Life-Sustaining Factors on the Causal Pathway to Suicide: Experimental and Longitudinal Evidence for a Mindfulness-Grounded Model of Suicide Resilience

Khan R. L. Collins
BSc (Hons), GradDip Psych, BAppSc (Hons)

A thesis submitted to The University of Western Australia
to fulfil the requirements for the degree of
Doctor of Philosophy and in partial fulfilment of the requirements for the degree of
Master of Psychology (Clinical)

School of Psychological Science

2018
Author’s Declaration

I, Khan Collins, certify that:

This thesis has been substantially accomplished during enrolment in the degree.

This thesis does not contain material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution.

No part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of The University of Western Australia and where applicable, any partner institution responsible for the joint-award of this degree.

This thesis does not contain any material previously published or written by another person, except where due reference has been made in the text.

The works are not in any way a violation or infringement of any copyright, trademark, patent, or other rights whatsoever of any person.

The research involving human data reported in this thesis was assessed and approved by The University of Western Australia Human Research Ethics Committee.

This thesis contains published work and work prepared for publication, some of which has been co-authored.

Signature: [Redacted]
Date: 23 January 2018
Abstract

Two fundamental limitations to suicide research have been the underutilization of experimental methods that allow for the testing of the causal effects of key risk factors specified by leading contemporary theories and the relative lack of focus on life-sustaining resilience which may reduce the likelihood of suicide even when risk and adversity are heightened. The present thesis developed a novel experimental paradigm to modify perceived burdensomeness and thwarted belongingness—two proximal causal antecedents of suicidal desire proposed by the interpersonal theory of suicide—and examined three candidate life-sustaining resilience factors that may attenuate their impact. Study 1 demonstrated that the joint presence of experimentally-induced perceived burdensomeness and thwarted belongingness has a significant deleterious impact on willingness to persist, the erosion of which is a potential antecedent to suicide risk. However, individuals scoring higher on zest for life were buffered against these adverse outcomes. Moving beyond pre-existing individual differences in resilience, Studies 2 and 3 used the experimental paradigm to show that mindfulness training has resilience-enhancing effects when delivered both prior to, and during, the experience of heightened perceived burdensomeness and thwarted belongingness. Study 4 used a longitudinal design to show that mindfulness prospectively predicted lower suicidal ideation and suicidal intent through the mediating effect of zest for life, but—consistent with the buffering hypothesis—did so only under conditions of heightened general (psychological distress) and suicide-specific (perceived burdensomeness and thwarted belongingness) risk, replicating the pattern of effects observed in the earlier experimental studies. Shifting focus to a third candidate life-sustaining factor, Study 5 used the experimental paradigm to show that manipulated perceptions of meaningfulness buffer against deficits in persistence caused by elevated perceived burdensomeness and thwarted belongingness.
Findings have been synthesized into a mindfulness-grounded model of suicide resilience which proposes that mindful awareness contributes to zest for life both directly and indirectly through perceptions of meaning in life, with this heightened zest acting as a buffer to reduce the likelihood of suicidal desire in the face of heightened risk and adversity. This model articulates how life-sustaining resilience can be integrated within contemporary theories of suicide and informs prevention efforts by outlining how suicide resilience might be enhanced using mindfulness training together with a focus on the pursuit of personally valued goals. Increasing resilience in this manner has the potential to improve the effectiveness of suicide prevention strategies beyond current risk-centric models.
Table of Contents

Author’s Declaration................................................................................................................... iii
Abstract.........................................................................................................................................v
Table of Contents....................................................................................................................... vii
Statement of Contribution........................................................................................................... ix
Acknowledgements.......................................................................................................................x
Publications Arising from this Thesis ......................................................................................... xi

Chapter 1 General Introduction..............................................................................................1
1.1 Nomenclature of Suicidal Behavior .......................................................................3
1.2 Suicide Research Literature: The Current State of Affairs .........................3
1.3 The Interpersonal Theory of Suicide .................................................................6
1.4 A Role for Life-Sustaining Factors .................................................................9
1.4.1 Zest for Life .........................................................................................................14
1.4.2 Meaning in Life ...................................................................................................15
1.4.3 Mindfulness .........................................................................................................19
1.5 An Experimental Analogue .................................................................................22
1.6 Thesis Aims and Chapter Outline ........................................................................24
1.7 References............................................................................................................29

Chapter 2 Testing the Causal Effects of Risk and Resilience Factors.........................49
2.1 Abstract................................................................................................................55
2.2 Introduction..........................................................................................................56
2.3 Study 1.................................................................................................................59
2.4 Method.................................................................................................................61
2.5 Results and Discussion ........................................................................................66
2.6 Study 2.................................................................................................................73
2.7 Method.................................................................................................................75
2.8 Results and Discussion ........................................................................................77
2.9 General Discussion ..............................................................................................82
2.10 References............................................................................................................89

Chapter 3 A Mindfulness Intervention to Enhance Resilience during the Experience of Heightened Risk and Adversity ..........................................................103
3.1 Abstract..............................................................................................................107
3.2 Introduction........................................................................................................108
3.3 Method...............................................................................................................111
3.4 Results................................................................................................................119
3.5 Discussion..........................................................................................................125
3.6 References..........................................................................................................131
Statement of Contribution

The candidate played the major role in study design, preparation of study materials, data collection, analysis, interpretation, writing, and revisions for all studies reported within this thesis, with exceptions listed as follows:

- Coordinating supervisor Werner Stritzke and co-supervisor Andrew Page jointly designed the studies presented in Chapter’s 2, 3, and 5 with the candidate. Andrew Page programmed the initial version of the experimental paradigm developed in Chapter 2. The candidate programmed the majority of revisions used in the studies presented in Chapter’s 3 and 5.

