been explicitly incorporated into national strategies for suicide prevention, whereas social isolation has (WHO, 2018).

Despite not being included in national suicide prevention strategies, countries, such as England and Japan, have introduced national strategies to specifically tackle loneliness and social isolation (Department for Digital, Culture, Media & Sport, 2021). Such government plans acknowledge that, although similar, loneliness and social isolation are not synonymous with one another (e.g., UK Government, 2022; National Institute on Aging, 2022), with both having adverse implications on mental health. However, so far none have highlighted that loneliness in any domain (e.g., social, family or romantic) is sufficient to be lonely. Instead, they commonly approach loneliness as a unidimensional construct and encourage engagement with outreach support systems. As discussed in section 6.3.1, bringing people of similar experiences together may be an effective treatment for negative mental health outcomes for those experiencing loneliness. However, such strategies may not address the cause of loneliness. For example, fostering greater social contacts (i.e., friendships), may not reduce one's romantic loneliness.

To tackle such nuanced experiences of loneliness, drawing on peer experience to guide national strategies may be advantageous. Much like the Lived Experience Panel which guides Scotland's Suicide Prevention Action Plan (2018), the need for co-produced services for the development of loneliness interventions are highlighted in England's loneliness strategy (Department for Digital, Culture, Media and Sport, 2018). We posit therefore, that national suicide prevention strategies may benefit from collaborating with other policy makers and lived experience panels (e.g., Loneliness and Social Isolation in Mental Health Network Coproduction Group). Doing so would help identify how loneliness interventions might 'fit' within existing suicide prevention strategies and highlight the opportunity to develop novel approaches.

## **6.4 Reflexivity**

Reflecting upon this thesis, I think it was helpful to have completed my systematic review and meta-analysis as early as I did. Doing so helped me have an awareness of existing literature, theories and models relating to suicide and interpersonal factors. Furthermore, while reviewing published literature, I learned what high quality, well-written research papers should include. In contrast, I would have preferred to remove Study 1 and conduct the qualitative study (Study 2) as my first, primary data study instead. This would have left Study 3 unchanged and allowed the opportunity for me to explore something further for my final study in this thesis. This new final study could have either been a further exploration of the role of romantic loneliness in relation to self-injurious thoughts and/ or behaviour, or exploring the association between loneliness and risk of self-injury using an experimental study design. Finally, including social anxiety or thwarted belongingness as a measure within the thesis would have helped to further investigate the extent to which loneliness is independently associated with self-injury when other interpersonal factors are controlled for.

## **6.5 COVID-19**

Results, especially those summarised in Chapters 4 and 5, may not reflect those of pre-pandemic times. Indeed, across the course of the development of this thesis, public and professional awareness of loneliness, social isolation and emotional connectivity have expanded considerably. Such interventions were aimed relieve loneliness stigma and to help reduce or mitigate its occurrence, thereby protecting mental and physical wellbeing. These campaigns may have led to individuals being more reflective of their experiences of loneliness, as well as proactive in responding to it, including being more forthcoming in terms of disclosing their experiences during their participation in the studies.

The final study of this thesis (Chapter 5) was meant to be experimental in design, however, due to UK government mandated-social restrictions, it was decided that another online study would be more appropriate and feasible. In addition, as recruitment was slow for the first study, a cross-sectional design was used for the third study as attrition may have led to too much missing data.

## 6.6 Limitations

Despite the findings of this thesis adding to existing literature, they must be interpreted within the context of a number of limitations. Suicide death is a rare phenomenon and, with the exception of one study in the systematic review, it was not captured in this thesis as an outcome. Furthermore both the IMV model and IPT, has highlighted that there are key factors that differentiate between those who experience self-injurious thoughts from those with experiences of self-injurious behaviours (see section 1.9.3). However none of these differentiating factors (e.g., impulsivity, pain tolerance), were explored across this thesis. Therefore, the extent to which the variables independently differentiated between self-injurious thoughts and self-injurious behaviours, was not fully ascertained.

Additionally, these studies were tested solely within the context of the IMV model, therefore alternative interactive effects were not tested. Furthermore, given the cross-sectional nature of studies 1 and 3, cause and effect were between variables could not be established.

As is common with convenience sampling, most participants in this thesis were young adults (aged  $\geq 18$  years old; Study 1:  $35.27 \pm 13.9$  years; Study 2: 20 to 25 years; Study 3:  $26.96 \pm 9.79$  years). As such, these findings may not be applicable to other age groups. Equally, although the studies were open worldwide, they were all conducted in English and advertised on websites based in the UK. Therefore, the findings across studies 1-3 may not be generalisable to populations outside of the UK. Furthermore, as studies 1-3 were conducted online via online survey platforms and remote video conferencing, the findings may not compare to findings collected using in-person interviews. In these studies, a version of the UCLA-LS was used to measure loneliness. Despite the popularity of the UCLA, it is argued that it may not be applicable to all cultures and may therefore not be a valid measure. To an extent, this was observed between studies 1 and 3 where between-group findings were inconsistent. Furthermore, the standardisation of SELSA remains unclear and an alternative measure, such as the De Jong Gierveld scale, may have been a more appropriate tool to measure multiple forms of loneliness.

## 6.7 Future research

Many of the interpersonal factors associated with self-injurious thoughts and behaviour identified here (e.g., loneliness, perfectionism, trauma) and existing suicide risk factors (e.g., stigma, burdensomeness) have a strong underlying commonality; the need for social acceptance. Future work exploring loneliness must consider the multifaceted nature of loneliness in order to facilitate comprehensive measurements, especially in relation to self-injurious thoughts and behaviours.

Indeed, this thesis has reinforced existing literature that romantic loneliness is distinct from family or social loneliness. Marital status, though not indicative of the absence of romantic loneliness, can provide some indication of the instrumental or emotional supports one has available. Based on a meta-analysis by Kyung-Sook *et al.* (2018) of 36 studies, unmarried men were significantly more likely to die by suicide than married men or unmarried women. Therefore, we propose that future research explore the role of romantic loneliness in relation to suicide and suicide attempt, particularly in relation to relationship status and satisfaction.

Equally, further exploration of the role of primary caregivers in relation one's mental health, especially the association between loneliness and self-injury, would also be advantageous. Finally, in response to COVID-19 and the resultant national lockdowns, numerous loneliness intervention services were introduced across many countries (Department for Digital, Culture, Media and Sport, 2022; National Institute of Aging, 2022). These aimed to improve awareness and response to loneliness and social isolation. The monitoring of engagement with these services in relation to self-harm and mental health would further help to identify effective strategies to reduce suicide death and the efficacy of anti-stigma campaigns.

## 6.8 Conclusions

This thesis adds to a body of evidence that interpersonal factors from across the life-course are associated with risk of self-injurious thoughts and/or behaviours, both cross-sectionally and prospectively. Specifically, childhood emotional abuse, socially supported coping, depression, loneliness and suicidal ideation are key to understanding suicide risk. The research here has yielded consistent findings, namely that loneliness is likely to operate as

a moderator between entrapment and suicidal ideation within the context of the IMV model. The association between loneliness and self-injurious thoughts and behaviours was observed to be particularly pertinent to adolescences and young adults, or those of retirement age; coinciding with ages associated with social transitions. Furthermore, findings indicated that in relation to self-injurious thoughts and behaviours, loneliness operates independently of social isolation and should be considered as a multi-dimensional construct. Specifically, romantic loneliness, when compared to other forms of loneliness, was indicated to have a distinct association with suicidal ideation. Such findings inform current and future theory-driven suicide prevention and mental health strategies which aim to target loneliness.

Novel findings summarised in this thesis indicate that membership in multiple support networks and problem-solving coping may be protective factors of suicide; weakening the association between entrapment and suicidal ideation. Early interventions targeted at reducing traits of socially prescribed perfectionism or childhood emotional abuse, may also be advantageous in reducing risk of suicide in later life. Equally, strategies to help reduce stigma around suicide, mental health and loneliness, may aid help-seeking by those in distress. The opportunity to have feelings normalised, through peer-support or talking therapy, may be integral to reducing suicide risk, as would collaborative approaches to national suicide prevention strategies. Although future work would benefit from replicating this research, the preliminary findings here offer significant contributions to suicide research. Specifically, romantic loneliness may be more influential than social support in the manifestation of self-injurious thoughts and behaviours. Future research would benefit from exploring this association in greater detail, especially in high-risk groups.

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# Appendices

## Appendix 1: Clarification of included studies

1. Kleiman *et al.* (2017) contained two studies with separate methods and participants so was split for the purpose of this review and are referred to as; Kleiman *et al.* (2017, study 1) and Kleiman *et al.* (2017, study 2).
2. Nickel *et al.* (2006) refers to their outcome variable as ‘suicide attempts’, however the authors of this review believed the criteria set by Nickel *et al.* (2006) was more reflective of suicide behaviour in general and is therefore categorised as such in this review. Equally, Stevenson *et al.* (2021) refers to their outcome variable as ‘suicidal ideation or behaviour’ however the current authors of this review agreed the measure items were reflective of suicidal ideation only and was therefore categorised as such in the current study.
3. Pietrzak *et al.* (2017) is a letter to the editor instead of a peer-reviewed article. As this paper met *all* study criteria and was still published in a peer-reviewed journal, it was agreed between the review authors that this study would be included.
4. Bennardi *et al.* (2019) did not provide results on suicidal behaviour due to lack of data, therefore only the results regarding suicidal ideation are considered for this review.
5. Batterham *et al.* (2022) Gallagher *et al.* (2014), Hom *et al.* (2019), O’Connor *et al.* (2021) and Schinka *et al.* (2013) all reported effect sizes between loneliness and later SIB at multiple timepoints. These effect sizes were aggregated to create an overall effect size. See Table 2.2 for further details.
6. Papers which reported multiple outcome measures (O’Connor *et al.*, 2021; Schinka *et al.* 2013), were referred to based on the outcome measure explored. See Table 2.2 for further details.
7. Scheer *et al.* (2021) measured both active and passive suicidal ideation at the same timepoint. As this review was investigating any form of self-injurious thoughts, not the way in which they manifest, the effect size of loneliness in relation to each of these outcome variables was collapsed into one overall effect size exploring loneliness in relation to later suicidal thoughts.



8. Three studies (Salzinger *et al.*, 2007; Schinka *et al.*, 2013; Paul & Fancourt, 2022) measured both suicidal ideation and behaviour at follow-up. The effect sizes in relation to each of these outcome variables are referred to separately throughout the text dependent on the outcome variable measured, for example, Schinka *et al.*, 2013 behaviour; Schinka *et al.* (2013) ideation.
9. Wang, Wang *et al.* (2021) investigated loneliness in relation to later suicidal behaviour in relation to left-behind and non-left-behind participants separately. As such these studies are discussed separately throughout the current review.

## Appendix 2: Reasons for studies not included in the meta-analysis

- Two studies (Kleiman *et al.*, 2017, study 1 and 2) used Ecological Monitory Assessment (EMA) which is unsuitable for the analyses of the current meta-analysis.
- One author (McGraw *et al.*, 2008) no longer had access to the raw data required to be included in the meta-analysis.
- Two authors (Trakhtenbrot *et al.*, 2016; Stein *et al.*, 2017) did not respond to review authors request for further information.

## Appendix 3: Controlled variables for adjusted univariate analysis between loneliness and SIB.

Study	Variables controlled
Antonelli-Salgado <i>et al.</i> (2021)	Sex at birth, age groups, the region of residency, race/ethnicity, and household income
Ayalon and Shiovitz-Ezra (2011)	<p>Age gender, education, geographic region.</p> <p>Physical health: chronic conditions, activities of daily living, instrumental activities of daily living, health indicators: medical status</p> <p>Mental health: depressive symptoms, hope</p> <p>Social variables: marital status, parent alive, number of living siblings, number of living children, living arrangement, activity level</p>
Bennardi <i>et al.</i> (2019)	Age, gender, years of education, baseline suicide ideation, heavy alcohol use, baseline depression and health status.
Chen <i>et al.</i> (2021)	Social support (emotional support, instrumental support, friendship), interpersonal conflict (perceived rejection, perceived hostility)
Gallagher <i>et al.</i> (2014)	Baseline depression symptoms, number of psychiatric diagnoses, and suicidal ideation
Joiner and Rudd (1996)	Hopelessness
Junker, Bjorngaard and Bjerkeset (2017)	Age, gender, cohabitation situation, socio-economic status/ parental education level at baseline

Kleiman <i>et al.</i> (2017, study 1 and study 2)	Baseline suicidal ideation
Klim <i>et al.</i> (2020)	Age, gender
Lasgaard, Goossens and Elklit (2011)	Depression
Nichter <i>et al.</i> (2021)	Age, education, military enlistment, psychiatric factors, psychosocial factors
Paul and Fancourt (2022)	Gender, age, education, occupation type, and loneliness and suicidal ideation at time point 2, and pre-existing mental health condition at time point 1.
Rissanen <i>et al.</i> (2021)	Age and sex
Sasaki <i>et al.</i> (2021)	Age, gender, occupation, baseline SI, and mental health condition
Scheer <i>et al.</i> (2021)	Age, sexual orientation, race and outcome at baseline
Shaw <i>et al.</i> (2021)	Socio-demographic factors (sex, age, ethnicity, employment status, deprivation and highest qualification, ever had same sex relationship), physical health measures, living arrangements, loneliness and perceived social support
Stevenson <i>et al.</i> (2021)	Age, gender, relationship status, employment status and income
Stolz <i>et al.</i> (2016)	Baseline outcome variable
Trakhtenbrot <i>et al.</i> (2016)	Age, gender, mental pain domain: mental pain, depression, hopelessness

Wang, Wang and Lui (2021)	Age, gender, length of separation, and family income
Wang <i>et al.</i> (2021)	Socioeconomic status
Wichstrom (2009)	Demographic characteristics: age, gender Baseline variables: self-injury

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## Appendix 4: Studies included in the mediation analysis of loneliness and SIB as a function of depression

Ayuso-Mateos *et al.* (2021); Bonner and Rich (1988); Gallagher *et al.* (2014); Joiner and Rudd (1996); Lasgaard *et al.* (2011); McGraw *et al.* (2008); Schinka *et al.* (2013); Stevenson *et al.* (2021).

## Appendix 5: Self-injurious history questions

- 1) Have you ever seriously thought of taking your life, but not actually attempted to do so?
  - a) Yes
  - b) No
  
- 2) Have you ever made an attempt to take your life?
  - a) Yes
  - b) No
  
- 3) Have you ever seriously thought about trying to deliberately harm yourself but not with the intention of killing yourself but not actually done so?
  - a) Yes
  - b) No
  
- 4) Have you ever deliberately harmed yourself in any way but not with the intention of killing yourself?
  - a) Yes
  - b) No
  
- 5) Have you ever had thoughts of suicide?
  - a) Yes
  - b) No

# Appendix 6: A Systematic Exploration of The Brief Cope Using Factor Analyses

## 1. Abstract

Differences in coping styles have been shown to be a factor associated with experiences of suicidal ideation and behaviour. Those with adaptive coping styles (e.g., planning) are associated with less severe self-injury engagement or histories, with the inverse being true for those with maladaptive coping styles (e.g., substance use). The 28-item Brief COPE (Carver, 1980) measures 14 styles of coping. Due to the large number of subscales, factor modelling is often applied to this measure to identify overarching coping styles. The text here aimed to identify of a suitable factor model for Brief COPE data captured in Chapter 3 of the current thesis. Splitwise exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) and comparison using a similar dataset EFA. A scoping search of existing EFA models published in peer reviewed journals revealed seven factor models, however only one met acceptable model fit criteria using the current data. The findings indicate that coping styles vary considerably between datasets, including by age and self-injury history. There are few journal articles which include a summary of factor-loadings following an EFA using the Brief COPE. Based on these findings, a standardised tool for assessing coping styles in the general population is required to allow comparisons between participant samples. Doing so will help identify further trends between coping styles and health behaviour.

## 2. Introduction

Suicide research has consistently found that individuals who experience self-injurious thoughts or behaviour are more likely to use maladaptive coping styles (e.g., avoidance, self-blame) than those who do not (Guerreiro *et al.*, 2013). Maladaptive coping styles are found to offer short-term stress relief but are ultimately ineffective in the long-term. Within models of suicidal behaviour, coping styles are only directly addressed in O'Connor and Kirtley's (2018) Integrated Motivational-Volitional model. Here, it is theorised that when in a stressful situation (e.g., defeat or humiliation), maladaptive coping styles can add to this stress when they are shown to be ineffective. In turn, this can give rise to further distress and potential feelings of entrapment (Gooding *et al.*, 2016). Conversely, adaptive

coping styles (e.g., planning, positive reframing) are posited to weaken the association between defeat and entrapment through, and thereby mitigate experiences of entrapment.

The Brief Cope (Carver, 1997) is a 28-item measure assessing 14 styles of coping. This measure is a shorter version of the full COPE scale which is the most widely used measure to assess coping style (Kato, 2015). The COPE was originally designed to assess coping styles in breast cancer populations, however the Brief COPE was found to be faster and include more focused coping styles, and therefore, more popular than the original 53-item measure (Kato, 2015). Carver (1997) did not advise on how these measures may be grouped or interpreted and invites users to adapt the wording of the measure where appropriate and to omit any items they feel are unnecessary. Furthermore, a meta-analysis by Kato (2015) found that almost three quarters of people to use the COPE scale conducted a factor analysis to identify overarching coping styles. Conditions for factor analysis, however, is the need for sufficient participant data in order for factor structures to be identifiable, as well as for the proposed model to meet a series of statistical criteria in order for the factor model to be reliably accepted.

### *2.1 Current aim*

The aim of this study was to use factor analysis to identify a factor model structure acceptable to the Brief COPE data collected from the general population.

## **3. Methods**

### *3.1. Data collection*

Two raw datasets were included in the current research study. Data collection and data cleaning methods of Dataset 1 are described in Chapter 3. Briefly, data were collected via an anonymous survey available worldwide for participations aged 18 years and over. Analysis on SPSS (v.26) indicated four participants had completed less than 75% of the survey and were therefore deleted. Missing data analysis of the remaining Brief Cope dataset (n= 400) revealed no missing data items. Data collection methods of Dataset 2 were similar to that of Dataset 1 (for a full description see Zortea *et al.*, 2020).

### *3.2 Statistical analyses*

For the splitwise EFA of Dataset 1, participant data were randomly allocated to either the EFA or CFA groups. Exploratory factor analyses (EFA) were conducted on SPSS (version

26) using principal axis rotation. Items with correlations less than 0.3 were excluded from EFA. In keeping with criterion set by Kaiser (1970), factors were accepted if the Eigen value was  $>1.0$ . EFA output were inspected for cross-factor loadings. Where cross-factor loadings were identified, the item was allocated to the factor with the greatest correlation and excluded from all remaining factors. Following cross-factor analysis, factors which had two or less items were deemed invalid and were not included in the confirmatory factor analysis (CFA). All CFA were conducted using the AMOS add-on package for SPSS (v. 27).

### *3.3 Model fit criteria*

Akaike Information Criterion (AIC), is used to compare the fit of different models, where a lower number reflecting better fit. Additional model fit statistics included; root mean square residual statistic (RSMEA) which assesses badness of fit, with lower scores demonstrating better fit. Acceptability of fit following a RMSEA is  $\leq 0.07$  (Steiger, 2007). Tucker-Lewis Index (TLI) measures a relative reduction in misfit per degree of freedom whereas the Comparative Fit Index (CFI) assesses improvement in fit from the original model to the hypothesised model (Shi and Maydeu-Olivares, 2019). The acceptability criteria for both the TLI and CFI are  $>0.9$  (Hu & Bentler, 1999). Square root mean square residual (SRMR) was acceptable if the score was  $<0.08$ . Chi-square captures internal consistency, however it is too sensitive for samples sizes greater than 250 (Bentler & Bonett, 1980) and was therefore not included in CFA data summaries testing datasets greater than 250 participants (i.e., Dataset 1; West *et al.*, 2012, p.211).

### *3.4 Scoping search*

A scoping search of existing literature was conducted on the 11<sup>th</sup> of December 2019. The search used five databases (CINHAL, Medline, PsychInfo, PsychArticles, Web of Knowledge) and one search engine (Google Scholar) to search for articles which included the following terms: 'Brief COPE' AND 'factor analysis' AND suicid\* OR self-harm OR self harm OR self-injur\* OR self injur\*. Results were limited to: i) journal articles, ii) written in English, iii) includes an EFA of the Brief Cope iv) the Brief COPE measure uses the same items and Likert scale to that of Dataset 1, and v) provides a summary of the factor loadings of the EFA.



## 4. Results

### *4.1 Participant sample*

Participant sample demographics of Datasets 1 and 2 are summarised in Table A6.1.