- Data for the study presented in Chapter 4 were collected as part of a university-wide longitudinal study developed and administered through a collaboration between the School of Psychological Science and the UWA Health Promotion Unit. Julia Brown played a significant role in the design of this study and the data collection process, and provided assistance with data analysis.

- Ida Best, Claudia Stebbing, and Melissa Legendre worked with the candidate on the studies presented in Chapter’s 2, 3, and 5 by assisting with study design, participant recruitment, and data collection.

The candidate has the permission of all contributors to include the work in this thesis.

Candidate signature: 
Date: 23 January 2018

I, Werner Stritzke, certify that the candidate’s statements regarding his contribution to the works presented in this thesis are correct.

Coordinating Supervisor signature: 
Date: 23 January 2018
Acknowledgements

I would first like to express my gratitude to my supervisors, Dr Werner Stritzke and Professor Andrew Page, for their guidance and support over the years. Their enthusiasm and dedication to research is truly inspiring. Werner, you have taught me the importance of precision and attention to detail both in language and in experimentation. Andrew, you have taught me that sometimes getting caught up in the detail is not worth the hassle! Both of these lessons (among the many others imparted) are invaluable and will hold me in good stead as I embark upon my career.

A huge thank you to my classmates in the clinical program, particularly Gaby, Prue, Erica, Kim, Claire and Julia. Your encouragement, wise counsel, and humour have made this a far smoother and enjoyable journey than I could have ever expected. I am also grateful to the Honour’s students that I have had the pleasure to work with over the years (Ida, Claudia, Melissa and Florence, among others). Your hard work and dedication to our research projects have been essential ingredients.

To my family—Deborah, Ari and Jasper—this thesis is dedicated to you. I could not imagine completing this without your love and encouragement, even if from some of you it was only in the form of smiles and cuddles. Undertaking a combined PhD and Master’s program with two young children at home has only made completion all the sweeter. To the rest of my family, including Mum and Dad, thank you for supporting me over the years and for showing an interest in my work, no matter how technical or obscure the subject matter.

This research was supported by an Australian Government Research Training Program (RTP) Scholarship and a Prescott Postgraduate Scholarship administered through The University of Western Australia.
Publications Arising from this Thesis

Chapter 2


Chapter 3


Chapter 4

Chapter 1 General Introduction

Suicide remains a significant public health problem across the globe. Every year over 800,000 people kill themselves and for every person who dies by suicide at least 20 others make an attempt (World Health Organization, 2014). In Australia, suicide is the leading cause of death among 15-44 year olds, outnumbering deaths by motor vehicles and skin cancer (ABS, 2015). Despite an exponential increase in published research into suicide over the past several decades (Nock, 2016), these statistics remain largely unchanged (Brown & Jager-Hyman, 2014; Kleiman & Anestis, 2015), and in some sectors of the global population may even be worsening (Bastiampillai, Sharfstein, & Allison, 2016; Robinson, Bailey, Browne, Cox, & Hooper, 2016; Snowdon et al., 2017). Further efforts to understand why some people choose to end their own lives, while others are able to persist with living in the face of adversity, are therefore essential.

Successful prevention rests largely on the ability to accurately predict suicidal behavior (Glenn & Nock, 2014; World Health Organization, 2014). Until relatively recently, suicide research has focused almost exclusively on the identification of risk factors; variables that are associated with an increased probability of suicidal outcomes (Johnson, Wood, Gooding, Taylor, & Tarrier, 2011). Indeed, hundreds of such risk factors have now been identified in the literature (Chu et al., 2017; Franklin et al., 2017). Despite the obvious importance of this endeavor, far less is known about resilience factors that serve to reduce the likelihood of suicidality even when risk and adversity are heightened (O’Connor & Nock, 2014). This is a limitation that dramatically reduces the scope for effective prevention (Wingate et al., 2006). Advancing our understanding of suicide will in part be driven by the development and testing of theoretical models that more precisely specify how both risk and resilience factors interact to motivate or mitigate suicidal thoughts and behaviors (Nock, 2012). In
addition, because of the inherent constraints in suicide research, there is an absence of evidence speaking to the causal role of key theoretical risk factors. This is a critical gap in the literature that can be filled by novel methodologies that enable the causal effects of putative suicide risk and resilience factors to be safely tested in experimental settings.