### *4.2 Splitwise EFA of Dataset 1*

Eight and four factors were identified following lower- (items) and higher order (subscale) EFA (see Tables A6.2 and A6.3 respectively). Significant cross-loadings were observed in both analyses. Due to the significant difference between observed and those identified following cross-factor loading analysis, it was concluded that a splitwise CFA would not be valid.

### *4.3 Comparison CFA with a similar dataset*

An item-level EFA of Dataset 2 revealed three factors, however this model was not an acceptable fit for Dataset 1 ( $X^2= 684.77$  ( $p<0.001$ ); CFI= 0.828, TLI=0.801, RMSEA= 0.102, SRMR= 0.080, AIC= 762.77).

### *4.4 Scoping search for existing models*

A scoping search of existing literature was conducted to identify an established factor model acceptable to Dataset 1. Searches using academic databases returned 130 journal articles. A further 24 articles were identified through other sources; 18 studies were identified via informal title screening of Google Scholar, and six studies were identified via chaining of articles read during the full-text screening. After duplicates were removed 117 study abstracts were screened with 77 included in the full text screening. The reasons for articles being excluded following full-text screening are summarised in figure A6.1, however the leading reason was that the Brief COPE measure was not comparable to the version used for Dataset 1 participants. After full text screening, seven studies were eligible to be included for CFA using Dataset 1.

### *4.5 CFA of existing Brief COPE factor models using Dataset 1*

Table A6.4 summarises the model fit of eligible existing models of the Brief COPE. Based on the model fit criteria summarised in section 2.3, Nahlen and Saboonchi (2010) four-factor model had the best model fit (AIC= 208.23; RMSEA= 0.07, TLI= 0.90; CFI= 0.92, S(RMR)= 0.06).

Table A6.1. Summary of participant characteristics of Datasets 1 and 2 (n, %)

	<i>Dataset 1</i>					<i>Dataset 2</i>				
	Total sample*	NH	SIB	ST	SB	Total sample*	NH	SIB	ST	SB
<b>Gender</b>										
N	400	84	309	105	204	840	291	433	168	248
Male	19.25%	27.38%	17.15%	18.10%	16.67%	23.57%	29.55%	18.94%	23.21%	14.92%
Female	78.50%	71.43%	80.26%	80.00%	80.39%	75.83%	69.76%	80.14%	76.79%	83.47%
Other	1.50%	0.00%	1.94%	0.95%	2.45%	NA	0.00%	0.69%	0.00%	1.21%
Prefer not to say (n)	0	0	0	0	0	5	0	0	0	0

**Age**

	<i>Dataset 1</i>					<i>Dataset 2</i>				
	Total sample*	NH	SIB	ST	SB	Total sample*	NH	SIB	ST	SB
N	383	81	302	103	199	846	290	431	166	248
Mean (sd)	39.38 (15.78)	34.23 (13.19)	36.89 (14.44)	32.85 (12.3)	39.38 (15.78)	25.12 (8.16)	24.83 (8.07)	25.47 (8.64)	25.37 (8.9)	25.41 (8.46)
<b>Nationality</b>										
N	400	84	309	105	204	NA	NA	NA	NA	NA
British	68.75%	65.48%	68.61%	62.86%	71.08%					
Other	30.25%	32.14%	29.45%	35.24%	26.47%					
<b>Sexuality</b>										
N	400	84	309	105	204	840	291	433	168	248

	<i>Dataset 1</i>					<i>Dataset 2</i>				
	Total sample*	NH	SIB	ST	SB	Total sample*	NH	SIB	ST	SB
Heterosexual	72.50%	85.71%	68.28%	83.81%	59.31%	82.38%	75.98%	78.57%	74.19%	90.03%
Non-heterosexual	27.50%	13.10%	30.74%	14.29%	39.22%	17.62%	24.02%	21.43%	25.81%	9.97%

\* Regardless of suicide history group. NA= data not available. N= total number in group. NH= no history of self-injurious thoughts or behaviours; SIB= any history of self-injurious thoughts or behaviours; ST= history of self-injurious thoughts only; SB= history of self-injurious behaviour regardless of self-injurious thoughts.

Table A6.2 Item-level factor loadings from Dataset 1 splitwise EFA

Method of coping	Factor							
	1	2	3 <sup>B</sup>	4 <sup>B</sup>	5	6 <sup>B</sup>	7 <sup>B</sup>	8
1. Self-distraction								
2. Active coping	0.745							
3. Denial							0.598	
4. Substance use				0.977				
5. emotional support					-0.891			
6. Behavioural disengagement		0.491						
7. Active coping	.0782							
8. Denial							0.730	
9. Venting								
10. instrumental support					-0.815			
11. Substance use				0.990				
12. Positive reframing	0.398 <sup>A</sup>							-0.449
13. Self-blame		0.759						
14. Planning	0.576							
15. emotional support					-0.835			
16. Behavioural disengagement		0.538					0.302 <sup>A</sup>	
17. Positive reframing	0.398 <sup>A</sup>							-0.436
18. Humour			0.949					
19. Self-distraction								-0.498
20. Acceptance	0.412							
21. Venting					-0.363			
22. Religion						0.796		

Method of coping	Factor							
	1	2	3 <sup>B</sup>	4 <sup>B</sup>	5	6 <sup>B</sup>	7 <sup>B</sup>	8
23. instrumental support					-0.656			
24. Acceptance	0.452							
25. Planning	0.616							
26. Self-blame		0.730						
27. Religion						0.794		
28. Humour			0.841					

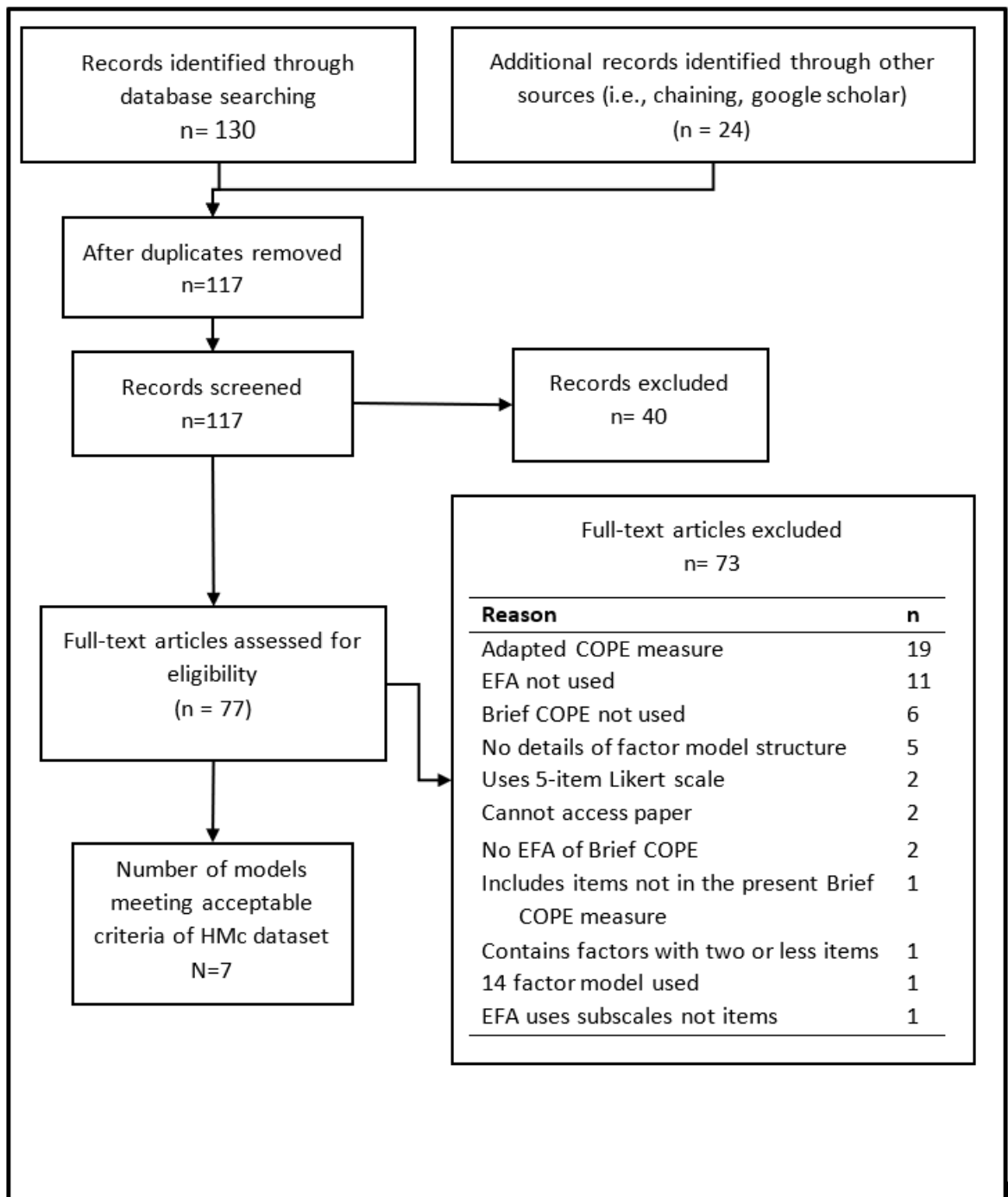
Correlations <0.3 were excluded from the EFA. Factors were included is eigen value was >1. <sup>A</sup> = items deleted following cross-factor analysis. <sup>B</sup>= Factors deleted following cross-factor loading analysis due to having two items or less.

Table A6.3. Sub-scale factor loadings from Dataset 1 splitwise EFA

Sub-scale	Factor			
	1	2	3 <sup>B</sup>	4 <sup>B</sup>
Acceptance	0.601		0.378 <sup>A</sup>	
Active coping	0.693	-0.104 <sup>A</sup>	0.128 <sup>A</sup>	-0.131 <sup>A</sup>
Behavioural disengagement	-0.315 <sup>A</sup>	0.73		-0.104 <sup>A</sup>
Denial	-0.118 <sup>A</sup>	0.458		
Emotional support	0.72		-0.504 <sup>A</sup>	0.258 <sup>A</sup>
Humour	0.185 <sup>A</sup>	0.183 <sup>A</sup>	0.197 <sup>A</sup>	0.292
Instrumental support	0.715	0.137 <sup>A</sup>	-0.414 <sup>A</sup>	
Planning	0.748		0.161 <sup>A</sup>	-0.362 <sup>A</sup>
Positive reframing	0.638	-0.103 <sup>A</sup>	0.325 <sup>A</sup>	
Religion	0.305			-0.114 <sup>A</sup>
Self-blame		0.712		-0.125
Self-distraction	0.252 <sup>A</sup>	0.416	0.242 <sup>A</sup>	0.311 <sup>A</sup>
Substance use		0.401		
Venting	0.469	0.337 <sup>A</sup>	-0.124 <sup>A</sup>	

Correlations <0.3 were excluded from the EFA. Factors were included is eigen value was >1. <sup>A</sup> = items deleted following cross-factor analysis. <sup>B</sup>= Factors deleted following cross-factor loading analysis due to having two items or less.

Figure A6.1 Prisma statement



EFA= Exploratory Factor Analysis.



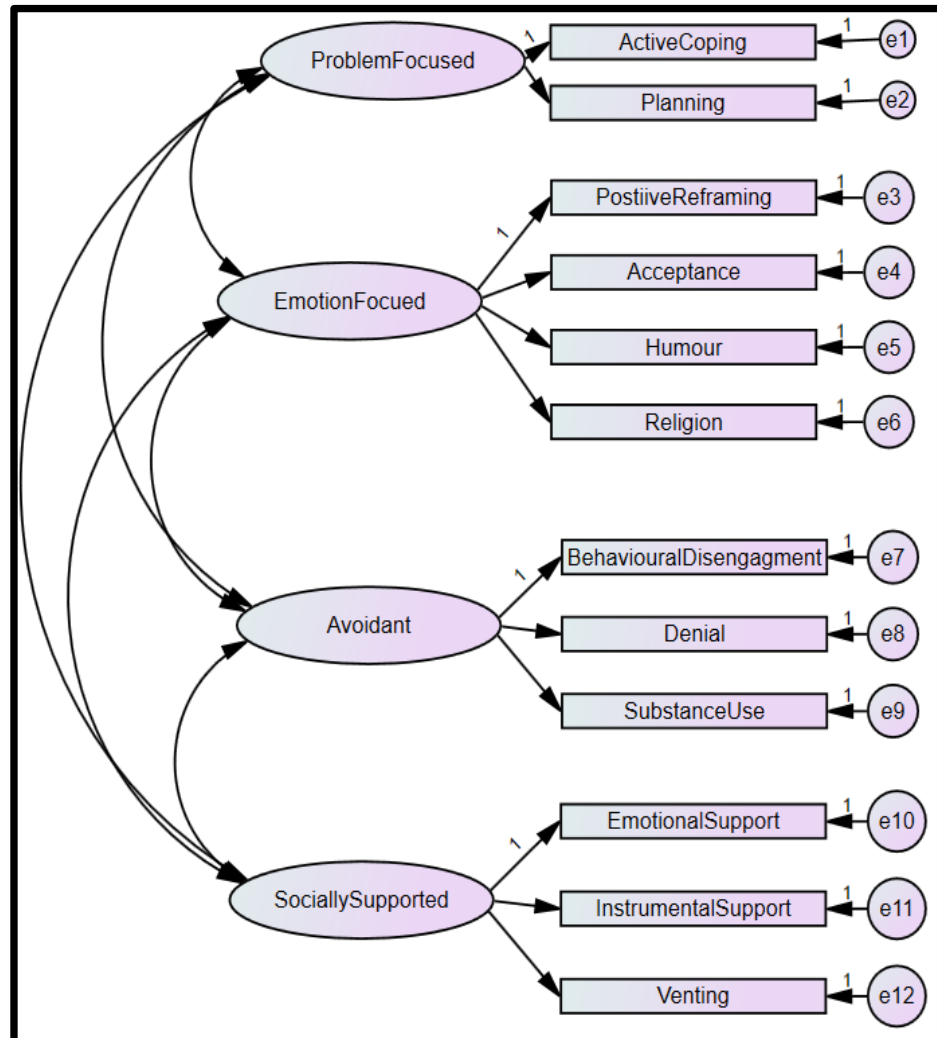
Table A6.4 Model fit analysis using Dataset 1 (n= 400) based on existing Brief COPE factor models from published literature

<b>Study</b>	<b>Model level</b>	<b>AIC</b>	<b>RMSEA</b>	<b>TLI</b>	<b>CFI</b>	<b>S(RMR)</b>
<i>Azale et al. (2018)</i>	Subscale	666.727	0.134	0.589	0.666	0.1280
<i>Baumstarck et al. (2017)</i>	Item	2558.448	0.123	0.56	0.624	0.105
<i>Bautista et al. (2013)</i>	Subscale	284.115	0.146	0.611	0.719	NA
<i>Hastings et al. (2005)</i>	Item	2983.8	0.142	0.449	0.5	0.1767
<i>Khazem et al. (2015)</i>	Item	2903	0.139	0.476	0.52	0.1158
<i>Knowles et al. (2011)</i>	Item	833.434	0.127	0.652	0.702	0.1278
<i>Nahlen and Saboonchi (2010)</i>	Item	208.229	0.072	0.895	0.923	0.0556

CFI= Comparative fit index; TLI= Tucker lewis index; RSEA= Root mean square error of approximation; SRMR= square root mean square residual; AIC= Akaike Information Criterion

The factoring loading of Nahlen and Saboonchi (2010) are displayed in figure A6.2, with factors defined as follows: problem-solving, avoidant coping, socially supporting coping and emotion focused coping.

Figure A6.2. Model fit of Nahlen and Saboonchi (2010) factor structure for coping using Dataset 1



## 5. Discussion

The aim of this research was to identify an acceptable factor model of the Brief Coping based on Dataset 1. This objective was achieved upon identification of the factor model EFA developed by Nahlen and Saboonchi (2010).

Splitwise EFA-CFA of Dataset 1 revealed a poor model fit. Whole dataset EFA of Dataset 2 produced a three-factor model, however CFA using Dataset one did not meet acceptable model-fit criteria. A scoping search for existing Brief COPE factor models identified seven

studies met the inclusion and exclusion of the scoping search. CFA analysis of all eligible paper revealed that only one factor model had statistically acceptable model fit using Dataset 1.

Using Dataset 1 to test the model fit of the Nahlén and Saboonchi (2010) four-factor model, the AIC of was the lowest of all models tested and the CFI and SRMR were acceptable. In contrast, although RMSEA and TLI were very close to the cut-off scores, they did not meet statistically acceptable model-fit criteria. However, as discussed by Lai and Green (2016), inconsistencies between CFI and RMSEA does not necessarily mean the model-fit should be rejected. One of the leading reasons being that model-fit criteria has yet to be finalised (Cleare *et al.*, 2017).

A second consideration is that although the Nahlén and Saboonchi (2010) factor model was accepted here as an appropriate model-fit, Nahlén and Saboonchi (2010) did not include substance use within their measure. Substance abuse is a common coping style for people who engage in self-injurious behaviour, with drugs and alcohol commonly used as a form of self-medicating to cope with emotional pain (Williams & Hasking, 2010). Dataset 1 comprised of an above average proportion of participants with a history of self-injurious thoughts and behaviours compared to other studies investigating self-injury through similar data collection methods and so would have been likely been a key coping tool for a large part of the Dataset 1 participant sample. The absence of the substance abuse subscale from Nahlén and Saboonchi's (2010) factor model may have led to an inaccurate representation of the overarching coping styles of those used in Dataset 1. Furthermore, Nahlen and Saboonchi's (2010) study focused on participants who had experienced a cardiac episode, which may not be comparable to the general population recruited in Dataset 1.

### *5.1 Conclusion*

The research described here illustrates that even when using similar sample population, factor models based on the Brief Cope vary significantly between participant sample groups. This suggests that there is not a factor model of the Brief COPE which can be generalised to general populations when conducting suicide research. Future studies which include the Brief Cope are recommended to recruit  $\geq 500$  participants to thereby enable an acceptable splitwise factor analysis. Studies which do not attain such participant sizes are recommended to search for existing models to test their model fit. This text demonstrates

that there is a need to develop a measure for assessing coping styles which is applicable to the general population when conducting suicide research.

## Appendix 7: Brief COPE model fit (A) and coping styles (B)

### A. Brief COPE model fit

Statistic	Model-fit criteria	Model fit output
RMSEA	$\geq 0.7$	0.072
TLI	$\geq 0.9$	0.895
CFI	$\geq 0.9$	0.923
SRMR	$< 0.08$	0.056

Model fit is based on the structure developed by Nahlén and Sadoonchi (2010). Chi is not reported as it has been shown to be too sensitive to sample sizes of this size (Bentler and Bonett, 1980). Acceptability criteria for RMSEA was based on Steiger (2007), with a cut-off of  $>0.7$ . It is widely agreed that the recommended cut-offs by Hu and Bentler (1999) are acceptable; TLI and CFI was 0.9, SRMR  $<0.08$ .

### B. Brief COPE subscale coping styles:

- a) Problem-focused coping: Planning, active coping, suppression.
- b) Socially supporting coping: Emotional social support, instrumental social support, venting.
- c) Avoidant: Behavioural disengagement, denial, substance use, mental disengagement.
- d) Emotion focused coping: Restraint, positive reinterpretation, acceptance, humour, religion.

## Appendix 8: Correlations of psychometric measures

		Coping				Defeat	Entrapment			Loneliness	Memory	
		Problem Focused Coping	Avoidant Coping	Socially Supportive Coping	Emotion Focused Coping		External	Internal	Total		Directing behaviour	Social bonding
<b>Coping</b>	Problem Focused	r	-0.211***	0.529***	0.531**	-0.237***	-0.130**	-0.148***	-0.145***	-0.235***	0.282***	0.234***
		n	400	400	400	400	399	399	399	400	400	400
	Avoidant	r		-0.04	-0.132**	0.635***	0.508***	0.533***	0.546***	0.488***	0.02	0.01
		n		400	400	400	399	399	399	400	400	400
	Socially Supportive	r			0.392***	-0.135**	-0.09	-0.02	-0.07	-0.319***	0.410***	0.384***
		n			400	400	399	399	399	400	400	400
	Emotion Focused	r			-0.241***	-0.151***	-0.135**	-0.152***	-0.261***	0.310***	0.254***	
		n			400	399	399	399	400	400	400	
<b>Defeat</b>		r				0.713***	0.744***	0.764***	0.767***	-0.04	-0.116*	

		<b>Coping</b>				<b>Defeat</b>	<b>Entrapment</b>			<b>Loneliness</b>	<b>Memory</b>	
		Problem Focused Coping	Avoidant Coping	Socially Supportive Coping	Emotion Focused Coping		External	Internal	Total		Directing behaviour	Social bonding
		n					399	399	399	400	400	400
<b>Entrapment</b>	External	r						0.804***	0.963***	0.634***	0.04	-0.03
		n						399	399	399	399	399
	Internal	r							0.934***	0.604***	0.05	0.02
		n							399	399	399	399
	Total	r								0.653***	0.04	-0.01
		n								399	399	399
<b>Loneliness</b>		r									-0.162***	-0.221***
		n									400	400
<b>Memory</b>	Directing Behaviour	r										0.578***
		n										400

	<b>Coping</b>				<b>Defeat</b>	<b>Entrapment</b>			<b>Loneliness</b>	<b>Memory</b>	
	Problem Focused Coping	Avoidant Coping	Socially Supportive Coping	Emotion Focused Coping		External	Internal	Total		Directing behaviour	Social bonding
<b>Mean</b>	10.38	10.95	13.86	17.61	29.59	15.83	10.74	26.57	47.51	11.02	10.23
<b>sd</b>	3.284	4.01	4.444	4.637	16.237	10.967	8.288	18.305	12.792	4.165	4.584

Continued.