The current thesis comprises a series of studies that aim to test predictions of the interpersonal theory of suicide (ITS; Joiner, 2005; Van Orden et al., 2010) and examine the potential moderating or buffering role of three candidate life-sustaining resilience factors. To achieve this aim, an experimental paradigm will be developed to modify perceived burdensomeness and thwarted belongingness—interpersonal factors proposed to be proximal causal antecedents of suicidal desire—and measure their effects on a theoretically-relevant analogue construct. Using this experimental paradigm, several life-sustaining factors that may enhance resilience to proximal risk factors are also tested, with a view to informing potential targets for suicide prevention. Longitudinal methods are then used to complement these experimental studies and examine the proposition that the relationships between the identified life-sustaining factors and suicide resilience holds true beyond the laboratory. Finally, a theoretical model depicting how life-sustaining resilience might be enhanced to buffer against the death-promoting effects of perceived burdensomeness and thwarted belongingness is presented along with clinical recommendations and avenues for future research. The current thesis adds to the suicide research literature by testing a central causal hypothesis of a leading contemporary theory of suicide and demonstrating how engagement with life may be enhanced to mitigate the likelihood of suicidal behavior in the face of heightened risk and adversity.
1.1 Nomenclature of Suicidal Behavior

It is recognised that clearly defined and consistent terminology is crucial to the effective study of suicide (Silverman, Berman, Sanddal, O’Carroll, & Joiner, 2007a). Although the field has yet to reach a consensus on this issue, the current research program draws on a nomenclature of suicidal behavior (Silverman et al., 2007a; Silverman, Berman, Sanddal, O’Carroll, & Joiner, 2007b) that has been widely adopted in the literature (e.g., Chu et al., 2017; Klonsky, May, & Saffer, 2016; Van Orden et al., 2010). Suicidal behavior is a broad term that encompasses ideations (thoughts), communications, and behaviors which are self-initiated and motivated by at least some degree of intention to die\(^1\). The term suicidal ideation refers specifically to thinking about, considering or planning to engage in self-directed behaviors that are potentially lethal. The term suicide attempt refers to an attempt to inflict lethal self-injury that does not result in death, whereas suicide is reserved for cases in which a suicide attempt does result in death (Silverman et al., 2007b). The term suicide risk refers to the presence of suicidal thoughts or behaviors, whereas the term suicide risk factor refers to any factor that has been positively associated with the presence of suicidal thoughts or behaviors in a given population. Where appropriate, the current thesis differentiates between risk factors for suicidal desire (ideation) versus risk factors for suicide attempts.

1.2 Suicide Research Literature: The Current State of Affairs

The past few decades has seen substantial growth in research into understanding and predicting suicidal behavior (Nock, 2016). Epidemiological studies have identified multiple biological, cognitive, behavioral, and interpersonal risk factors for suicide (see Klonsky, May, & Saffer, 2016, Nock et al., 2008, and Van Orden et al., 2010 for

---

\(^1\) In the current thesis, the terms suicidal behaviors and suicidality are used interchangeably. While use of the term suicidality is generally discouraged because it lacks specificity (Silverman et al., 2007a; 2007b), this terminology is still widely used in the literature to refer to the spectrum of suicide-related thoughts, communications, and behaviors (e.g., Chu et al., 2017; Johnson et al., 2011).
reviews). The most robust of these include previous suicide attempts (Prinstein, 2008), psychiatric disorders (Bostwick & Pankratz, 2000), unemployment (Blakely, Collings, & Atkinson, 2003), social isolation (Joiner & Van Orden, 2008), and physical illnesses such as cancer (Rasic, Belik, Bolton, Chochinov, & Sareen, 2008). However, even this large body of literature is unable to provide a clear picture of suicide vulnerability conferred by these varied risk factors (Chang et al., 2016; Franklin et al., 2017; Large, Kaneson, et al., 2016; Large, Galletly, Myles, Ryan, & Myles, 2017). A recent meta-analysis synthesizing 50 years of research examining longitudinal predictors of suicidal behavior found that out of 3,428 total risk factor effect sizes, the ability to predict suicidality was only slightly better than chance (Franklin et al., 2017). Thus, attending to risk factors alone seems unlikely to yield sufficient data to reliably inform effective prevention.

The field of suicide research also faces a number of other unique challenges. Longitudinal studies examining the relationships between risk and resilience factors and suicidality over time are difficult because many individuals engaging in suicidal behaviors are not available for follow-up assessment, either because they have since died or are otherwise in too poor a state of mental health (Van Orden et al., 2010). These studies are also challenging to implement because of the comprehensive nature of the clinical assessments required at each time point and the need to ensure that assessment is sufficiently regular to capture data close to the point of death by suicide (Klonsky et al., 2016). Consequently, the majority of suicide research utilizes cross-sectional designs involving the collection of data at a single point in time. This is no less of an issue within the context of the ITS, with a recent meta-analysis and systematic review of literature examining the predictions of the theory over the past 10 years revealing that only 6.9% of studies used prospective designs (Chu et al., 2017). While cross-sectional studies are valuable to the extent that they are able to uncover potentially
meaningful associations between variables, they cannot speak to the temporal
precedence of predictor relative to outcome, an important step towards establishing that
the observed effects are causal in nature (Klonsky et al., 2016; Maltsberger, Schechter,
Herbstman, Ronningstam, & Goldblatt, 2015).

The multitude of risk factors that have been linked with suicidality may also
have hindered advancement of the field (Nock et al., 2008). On the one hand this
reflects a greater understanding of the various correlates of suicidal behavior, but on the
other it contributes to a lack of specificity that can be detrimental to both research and
practice (Nock, 2016). Identifying risk factors at an individual level has limited clinical
utility because even those who present with multiple risk factors are not necessarily any
more likely to engage in suicidal behavior compared to those presenting with few or no
risk factors (Large et al., 2016; Rudd, Joiner, & Rajab, 1996). Moreover, even when
multiple risk factors are present, only a small proportion of individuals who desire
suicide will go on to attempt it, and fewer still will end their own lives (Mann,
Waternaux, Haas, & Malone, 1999). So, while an impressive number of risk factors
have been identified, the lack of precision or specificity with which these factors can
predict suicidality remains a significant problem (Brent, 2011; Prinstein, 2008).

There is now broad consensus that the literature must move beyond the
identification of isolated risk factors towards the development and validation of
theoretical models that provide a framework through which to understand how complex
factors combine to motivate or mitigate suicidal behavior (O’Connor & Nock, 2014). In
doing so, these models aim to enhance specificity while—importantly—also identifying
potentially modifiable targets for treatment and ultimately prevention. The current thesis
focuses on the ITS, a leading contemporary theory which identifies factors proposed to
underlie proximal risk for lethal or near-lethal suicidal behavior.
1.3 The Interpersonal Theory of Suicide

The ITS delineates a causal pathway to suicide using three proximal constructs. *Perceived burdensomeness*, or the perception that one is so fundamentally flawed as to be a burden on others, and *thwarted belongingness*, or the perception that one is lacking meaningful interpersonal connections, are cognitive-affective states that are posited to generate a desire for suicide. According to the theory, these constructs arise from a thwarting of fundamental human needs to contribute and to belong, respectively, making them potent interpersonal risk factors. When experienced concurrently and in a context of hopelessness, perceived burdensomeness and thwarted belongingness are proposed to generate an active desire for suicide. However, an important additional assumption of the ITS is that a desire for suicide is necessary, but not sufficient, to motivate a serious attempt. To act on this desire one must have also acquired the capability for self-harm. This *acquired capability* for suicide is thought to develop over time via habituation processes that override the biologically hardwired fear of death and increase tolerance to the physical pain inherent in ending one’s own life (Van Orden et al., 2010).

A substantial body of evidence suggests the ITS may be a particularly useful lens through which to understand suicidality. The constructs of the theory have been associated with suicidal thoughts and behaviors in multiple clinical (Conner, Britton, Sworts, & Joiner, 2007; Horton et al., 2015; Joiner et al., 2009; Van Orden, Lynam, Hollar, & Joiner, 2006) and non-clinical samples (Christensen, Batterham, Mackinnon, Donker, & Soubelet, 2014; Christensen, Batterham, Soubelet, & Mackinnon, 2013; Glaesmer et al., 2017; Kleiman, Liu, & Riskind, 2014). Early studies in particular tend to provide positive support for the putative effects of the ITS constructs on suicidality both independently (Joiner et al., 2009; Van Orden, Witte, James, et al., 2008; Van Orden et al., 2006) and synergistically (Joiner et al., 2009; Van Orden, Witte, Gordon,
Bender, & Joiner, 2008). The incremental validity of the theory’s predictions is also supported by studies showing the interpersonal factors explain additional variance in suicidal behaviors beyond other major risk factors such as depression, hopelessness, and previous suicide attempts (e.g., Van Orden et al., 2006, 2008).

A primary strength of the ITS is its ability to explain the diversity of risk factors seen across suicidal individuals. Although the theory focuses on perceived burdensomeness, thwarted belongingness, and acquired capability, other more distal factors are proposed to act to increase risk via these more proximal constructs (Chu et al., 2017; Van Orden et al., 2010). That is, evidence-based predictors of suicide elevate risk because they are indicators of the ITS components. For example, childhood abuse and domestic violence may decrease one’s sense of belonging, while factors such as unemployment and physical illness may feed into perceptions that one is unable to contribute and is therefore a burden on others. Similarly, factors such as previous suicide attempts and exposure to violence may increase one’s acquired capability for lethal suicidal behavior (Van Orden et al., 2010). Thus, the ITS provides a framework that accounts for many of the known risk factors while also identifying risk factors that are most proximally located—and hence potentially more clinically useful—on the pathway to suicide.