		<b>Memory</b>		<b>Socially prescribed perfectionism</b>	<b>Social Support</b>	<b>Stress</b>	<b>Trauma</b>				<b>Suicide probability</b>	
		Social continuity					Emotional Abuse	Emotional Neglect	Physical Abuse	Physical Neglect		Sexual Abuse
<b>Coping</b>	Problem Focused	r	0.126**	-0.166***	0.146***	-	-0.03	0.08	0.06	-0.01	-0.02	-0.191**
		n	400	400	399	400	400	400	400	400	400	400



		<b>Memory</b>	<b>Socially</b>	<b>Social</b>	<b>Stress</b>	<b>Trauma</b>				<b>Suicide</b>	
		Social continuity	prescribed perfectionism	Support		Emotional Abuse	Emotional Neglect	Physical Abuse	Physical Neglect	Sexual Abuse	probability
Avoidant	r	0.240***	0.394***	-	0.630***	0.246***	-0.277***	0.127**	0.222***	0.232***	0.632***
	n	400	400	0.297***	400	400	400	400	400	400	400
Socially Supportive	r	0.293***	-0.110*	0.425***	-	-0.01	0.126**	0.04	-0.06	-0.03	-0.09
	n	400	400	0.145***	400	400	400	400	400	400	400
Emotion Focused	r	0.105*	-0.187***	0.188***	-	0.00	0.04	0.04	-0.03	-0.01	-0.201***
	n	400	400	0.262***	400	400	400	400	400	400	400
<b>Defeat</b>	r	0.197***	0.618***	-	0.835***	0.339***	-0.351***	0.132**	0.267***	0.241***	0.790***
	n	400	400	0.483***	400	400	400	400	400	400	400

		<b>Memory</b>		<b>Socially prescribed perfectionism</b>	<b>Social Support</b>	<b>Stress</b>	<b>Trauma</b>				<b>Suicide probability</b>	
		Social continuity					Emotional Abuse	Emotional Neglect	Physical Abuse	Physical Neglect		Sexual Abuse
<b>Entrapment</b>	External	r	0.176***	0.507***	-	0.671***	0.282***	-0.334***	0.10*	0.215***	0.182***	0.615***
		n	399	399.00	0.426***	399	399	399	399	399	399	399
	Internal	r	0.210***	0.508***	-	0.680***	0.264***	-0.265***	0.06	0.153***	0.162***	0.638***
		n	399	399	0.341***	399	399	399	399	399	399	399
	Total	r	0.201***	0.533***	-	0.710***	0.288***	-0.320***	0.09	0.198***	0.183***	0.657***
		n	399	399	0.409***	399	399	399	399	399	399	399
<b>Loneliness</b>		r	0.03	0.538***	-	0.703***	0.324***	-0.411***	0.100*	0.271***	0.217***	0.682***
	n	400	400	0.682***	399.00	400	400	400	400	400	400	400

		<b>Memory</b>		<b>Socially prescribed perfectionism</b>	<b>Social Support</b>	<b>Stress</b>	<b>Trauma</b>				<b>Suicide probability</b>	
		Social continuity					Emotional Abuse	Emotional Neglect	Physical Abuse	Physical Neglect		Sexual Abuse
<b>Memory</b>	Directing Behaviour	r	0.496***	-0.01	0.195***	-0.03	-0.06	0.130**	0.02	-0.09	-0.01	-0.03
		n	400	400	399.00	400	400	400	400	400	400	400
	Social bonding	r	0.451***	0.00	0.190***	-0.07	-0.07	0.182***	-0.06	-0.08	0.07	-0.100*
		n	400	400	399	400	400	400	400	400	400	400
	Self-continuity	r		0.164***	0.02	0.188***	0.04	0.111*	-0.01	-0.02	-0.04	0.183***
		n		400	399	400	400	400	400	400	400	400
<b>Socially prescribed perfectionism</b>		r			-	0.581***	0.325***	-0.265***	0.129**	0.258***	0.172***	0.541***
		n			0.372***	399.00	400	400	400	400	400	400
<b>Social Support</b>		r				-	-0.307***	0.354***	-0.100*	-	-	-0.445***
						0.443***				0.271***	0.154***	

		Memory	Socially	Social Support	Stress	Trauma				Suicide probability	
		Social continuity	prescribed perfectionism			Emotional Abuse	Emotional Neglect	Physical Abuse	Physical Neglect		Sexual Abuse
		n			399	399	399	399	399	399	
Stress	r					0.313***	-0.332***	0.112*	0.244***	0.204***	0.692***
	n					400	400	400	400	400	400
Childhood trauma	Emotional Abuse	r					-0.721***	0.487***	0.583**	0.375***	0.396***
		n					400	400	400	400	400
	Emotional Neglect	r						-	-	-	-0.363***
		n						400	400	400	400
	Physical Abuse	r							0.472***	0.359***	0.192***
		n	h						400	400	400

	<b>Memory</b>	<b>Socially</b>	<b>Social</b>		<b>Trauma</b>					<b>Suicide</b>
	Social	prescribed	Support	Stress	Emotional	Emotional	Physical	Physical	Sexual	probability
	continuity	perfectionism			Abuse	Neglect	Abuse	Neglect	Abuse	
Physical	r								0.326***	0.261***
Neglect	n								400	400
Sexual	r									0.283***
Abuse	n									400
<b>Mean</b>	9.08	61.48	20.45	8.56	2.33	3.05	1.43	1.83	1.71	6.65
<b>Sd</b>	4.532	17.231	6.650	3.783	1.241	1.090	0.876	1.097	1.129	5.808

\* p<0.05; \*\* p< 0.01; \*\*\* p<0.001. sd.= standard deviation

## Appendix 9: Univariate multinomial logistic regression

Univariate multinomial logistic regression comparing variable scores between NH, SI and SB participant groups (n= 393, df=2)

<b>Variable</b>	$\chi^2$	<i>p</i>
<b>Coping</b>		
Avoidant	<b>77.563</b>	<b>0.0001</b>
Emotion Focused	0.096	0.953
Problem Focused	3.201	0.202
Socially Supportive	5.524	0.063
<b>Defeat</b>	<b>127.366</b>	<b>0.0001</b>
<b>Entrapment</b>	<b>90.041</b>	<b>0.0001</b>
<b>Loneliness</b>	<b>94.797</b>	<b>0.0001</b>
<b>Memory</b>		
Directing behaviour	0.105	0.949
Self-Continuity	<b>6.134</b>	<b>0.047</b>
Social bonding	0.076	0.963
<b>Socially Prescribed Perfectionism</b>	<b>64.796</b>	<b>0.0001</b>
<b>Social Support</b>	<b>38.139</b>	<b>0.0001</b>
<b>Stress</b>	<b>87.013</b>	<b>0.0001</b>
<b>Trauma</b>		
Emotional Abuse	<b>89.159</b>	<b>0.0001</b>
Emotional Neglect	<b>55.964</b>	<b>0.0001</b>
Physical Abuse	<b>14.883</b>	<b>0.001</b>
Physical Neglect	<b>33.149</b>	<b>0.0001</b>
Sexual Abuse	<b>17.088</b>	<b>0.0001</b>
<b>Suicidal Ideation</b>	<b>193.694</b>	<b>0.0001</b>

$X^2$ = chi-square, p= p-value; df= degrees of freedom. No history of self-injurious thoughts or behaviour group is reference group (NH). Values highlighted in bold are statistically significant ( $p < 0.05$ ).

## Appendix 10: Univariate multinomial logistic regression pairwise analysis

Univariate multinomial logistic regression pairwise analysis of variables associated with self-injurious history group membership (n = 393)

Variable	NH vs SB <sup>a</sup>					NH vs SB <sup>a</sup>					SI vs SB <sup>b</sup>				
	B	OR	95% CI		<i>p</i>	B	OR	95% CI		<i>p</i>	B	OR	95% CI		<i>p</i>
			Low	High				Low	High				Low	High	
<b>Coping</b>															
Avoidant	<b>0.279</b>	<b>1.321</b>	<b>1.179</b>	<b>1.481</b>	<b>0.0001</b>	<b>0.388</b>	<b>1.475</b>	<b>1.320</b>	<b>1.647</b>	<b>0.0001</b>	<b>0.110</b>	<b>1.116</b>	<b>1.048</b>	<b>1.188</b>	<b>0.001</b>
Emotion Focused	0.008	1.008	0.948	1.072	0.801	0.0	1.0	0.947	1.057	0.986	-0.007	0.993	0.944	1.044	0.773
Problem Focused	0.041	1.042	0.954	1.138	0.362	-0.025	0.975	0.902	1.054	0.530	-0.066	0.936	0.870	1.007	0.075
Socially Supportive	<b>0.075</b>	<b>1.078</b>	<b>1.010</b>	<b>1.151</b>	<b>0.024</b>	0.030	1.030	0.972	1.092	0.316	-0.046	0.955	0.906	1.007	0.090
<b>Defeat</b>	<b>0.086</b>	<b>1.090</b>	<b>1.060</b>	<b>1.121</b>	<b>0.0001</b>	<b>0.123</b>	<b>1.131</b>	<b>1.100</b>	<b>1.162</b>	<b>0.0001</b>	<b>0.037</b>	<b>1.037</b>	<b>1.020</b>	<b>1.055</b>	<b>0.0001</b>
<b>Entrapment</b>	<b>0.064</b>	<b>1.067</b>	<b>1.043</b>	<b>1.091</b>	<b>0.0001</b>	<b>0.085</b>	<b>1.089</b>	<b>1.065</b>	<b>1.112</b>	<b>0.0001</b>	<b>0.020</b>	<b>1.021</b>	<b>1.007</b>	<b>1.035</b>	<b>0.003</b>