By distinguishing between people who desire death and those who have acquired the capability to act on this desire, the ITS also overcomes one of the most significant hurdles in suicide research. That is, explaining why the majority of people who desire suicide will not make a serious attempt to end their own life (Klonsky & May, 2014). This ideation-to-action framework contrasts with many other theories of suicide that fail to differentiate between risk factors for suicidal ideation and risk factors for suicide attempts (Klonsky & May, 2014; Ribeiro & Joiner, 2009). The ITS is therefore able to account for the person who desires suicide but is unable to make an
attempt, the person who is capable of self-harm but does not desire death, and the
person who both desires and is capable of ending his or her life, thereby increasing both
the sensitivity and specificity of the theory’s causal predictions (Stellrecht et al., 2006).

Despite its growing popularity amongst suicide researchers and a promising
body of empirical evidence supporting its core predictions, the ITS overlooks the notion
that some individuals may possess life-sustaining resilience that guards against suicidal
thoughts and behaviors, even in the presence of heightened risk (Cheavens, Cukrowicz,
Hansen, & Mitchell, 2016). Indeed, one of the most striking facts about suicide is that
the vast majority of people who experience significant stress and adversity will not
contemplate suicide, finding instead a way to cope and even flourish in these situations
(Cha & Nock, 2009; Wingate et al., 2006). Although the ITS alludes to the presence of
life-sustaining factors by stating that suicide is unlikely unless one has first “beaten
down the instinct to live” (Joiner, 2005, p. 24), it makes no predictions about such
factors as potential moderators within its causal framework.

As previously outlined, there is now a sizeable evidence base suggesting the ITS
constructs are important factors relevant to the emergence of suicidality. However, as
this research base has grown, our understanding of the relationship between these
factors and suicidal outcomes has also become more nuanced. For instance, recent
reviews have identified some inconsistencies concerning the effects of perceived
burdensomeness and thwarted belongingness across studies and samples. In a
systematic review of 66 studies, Ma, Batterham, Calear, and Han (2016) found the
effect of perceived burdensomeness on suicidal ideation was the most supported, with
approximately three quarters of studies reporting significant effects across multiple
clinical and non-clinical samples. In contrast, the predictions concerning the main
effects of thwarted belongingness and acquired capability received only modest support,
with a substantial number of studies finding no effects. Another recent systematic
review and meta-analysis of 122 studies similarly determined that perceived burdensomeness is more strongly related to suicidal thoughts and behaviors than is thwarted belongingness, while the effect sizes for the interaction between these interpersonal factors in predicting suicidal ideation range from small to moderate (Chu et al., 2017). This latest review ultimately concluded that, while clearly a valuable frame through which to understand suicidality, the predictive ability of the ITS as currently specified may be no better than many other well-studied predictors of suicide risk, pointing to the need for further refinement.

Cero, Zuromski, Witte, Ribeiro, and Joiner (2015) speculate that the most plausible explanation for the observed inconsistencies in the evidence base is the existence of unspecified moderators that serve to amplify or attenuate the effects of the interpersonal factors across studies and samples. These authors suggest that demographic (e.g., age) and psychological moderators such as hopelessness should be priorities for future research. However, the recent large-scale meta-analysis by Chu et al. (2017) found limited support for the idea that hopelessness regarding the tractability of perceived burdensomeness and thwarted belongingness amplifies the relationship between these interpersonal factors and suicidal desire. Hence, perhaps a more critical direction for future research is to examine the potential role for life-sustaining moderators within the theory’s causal framework.

1.4 A Role for Life-Sustaining Factors

The realisation that focusing on risk factors alone has not yielded any appreciable decrease in the rate of suicide has led to calls for an extension beyond the assessment of risk factors towards aspects such as collaborating with the patient, social support mapping, and safety planning, providing a more nuanced and inclusive examination of the dynamics of risk and protection (Hawgood & De Leo, 2016; Mulder,
In the clinical domain, suicide risk management protocols have traditionally focused on the application of categorical risk assessment tools which often fail to adequately distinguish individuals who are likely to engage in suicidal behavior from those who are not (Mulder, 2011). However, more recent protocols focus more heavily on ascertaining the suicidal status of individuals through a collaborative and patient-centred process (Oquendo & Bernanke, 2017). Such protocols include the Collaborative Assessment and Management of Suicidality (CAMS; Jobes, 2006, 2016), the Chronological Assessment of Suicide Events (CASE; Shea, 2011), the Attempted Suicide Short Intervention Program (ASSIP; Michel & Gysin-Maillart, 2015), and the Screening Tool for Assessing Risk of Suicide (STARS; Hawgood & De Leo, 2015). These evidence-based approaches focus on mitigating risk and supporting growth and recovery, with the ultimate aim of enhancing the patients’ desire to continue living (Hawgood & De Leo, 2016).

While suicide risk factors are death-promoting, suicide protective factors are life-sustaining, enabling an individual to persist with living in the face of stress or adversity. Until fairly recently, a common view was that protective factors are simply the inverse of risk factors (Johnson et al., 2011). For instance, high levels of social support would be considered a protective factor, whereas low levels of social support would constitute a risk factor. Researchers adopting this approach would conclude that a factor is protective based on a negative bivariate correlation between that factor and suicidal outcomes. However, a more contemporary resilience-informed approach (i.e., the buffering hypothesis; Johnson et al., 2011) argues that protective factors exist on a separate dimension to risk and act to moderate the relationship between risk and suicidality. According to the buffering hypothesis, protective factors are inactive or irrelevant when adversity and risk factors are low, but under conditions of heightened risk and adversity they serve to buffer or attenuate the likelihood of suicidal outcomes.
This approach is arguably of critical import since it enables researchers and clinicians to focus on factors that can be independently enhanced to offset risk for suicide, complementing the focus on a direct amelioration of risk factors.

The notion that risk and protective factors exist on separate dimensions aligns with the World Health Organization’s definition of mental health as a positive state of psychological wellbeing that extends beyond the absence of disease (World Health Organization, 2005). Indeed, mounting evidence suggests that mental health and wellbeing cannot just be equated with an absence of illness (e.g., Fava & Tomba, 2009; Keyes, 2007). Measures of mental illness correlate (negatively) only modestly with measures of well-being (Ryff & Keyes, 1995) and only a small proportion of those without a diagnosed mental illness can be classified as flourishing (Keyes, 2005). Mental disorder and wellbeing therefore appear to be distinct constructs with distinct implications for human health and functioning. A complete picture of psychological status therefore requires a move beyond the traditional deficit-focused model; a shift that is equally relevant to suicide research.

Increasing evidence suggests that far from being driven by an overwhelming desire to end their own life, suicidal individuals are in fact deeply ambivalent and oscillate between desiring to live and desiring to die (Britton, 2015; Brown, Steer, Henriques, & Beck, 2005; Kovacs & Beck, 1977). According to the ambivalence model of suicide, it is the outcome of this internal struggle, rather than a single unidirectional motivation, that determines who will or will not die by suicide (Gutierrez, 2006). The idea that the suicidal mind is characterized by ambivalence is not new. Freud (1922) spoke about two opposing basic drives—life (Eros) and death (Thanatos)—that are in constant tension. Suicide, he posited, occurs when the death drive is turned inwards towards oneself, overcoming the drive for life. Similarly, Shneidman (1964) proposed that suicidal individuals wish to die and simultaneously wish to be rescued (so they can
continue living). He argued that in order for suicide to occur, death-promoting forces must “overcome the normal, ordinary, almost ubiquitous life-sustaining habits of our days” (Shneidman, 1996, p. 90).

Early support for the notion of suicidal ambivalence came from Kovacs and Beck (1977). In a study of patients hospitalized for a recent suicide attempt, they observed that when the wish to die was greater than the wish to live, the level of suicidal intent was more severe compared to when these coexisting forces were more evenly balanced. Conversely, when the desire to live was stronger than the desire to die, suicidal intent was minimal. This finding has been borne out in multiple studies. For instance, lower will to live has been shown to predict increased risk for suicidality above and beyond a desire for death (Brown, Steer, Henriques, & Beck, 2005; O’Connor et al., 2012) and lower ratings of favorability of life have been more closely associated with suicidal intent than higher ratings of favorability of death (Wetzel, 1975). Additionally, evidence suggests that implicit suicide-related cognitions may better reflect a diminished desire to live, rather than an elevated desire to die (Harrison, Stritzke, Fay, Ellison, & Hudaib, 2014). Thus, the evidence to date suggests that the will to live is not simply the inverse of the will to die. Instead, these are phenomena forming two related but distinct dimensions.

Viewing desire to live and desire to die as distinct dimensions may provide valuable insight into how life-sustaining resilience factors can be enhanced to offset risk for suicide. For instance, Kovacs and Beck (1977) suggest that establishing the magnitude of death and life wishes can provide an entry point into therapy with suicidal individuals, augmenting the clinician’s focus on the direct amelioration of risk. Treatments targeting a reduction in suicidality may also differentially impact these dimensions. Recent research programs have observed large reductions in suicidal behavior after relatively minor increases in the wish to live, suggesting that even a weak
wish to live may outweigh a strong desire to die (Bryan, Rudd, Peterson, Young-McCaughan, & Wertenberger, 2016). An emphasis on enhancing desire to live would be consistent with a motivational interviewing approach to suicide, where clinicians aim to increase motivation to live while reducing focus on motivators for death (Britton, 2015; Britton, Patrick, Wenzel, & Williams, 2011). A guiding principle here is that the suicidal individual has an underlying (though diminished) desire for life that is counterbalancing his or her desire for death (Britton, Williams, & Conner, 2008).

Fostering this inherent life force can therefore tip the decisional balance towards living and motivate a (re)connection with life.