Variable	NH vs SB <sup>a</sup>					NH vs SB <sup>a</sup>					SI vs SB <sup>b</sup>				
	B	OR	95% CI		<i>p</i>	B	OR	95% CI		<i>p</i>	B	OR	95% CI		<i>p</i>
			Low	High				Low	High				Low	High	
<b>Loneliness</b>	<b>0.097</b>	<b>1.102</b>	<b>1.068</b>	<b>1.136</b>	<b>0.0001</b>	<b>0.124</b>	<b>1.132</b>	<b>1.098</b>	<b>1.167</b>	<b>0.0001</b>	<b>0.027</b>	<b>1.028</b>	<b>1.007</b>	<b>1.048</b>	<b>0.008</b>
<b>Memory</b>															
Directing behaviour	0.009	1.009	0.942	1.081	0.797	0.000	1.0	0.941	1.063	0.994	-0.009	0.991	0.937	1.049	0.761
Self-Continuity	0.053	1.054	0.989	1.125	0.108	0.072	1.075	1.014	1.138	0.015	0.019	1.019	0.967	1.074	0.478
Social bonding	-0.006	0.994	0.934	1.058	0.851	0.001	1.001	0.947	1.058	0.969	0.007	1.007	0.957	1.060	0.786
<b>Socially Prescribed Perfectionism</b>	<b>0.043</b>	<b>1.044</b>	<b>1.024</b>	<b>1.064</b>	<b>0.0001</b>	<b>0.067</b>	<b>1.069</b>	<b>1.050</b>	<b>1.089</b>	<b>0.0001</b>	<b>0.024</b>	<b>1.024</b>	<b>1.009</b>	<b>1.040</b>	<b>0.002</b>
<b>Social Support</b>	<b>-0.090</b>	<b>0.914</b>	<b>0.869</b>	<b>0.961</b>	<b>0.0001</b>	<b>-0.134</b>	<b>0.875</b>	<b>0.835</b>	<b>0.917</b>	<b>0.0001</b>	<b>-0.044</b>	<b>0.957</b>	<b>0.923</b>	<b>0.993</b>	<b>0.019</b>
<b>Stress</b>	<b>0.238</b>	<b>1.268</b>	<b>1.156</b>	<b>1.392</b>	<b>0.0001</b>	<b>0.372</b>	<b>1.451</b>	<b>1.324</b>	<b>1.590</b>	<b>0.0001</b>	<b>0.134</b>	<b>1.144</b>	<b>1.066</b>	<b>1.227</b>	<b>0.0001</b>
<b>Trauma</b>															
Emotional Abuse	<b>0.753</b>	<b>2.123</b>	<b>1.519</b>	<b>2.966</b>	<b>0.0001</b>	<b>1.211</b>	<b>3.357</b>	<b>2.433</b>	<b>4.631</b>	<b>0.0001</b>	<b>0.458</b>	<b>1.581</b>	<b>1.292</b>	<b>1.935</b>	<b>0.0001</b>

Variable	NH vs SB <sup>a</sup>					NH vs SB <sup>a</sup>					SI vs SB <sup>b</sup>				
	B	OR	95% CI		p	B	OR	95% CI		p	B	OR	95% CI		p
			Low	High				Low	High				Low	High	
Emotional Neglect	<b>-0.855</b>	<b>0.425</b>	<b>0.290</b>	<b>0.623</b>	<b>0.0001</b>	<b>-1.125</b>	<b>0.325</b>	<b>0.226</b>	<b>0.466</b>	<b>0.0001</b>	<b>-0.271</b>	<b>0.763</b>	<b>0.613</b>	<b>0.949</b>	<b>0.015</b>
Physical Abuse	0.272	1.312	0.840	2.049	0.232	<b>0.613</b>	<b>1.846</b>	<b>1.245</b>	<b>2.739</b>	<b>0.002</b>	<b>0.341</b>	<b>1.407</b>	<b>1.053</b>	<b>1.880</b>	<b>0.021</b>
Physical Neglect	<b>0.605</b>	<b>1.831</b>	<b>1.276</b>	<b>2.627</b>	<b>0.001</b>	<b>0.832</b>	<b>2.299</b>	<b>1.641</b>	<b>3.220</b>	<b>0.0001</b>	<b>0.228</b>	<b>1.256</b>	<b>1.013</b>	<b>1.557</b>	<b>0.038</b>
Sexual Abuse	0.199	1.221	0.895	1.664	0.207	<b>0.482</b>	<b>1.619</b>	<b>1.232</b>	<b>2.127</b>	<b>0.001</b>	<b>0.282</b>	<b>1.326</b>	<b>1.067</b>	<b>1.649</b>	<b>0.011</b>
<b>Suicidal Ideation</b>	<b>0.547</b>	<b>1.729</b>	<b>1.469</b>	<b>2.034</b>	<b>0.0001</b>	<b>0.697</b>	<b>2.008</b>	<b>1.703</b>	<b>2.368</b>	<b>0.0001</b>	<b>0.150</b>	<b>1.162</b>	<b>1.101</b>	<b>1.226</b>	<b>0.0001</b>

B= Unstandardised beta; OR= Odds Ratio; CI= Confidence Interval; p= p-value; <sup>a</sup> NH group is reference; <sup>b</sup> SI is reference. Values highlighted in bold are statistically significant (p<0.05). NH= No history of self-injurious thoughts or behaviour; SI= history of self-injurious thoughts only; SB= history of self-injurious behaviour.

## Appendix 11: Univariable and multiple variable logistic regressions adjusted by age and gender

Data listed below are based on a sub-sample of the participant sample who disclosed their age and gender.

Variable	Univariate (n= 380)		Multivariate (n= 379)	
	$\chi^2$	<i>p</i>	$\chi^2$	<i>p</i>
<b>Coping</b>				
Avoidant	<b>69.162</b>	<b>&lt;0.001</b>	2.510	0.285
Emotion Focused	0.288	0.866	2.096	0.351
Problem Focused	2.983	0.225	0.419	0.811
Socially Supportive	4.789	0.091	4.356	0.113
<b>Defeat</b>	<b>115.603</b>	<b>&lt;0.001</b>	1.437	0.487
<b>Entrapment</b>	<b>82.013</b>	<b>&lt;0.001</b>	1.877	0.391
<b>Loneliness</b>	<b>87.596</b>	<b>&lt;0.001</b>	<b>9.473</b>	<b>0.009</b>
<b>Memory</b>				
Directing behaviour	0.102	0.950	0.156	0.925
Self-Continuity	4.293	0.117	1.365	0.505
Social bonding	0.268	0.875	1.445	0.485
<b>Socially Prescribed Perfectionism</b>	<b>57.228</b>	<b>&lt;0.001</b>	0.101	0.951
<b>Social Support</b>	<b>33.1907</b>	<b>&lt;0.001</b>	0.395	0.821
<b>Stress</b>	<b>79.523</b>	<b>&lt;0.001</b>	1.767	0.413
<b>Trauma</b>				
Emotional Abuse	<b>80.881</b>	<b>&lt;0.001</b>	<b>16.066</b>	<b>&lt;0.001</b>
Emotional Neglect	<b>48.381</b>	<b>&lt;0.001</b>	1.564	0.457
Physical Abuse	<b>13.778</b>	<b>0.001</b>	0.420	0.811

<b>Variable</b>	<b>Univariate</b> (n= 380)		<b>Multivariate</b> (n= 379)	
	$\chi^2$	<i>p</i>	$\chi^2$	<i>p</i>
Physical Neglect	<b>30.528</b>	<b>&lt;0.001</b>	0.154	0.926
Sexual Abuse	<b>15.001</b>	<b>0.001</b>	0.746	0.689
<b>Suicidal Ideation</b>	<b>187.869</b>	<b>&lt;0.001</b>	<b>46.095</b>	<b>&lt;0.001</b>

## Appendix 12: Screening interview

Q1 Thank you for expressing an interest in the study exploring interpersonal relationships prior to suicidal behaviour. I am calling to see if we could discuss your eligibility a little further. This should take no more than 10 minutes, is now an ok time to talk?

Yes: Continue to Q2

No: That's fine, would you like to arrange a time for me to call you back?

*Make arrangements*

Date:

Time:

Q2 To assess your eligibility for this particular study there are some questions that are a little sensitive, is there somewhere nearby you could go to where you will feel comfortable answering these questions?

Yes : Continue to question 3

No : Would you like to continue the with these questions and we can stop at any time, or would you prefer I call you at a later time?

- Continue call: Continue to next question
- Discontinue call: Arrange time to call back

Date:

Time:

Thank you. The first few questions are a general demographic questions, then moving on to ensure your current health. If you have any questions or would like to rephrase anything please let me know.

Q3 First can you confirm your date of birth?

DOB:\_\_\_\_\_.

- Acceptable: Continue to Q4
- Unacceptable: *'I'm afraid this study is strictly for people aged 18 or over. Yours date of birth would suggest you are younger than this and so I'm afraid you would not be able to take part in this study. Most studies in SBRL are for those aged 18 and over, but not all of them. I would encourage you check the website again in a little while as there will likely be another study which you can engage in. In the meantime thank you for your interest in taking part in this study!'*

Q4 And how would you describe your level of English? Have you ever had to complete assessments to assess your verbal fluency?

High/ fluent; Continue to Q5

Low; incoherent: *'Unfortunately this study requires participants to clearly convey what they are thinking and so our research remains as thorough as possible. As such I think this interview could be challenging and cause a frustration when discussing such a sensitive topic. I apologise that this is not the response you were looking for. However I would encourage you to check the SBRL website again in the future as we regularly have studies running looking for people with a variety of different histories. In the meantime, thank you very much for your interest in the study.'*

Q5 An important part of the interview is that the interview is recorded for later analysis. These recordings are held on a password protected device before being transcribed either by myself or 1<sup>st</sup> Class Secretarial, which is an external company regularly used by the University of Glasgow. Once the study is completed the audio files will be deleted. Are you ok with having the interview recorded?

Yes - proceed to question 6.