Treating desire for life and desire for death as counterbalancing forces also implies that life-sustaining factors independently moderate or reduce the association between risk and suicidality. If this is the case, then any comprehensive theory of suicide needs to account for both dimensions to provide a clearer picture of suicide vulnerability and, by extension, enhance the effectiveness of preventative interventions. However, most contemporary theories of suicide, including the ITS, overlook factors that motivate a re-engagement with life in favour of risk factors that contribute to a desire for death. The current thesis addresses this gap in the literature by examining three candidate life-sustaining factors on the causal pathway to suicide. This research program first examines the effects of individual differences in a construct that reflects a strong orientation towards living, *zest for life*, before shifting to two related life-sustaining resilience factors, *meaning in life* and *mindful awareness*. Finally, a pathway to enhanced engagement with and zest for life is delineated, demonstrating how the innate human drive to pursue life over death may be harnessed in clinical settings to mitigate risk for suicidality. The following subsections aim to characterize the life-sustaining qualities of zest, meaning in life, and mindfulness in situations of adversity to provide context for the subsequent empirical chapters.
1.4.1 

Zest for Life

In the positive psychology literature, “zest for life” is a character strength reflecting a habitual approach to life with energy, excitement, and anticipation (Park, Peterson, & Seligman, 2004). Part of the broader virtue of courage, zest is considered necessary for effectively navigating life’s inevitable challenges and setbacks. The word courage derives from the Latin heart and, thus, zest can be said to increase one’s strength of heart to face rather than withdraw from difficulties (Seligman, Steen, Park, & Peterson, 2005). Indeed, one who possesses zest can even be energized by the prospect of challenging situations (Peterson, Ruch, Beermann, Park, & Seligman, 2007). Zest therefore involves a commitment to living life to the full, including a willingness to persist through difficult circumstances for the sake of valued goals.

In the current thesis, zest for life is conceptualized as a strong orientation towards living that manifests as a sense of engagement with, and positive outlook on, life. Zest for life has a parallel in the construct of vitality, defined as the psychological energy available to one’s ego or self (Ryan & Frederick, 1997). Distinct from physical energy, vitality is a conscious experience of “aliveness” or invigoration that is influenced by both physical (e.g., illness) and psychological (e.g., purpose in life) factors. Most western models view vitality as a finite resource that can be depleted by stressors (Baumeister & Vohs, 2007). Depletions in vitality are associated with poorer physical and mental health and reduced resilience in the face of stressors, whereas higher levels of vitality are associated with greater wellbeing and satisfaction with life (Ryan & Deci, 2008; Ryan & Frederick, 1997). Although conceptually similar, zest for life can be differentiated from vitality in its greater emphasis on excitement and anticipation about what life has to offer in the future.

A sense of future possibility is fundamental to one’s self concept and a powerful determinant of how one relates to the world in the present, including during experiences
of stress or adversity (Chang et al., 2016). Optimism, or a general confidence that good things will happen in the future, is a disposition that enables one to take advantage of all that life has to offer, even when current conditions are perceived to be threatening or aversive (Scheier, Carver, & Bridges, 1994). Higher optimism is associated with reduced suicide risk (Osman, 1998) and moderates the association between the experience of adversity and suicidal behavior (Davidson, Wingate, Slish, & Rasmus, 2010; Hirsch & Conner, 2006; Hirsch, Wolford, LaLonde, Brunk, & Morris, 2007). Similarly, the positive future-oriented construct of hope, defined as a determination to reach goals and the ability to make plans to meet those goals, is also associated with reduced risk for suicide across multiple samples (Chang et al., 2016; Davidson & Wingate, 2013; Davidson et al., 2010). Moreover, adaptive goal pursuit appears to be a critical factor in successful coping with the type of adversity implicated in suicidality (O’Connor, Fraser, Whyte, MacHale, & Masterton, 2009; O’Connor, O’Carroll, Ryan, & Smyth, 2012). Thus, the ability to maintain a positive future outlook is a fundamental characteristic of zestful individuals, enabling them to persist with life in the face of heightened risk and adversity.

In line with the ambivalence model that views suicide as the final outcome of a subjective battle between the desire to die and the desire to continue living (Kovacs & Beck, 1977), the current thesis argues that zest for life is a resilience factor that directly buffers against the onset of suicidal desire by attenuating the impact of proximal risk factors that contribute to the desire for death.

1.4.2 Meaning in Life

“Ever more people today have the means to live, but no meaning to live for”

Victor Frankl
Frankl (1946) argued that human beings possess an innate drive to seek meaning; that is, to make sense of their existence and to find a purpose or overarching mission in life. So innate, he claimed, that a failure to realize meaning will result in psychological distress and a diminished desire to continue living. An impressive body of empirical research has since accumulated in support of Frankl’s claim. Perceiving one’s life to be less meaningful is associated with a greater need for therapy (Battista & Almond, 1973), stress (Mascaro & Rosen, 2006), psychopathology (Debats, 1996; Debats, van der Lubbe, &s Wezeman, 1993) and suicidal behaviors (Kleiman & Beaver, 2013). Conversely, higher levels of meaning have been associated with greater self-reported quality of and satisfaction with life (Heisel & Flett, 2004; Krause, 2007), better physical health (Steger, Mann, Michels, & Cooper, 2009), easier occupational adjustment (Littman-Ovadia & Steger, 2010), and lower all-cause mortality (Boyle, Barnes, Buchman, & Bennett, 2009). Examining the salutary effects of meaning has also been a major focus in the field of positive psychology, with hundreds of studies now documenting the positive effects of meaning in life on wellbeing and flourishing (see Steger, 2017 for a review). This research clearly demonstrates that the presence of meaning is a life-sustaining aspect of human existence.