No - *I understand that it can be difficult to share your experiences and have them recorded. As this study explores personal experiences, being able to record these answers is a key requirement for this study and without it we cant go ahead with the interview. However I would like to thank you for expressing an interest and volunteering to share your experiences. I would encourage you to check the SBRL website again in the future as we regularly have studies running looking for people with a variety of different histories, studies which involve online questionnaires where you don't need to be recorded. Thank you for your time, goodbye.*

Q6 Thank you. The next few questions are more to explore your psychological wellbeing.

This study is specifically interested in people who have acted on intentions to die. Have you ever engaged in a suicide attempt?

Yes- continue to next question

No – *'The study here is exploring factors which lead to suicide behaviour based on first-hand experience. Unfortunately you therefore don't meet criteria for this study. However your experiences are still valuable and I would encourage you to check the SBRL website again in the future as we regularly have studies running looking for people with a variety of different histories. Thank you for your time, goodbye.*

Q7 When was the last time you engaged in a suicide attempt?

Date: \_\_\_\_\_.

<5 years: continue to next question

>5 years: *'The study here is exploring suicide behaviour which has occurred in the last five years. It sounds like you are doing really well and you have kept yourself safe for a while now, however it also means you do not meet the criteria for this study. We have other studies beginning in SBRL all the time so*

*please get in touch as your experiences are still be very valuable to us, but in the meantime thank you very much for expressing your interest in this study. Goodbye.'*

Q8 And how would you describe your level of suicidality now?

*(if they have a plan discontinue)*

- Low: Continue to next question
- Moderate/ high: *Do you believe you can keep yourself safe for the next 7 days?*
- Yes – continue to next question
- No – *As you have indicated that you are experiencing elevated suicide ideation I am concerned that this study may negatively impact your mood. Is there someone you can contact when you are feeling like this?* Explore options with the participant for keeping themselves safe and encourage them to see their GP. If suicide risk is imminent, advise them to go to hospital or where possible arrange an ambulance or emergency GP appointment on the participants behalf.

Q9 What about other aspects of your mental health, do you feel you are experiencing any psychotic symptoms for example seeing or hearing things other people cant, or having irregular thoughts or beliefs?

- Yes –Thank you for sharing that with me. Unfortunately, as you have indicated that you are experiencing some sensory experiences, you are therefore not eligible to take part in this study. If these experiences are new to you, I would encourage you contact your GP or healthcare provider who can assess you and potentially support you with the symptoms you are experiencing. I am sorry if this is disappointing for you, however when you are feeling better then you are very welcome to explore the SBRL website to participate in another study of a similar research topic.
- No – continue to next question



Q10 Do you have a cognitive impairment or learning disability?

- Yes – Thank you, unfortunately, because of the level of detail required for the study in the interview and in the questionnaires we are using, we are unable to recruit participants with a cognitive impairment. I would like to thank you for your interest in the study, and would encourage you to look at the SBRL website for other studies which you may need to participate in.
- No – continue to next question

Q11 The final two questions are about the in-person meeting. The meeting for the study can be held either via video conferencing which requires a camera and microphone, your mobile phone may be able to support this, or at the Administrative Building of Gartnavel Royal Hospital (depending on health guidelines from the Scottish Government), are either of these options possible for you?

- Yes – continue to next question  
Circle option: In person / video conferencing
- No – I'm afraid the procedures of this study dictate that all interviews must be either conducted within the Administration Building or via an approved video conferencing platform. Unfortunately, if this is not possible then you cannot be a participant in this study. However, we regularly have a number of online or telephone studies throughout the year which you are welcome to participate in. If you go on the SBRL website, you can check you can find out more details and check your eligibility.

Q12 And finally, this study aims to explore peoples experiences of interpersonal relationships prior to their suicide behaviour for the purposes of research and suicide prevention. This meeting is not therapy, is that something you are comfortable with?

- Yes – arrange in person meeting and send reminder text/ email as preferred.

Interview date:\_\_\_\_\_.

Interview time:\_\_\_\_\_.

Contact details:

Email\_\_\_\_\_.

Telephone:\_\_\_\_\_.

Agree to text reminder? Yes/ No

- No – ‘I understand. Unfortunately this study does not offer a therapeutic intervention. If you are looking for someone to talk to then your GP may be able to refer you to adult mental health services. Alternatively Samaritans and Breathing Space are both highly trained in supporting people who wish to discuss sensitive topics like the ones we are discussing here. At this time it doesn’t seem appropriate for you to take part in this study, however perhaps at a later date you might feel ready to take part in other research. Please get back in touch whenever you like, and in the meantime thank you very much for taking the time to contact us for this study.’

## Appendix 13: Study variable correlations

Variable	Attachment		SPP	SELSA			UCLA-LS	Depression	Stress	Defeat	Entrapment	Suicidal Ideation
	Mother	Father		Family	Romantic	Social						
<b>Attachment</b>												
Mother	r	0.582***	0.012	-0.400***	0.006	-0.138**	-0.117**	-0.009	0.065	-0.120	0.024	-0.069
	n	574	579	580	579	577	580	580	576	576	580	580
Father	r		0.018	-0.406***	-0.005	-0.164***	-0.204***	-0.094*	-0.058	-0.156*	-0.109**	-0.133**
	n		574	575	574	572	575	575	571	575	575	575
<b>SPP</b>	r			0.344***	0.110**	0.281***	0.435***	0.469***	0.520***	0.546***	0.522***	0.473***

Variable	Attachment		SPP	SELSA			UCLA-LS	Depression	Stress	Defeat	Entrapment	Suicidal Ideation
	Mother	Father		Family	Romantic	Social						
	n			581	580	578	580	581	577	576	581	581
<b>SELSA</b>												
Family	r				0.112**	0.406***	0.530***	0.376***	0.307***	0.413***	0.422***	0.452***
	n				581	579	581	582	578	576	582	582
Romantic	r					0.135**	0.293***	0.216***	0.191***	0.089	0.220***	0.223***
	n					578	580	581	577	576	581	581
Social	r						0.746***	0.365***	0.378***	0.438***	0.438***	0.449***

Variable	Attachment		SPP	SELSA			UCLA-LS	Depression	Stress	Defeat	Entrapment	Suicidal Ideation
	Mother	Father		Family	Romantic	Social						
	n					578	579	575	576	579	579	
<b>UCLA</b>	r						0.538***	0.538***	0.607***	0.637***	0.575***	
	n						581	577	576	581	581	
<b>Depression</b>	r							0.731***	0.732***	0.767***	0.749***	
	n							578	576	582	582	
<b>Stress</b>	r								0.739***	0.745***	0.607***	
	n								576	578	578	

Variable	Attachment		SPP	SELSA			UCLA-LS	Depression	Stress	Defeat	Entrapment	Suicidal Ideation
	Mother	Father		Family	Romantic	Social						
<b>Defeat</b>	r										0.820***	0.709***
	n										576	576
<b>Entrapment</b>	r											0.732***
	n											582
Mean	18.92	15.80	60.23	13.82	24.15	10.9741	45.71	19.43	8.11	27.33	41.62	13.82
sd.	5.440	5.884	15.754	24.15	13.478	6.639	12.218	6.737	3.186	15.637	17.719	4.837
n	580	575	581	582	581	579	581	582	578	576	582	582

Variable	Attachment		SPP	SELSA			UCLA-LS	Depression	Stress	Defeat	Entrapment	Suicidal Ideation
	Mother	Father		Family	Romantic	Social						
$\alpha$	0.846	0.890	0.891	0.943	0.954	0.945	0.925	0.902	0.819	0.962	0.955	0.896

\*\*\* =  $p < 0.001$ ; \*\* =  $p < 0.01$ ; \* =  $p < 0.05$ ; r= regression coefficient; n = total number; sd.= standard deviation  $\alpha$ = cronbachs alpha; SPP= socially prescribed perfectionism.

## Appendix 14: Univariate pairwise post-hoc analysis

Variable	NH vs SI <sup>A</sup>		NH vs SB <sup>A</sup>		SI vs SB <sup>B</sup>	
	OR	95% CI	OR	95% CI	OR	95% CI
<b>Attachment</b>						
Mother	1.00	0.95 - 1.06	1.00	0.96 - 1.04	1.00	0.95 - 1.04
Father	1.01	0.96 - 1.07	0.98	0.94 - 1.01	0.97	0.93 - 1.01
<b>SPP</b>	1.01	0.99 - 1.03	<b>1.02</b>	<b>1.01 - 1.04</b>	1.01	0.99 - 1.03
<b>SELSA</b>						
Family	1.02	0.98 - 1.06	<b>1.04</b>	<b>1.01 - 1.07</b>	1.02	0.99 - 1.05
Romantic	<b>1.02</b>	<b>1.00 - 1.05</b>	<b>1.02</b>	<b>1.00 - 1.03</b>	0.99	0.97 - 1.01
Social	1.01	0.96 - 1.06	1.03	0.99 - 1.06	1.01	0.98 - 1.05
<b>UCLA</b>	1.02	0.99 - 1.04	<b>1.02</b>	<b>1.01 - 1.04</b>	1.01	0.99 - 1.03
<b>Depression</b>	<b>1.07</b>	<b>1.02 - 1.12</b>	<b>1.11</b>	<b>1.07 - 1.16</b>	<b>1.04</b>	<b>1.00 - 1.08</b>
<b>Stress</b>	1.05	0.95 - 1.15	<b>1.15</b>	<b>1.07 - 1.23</b>	<b>1.09</b>	<b>1.01 - 1.18</b>
<b>Defeat</b>	1.03	0.99 - 1.08	<b>1.10</b>	<b>1.06 - 1.13</b>	<b>1.06</b>	<b>1.03 - 1.09</b>
<b>Entrapment</b>	<b>1.02</b>	<b>1.00 - 1.04</b>	<b>1.03</b>	<b>1.02 - 1.05</b>	<b>1.02</b>	<b>1.00 - 1.03</b>
<b>Suicidal ideation</b>	<b>1.12</b>	<b>1.03 - 1.22</b>	<b>1.21</b>	<b>1.13 - 1.29</b>	<b>1.08</b>	<b>1.02 - 1.14</b>



Significant results are highlighted in bold. OR: Odds Ratio; <sup>A</sup> Control is reference variable; <sup>B</sup> Ideation is reference variable; NH= no history of self-injurious thoughts or behaviour group; SI= history of self-injurious thoughts but no history of self-injurious behaviour; SB= history of self-injurious behaviour (including suicide attempt), regardless of any history of self-injurious thoughts.

## Appendix 15: Multiple-variable multinomial post-hoc pairwise analysis

Variable	NH vs SI <sup>A</sup>		NH vs SB <sup>A</sup>		SI vs SB <sup>B</sup>	
	OR	95% CI	OR	95% CI	OR	95% CI
<b>Attachment</b>						
Mother	1.00	0.87- 1.16	1.10	0.96 - 1.25	1.09	0.98 - 1.22
Father	1.04	0.92- 1.18	1.02	0.91 – 1.14	0.98	0.88 - 1.09
<b>SPP</b>	0.98	0.93 - 1.02	0.96	0.92 – 1.00	0.98	0.95 – 1.02
<b>SELSA</b>						
Family	1.03	0.92 - 1.15	1.02	0.93 – 1.13	1.00	0.91 – 1.09
Romantic	1.04	0.99 – 1.08	0.98	0.94 – 1.02	<b>0.94</b>	<b>0.91 – 0.98</b>
Social	0.92	0.79 – 1.06	0.90	0.80 – 1.03	0.99	0.86 – 1.13
<b>UCLA-LS</b>	1.01	0.92 – 1.10	<b>1.10</b>	<b>1.01 – 1.20</b>	<b>1.09</b>	<b>1.01 – 1.19</b>
<b>Depression</b>	<b>1.21</b>	<b>1.01 – 1.46</b>	<b>1.23</b>	<b>1.03 – 1.46</b>	1.01	0.88 – 1.6
<b>Stress</b>	0.91	0.67 – 1.23	1.08	0.81 – 1.45	1.20	0.91 – 1.58
<b>Defeat</b>	1.00	0.93 – 1.08	0.99	0.92 -1.05	0.99	0.93 – 1.05
<b>Entrapment</b>	1.01	0.95 – 1.08	0.99	0.93 -1.05	0.98	0.93- 1.03

<b>Suicidal ideation</b>	1.33	0.97 – 1.83	<b>2.14</b>	<b>1.59 – 2.88</b>	<b>1.61</b>	<b>1.25 – 2.08</b>
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Significant results are highlighted in bold. OR: Odds Ratio; <sup>A</sup> Control is reference variable;

<sup>B</sup> Ideation is reference variable; NH= no history of self-injurious thoughts or behaviour

group; SI= history of self-injurious thoughts but no history of self-injurious behaviour;

SB= history of self-injurious behaviour (including suicide attempt), regardless of any

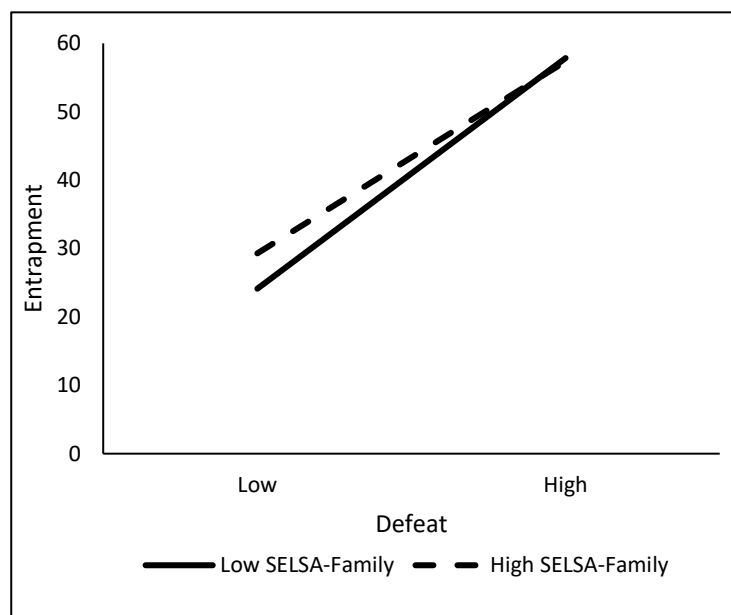
history of self-injurious thoughts.

## Appendix 16: Forms of loneliness as moderators of defeat and entrapment

### SELSA-Family:

A significant main effect was observed between defeat and entrapment ( $b= 1.01$ ,  $se= 0.086$ ,  $t= 11.82$ ,  $p < 0.001$ , 95% CI: 0.846 – 1.184) and between SELSA-Family and entrapment ( $b= 0.35$ ,  $se= 0.170$ ,  $t= 2.046$ ,  $p < 0.05$ , 95% CI: 0.013 – 0.684), however no significant interaction was observed between defeat and SELSA-Family in association with entrapment ( $b= -0.01$ ,  $se= 0.005$ ,  $t= -1.729$ ,  $p= 0.085$ , 95% CI: -0.018 – 0.001). Despite this, simple slopes analysis one standard deviation above and below the mean, show that low ( $b= 0.964$ ,  $se= 0.063$ ,  $t= -15.357$ ,  $p < 0.001$ , 95% CI: 0.840 – 1.087) and high ( $b= 0.802$ ,  $se= 0.068$ ,  $t= 11.880$ ,  $p < 0.001$ , 95% CI: 0.669 – 0.935) SELSA-Family was significantly different from zero (see figure A17.1).

Figure A17.1. Exploring SELSA-Family as a moderator between defeat and entrapment



### SELSA-Romantic:

A significant main effect was observed between defeat and entrapment ( $b= 0.90$ ,  $se= 0.087$ ,  $t= 10.24$ ,  $p < 0.001$ , 95% CI: 0.723 – 1.068) and but not between SELSA-Family and entrapment ( $b= 0.073$ ,  $se= 0.98$ ,  $t= 0.741$ ,  $p= 0.459$ , 95% CI: -0.120 – 0.265).

Furthermore, no significant interaction was observed between defeat and SELSA-

Romantic in association with entrapment ( $b= 0.003$ ,  $se= 0.003$ ,  $t= 0.098$ ,  $p= 0.922$ , 95% CI:  $-0.006 - 0.006$ ).

SELSA-Social:

A significant main effect was observed between defeat and entrapment ( $b= 0.991$ ,  $se= 0.083$ ,  $t= 11.932$ ,  $p < 0.001$ , 95% CI:  $0.827 - 1.155$ ) and but not between SELSA-Family and entrapment ( $b= 0.227$ ,  $se= 0.224$ ,  $t= 1.013$ ,  $p = 0.312$ , 95% CI:  $-0.215 - 0.669$ ).

Furthermore, no significant interaction was observed between defeat and SELSA-Romantic in association with entrapment ( $b= -0.007$ ,  $se= 0.006$ ,  $t= -1.151$ ,  $p= 0.251$ , 95% CI:  $-0.019 - 0.005$ ).

UCLA-LS:

A significant main effect was observed between defeat and entrapment ( $b= 0.167$ ,  $se= 0.015$ ,  $t= 11.125$ ,  $p < 0.001$ , 95% CI:  $0.137 - 0.196$ ) and but not between UCLA-LS and entrapment ( $b= 0.051$ ,  $se= 0.060$ ,  $t= 0.848$ ,  $p = 0.397$ , 95% CI:  $-0.070 - 0.163$ ).

Furthermore, no significant interaction was observed between defeat and ULCA-LS in association with entrapment ( $b= -0.002$ ,  $se= 0.001$ ,  $t= 1.159$ ,  $p= 0.247$ , 95% CI:  $-0.001 - 0.004$ ).

## Appendix 17: Depression as a mediator between loneliness and suicidal ideation

### SELSA-Family

SELSA-Family was significantly associated with depression ( $b= 0.298$ ,  $se= 0.031$ ,  $t= 9.768$ ,  $p<0.001$ , 95% CI: 0.238, 0.358) and depression was significantly associated with suicidal ideation ( $b=0.478$ ,  $se= 0.021$ ,  $t= 22.756$ ,  $p<0.001$ , 95% CI: 0.437, 0.519). The inclusion of SELSA-Family in the model did not reduce the direct effect to non-significance ( $b= 0.117$ ,  $se= 0.012$ ,  $t= 7.014$ ,  $p<0.001$ , 95% CI: 0.084, 0.149). As the indirect effect was significant ( $b= 0.143$ ,  $se= 0.018$ , 95% CI: 0.109, 0.178), this suggests that depression partially mediated the association between SELSA-Family and suicidal ideation.

### SELSA-Romantic

SELSA-Romantic was significantly associated with depression ( $b= 0.07$ ,  $se= 0.020$ ,  $t= 4.799$ ,  $p<0.001$ , 95% CI: 0.057, 0.136) and depression was significantly associated with suicidal ideation ( $b=0.527$ ,  $se= 0.020$ ,  $t= 25.264$ ,  $p<0.001$ , 95% CI: 0.487, 0.567). The inclusion of SELSA-Romantic in the model did not reduce the direct effect to non-significance ( $b= 0.022$ ,  $se= 0.010$ ,  $t= 2.176$ ,  $p<0.05$ , 95% CI: 0.002, 0.042). As the indirect effect was significant ( $b= 0.126$ ,  $se= 0.012$ , 95% CI: 0.105, 0.150), this suggests that depression partially mediated the association between SELSA-Romantic and suicidal ideation.

### SELSA-Social

SELSA-Social was significantly associated with depression ( $b= 0.377$ ,  $se= 0.039$ ,  $t= 9.803$ ,  $p<0.001$ , 95% CI: 0.302, 0.453) and depression was significantly associated with suicidal ideation ( $b=0.476$ ,  $se= 0.021$ ,  $t= 22.659$ ,  $p<0.001$ , 95% CI: 0.434, 0.516). The inclusion of SELSA-Social in the model did not reduce the direct effect to non-significance ( $b= 0.151$ ,  $se= 0.021$ ,  $t= 7.235$ ,  $p<0.001$ , 95% CI: 0.110, 0.192). As the indirect effect was significant ( $b= 0.180$ ,  $se= 0.023$ , 95% CI: 0.136, 0.226), this suggests that depression partially mediated the association between SELSA-Social and suicidal ideation.

### UCLA-LS

UCLA-LS was significantly associated with depression ( $b= 0.289$ ,  $se= 0.019$ ,  $t= 15.115$ ,  $p<0.001$ , 95% CI: 0.252, 0.327) and depression was significantly associated with suicidal

ideation ( $b=0.436$ ,  $se= 0.023$ ,  $t= 19.102$ ,  $p<0.001$ , 95% CI: 0.392, 0.481). The inclusion of UCLA-LS in the model did not reduce the direct effect to non-significance ( $b= 0.097$ ,  $se= 0.012$ ,  $t= 7.820$ ,  $p<0.001$ , 95% CI: 0.073, 0.121). As the indirect effect was significant ( $b= 0.126$ ,  $se= 0.012$ , 95% CI: 0.105, 0.150), this suggests that depression partially mediated the association between UCLA-LS and suicidal ideation.