Pursuing valued goals and discovering the meaning of one’s life can be differentiated from the experience of positive emotions such as happiness, as reflected in the distinct philosophies of hedonism and eudemonism (Ryan & Deci, 2001). In the hedonistic tradition, satisfaction with life is seen to be a function of one’s pleasurable experiences and the relative absence of negative experiences (Peterson, Ruch, Beermann, Park, & Seligman, 2007). The hedonist is focused on achieving positive affective states and makes decisions largely on the basis of whether a particular action
will further pleasure while minimizing pain. The eudemonic tradition, by contrast, views life satisfaction as deriving from the actualization of human potential, or the realizing of one’s inner daimon (Ryan, Huta, & Deci, 2008). Those who pursue eudaimonic wellbeing strive to identify and cultivate virtues, focusing on the process of living well rather than on outcomes of happiness or pleasure. While one who pursues eudaimonic wellbeing is likely to experience hedonic enjoyment, not all hedonic enjoyment is derived from eudaimonic living (Kashdan & Steger, 2007). Similarly, one can experience eudaimonic wellbeing in the absence of hedonic pleasure (Ryan et al., 2008).

Given eudaimonic living involves actively striving for what is held to be worthwhile, an individual who possesses eudaimonic wellbeing can also be said to be meaningfully engaged with his or her life (Ryan et al., 2008). Eudaimonia occurs when life activities are congruent with deeply held values, even if this necessarily involves a degree of pain or hardship (Waterman, 1993). Indeed, actions guided and motivated by values are very often ones that require a willingness to experience a degree of unpleasantness or even pain (Hayes, Strosahl, & Wilson, 2011). As such, one can be meaningfully engaged with one’s life even in situations where hedonic pleasure is absent, such as during times of stress or adversity. In fact, perceptions of meaning appear to be an important factor underlying one’s ability to adapt to and cope with adverse life events.

To understand how meaning can enhance coping in the face of stress, it is helpful to differentiate between global meaning and the process of meaning making (Park, 2010). Global meaning refers to a set of goals, assumptions, beliefs, and expectations about the world that serve as an organizing principle for one’s experience (Park, 2010), providing a sense of coherence to what is otherwise disordered and incoherent (Heintzelman, Trent, & King, 2013). The term meaningfulness is often used
to refer to this global meaning and represents one’s sense of purpose, or the extent to which life is perceived to be directed and motivated by valued life goals, and the feeling that one’s life matters (George & Park, 2016; Steger, 2013). During stressful or traumatic events this global meaning can be threatened, leading to varying degrees of psychological distress. To cope with this threat, individuals engage in a process of meaning making whereby interpretations of a specific stressor are aligned with global meaning frameworks in an attempt to restore a sense of order and coherence. This is achieved either through deliberate efforts to understand the event in a different way, such as by making positive reappraisals, or by altering global belief systems (Park & George, 2013), enabling individuals to integrate these events into their broader life narratives (Lockman & Servaty-Seib, 2016). Recent experimental evidence suggests that this tendency for meaning making is so deeply ingrained that even the anticipation of future negative events motivates a search for meaning (Park & Baumeister, 2017). This natural propensity for meaning making enables individuals to adapt to and cope with otherwise traumatic events, enhancing resilience and recovery (Henry et al., 2010; Park, 2010; Park & Folkman, 1997).

The positive influence of perceived meaning on stress coping is particularly pertinent to the problem of suicide. Frankl (1946) documented the role of meaning in life in preventing despair, hopelessness, and desire for suicide among his fellow prisoners in Nazi concentration camps. Similarly, Von Andics (1947) reported that a lack of meaning was strongly predictive of suicidality in post-war Austria. Subsequent empirical research has shown that meaning in life moderates the association between risk factors such as dysfunctional coping styles (Edwards & Holden, 2001) and depression (Heisel & Flett, 2004) and suicidality. Higher meaning in life also predicts lower levels of suicidal ideation over time in older adults, above and beyond the variance explained by risk factors such as depression and demographic variables such as
age and gender (Heisel & Flett, 2015; Heisel, Neufeld, & Flett, 2016). However, the
causal effects of meaning-making interventions in enhancing perceptions of
meaningfulness and the associated resilience-conferring effects of these perceptions
against suicide risk factors has yet to be examined. The current thesis therefore aims to
test the buffering effects of an experimental meaning-making intervention against the
proximal risk factors for suicidal desire identified by the ITS.

1.4.3 Mindfulness

“Meditation is not an escape from life but preparation for really being in life”

Thich Nhat Hanh

Mindfulness is an attribute of consciousness that has a powerful impact on one’s
experience of life in the present. Originating in Eastern spiritual traditions, mindfulness
has attracted increasing interest in contemporary psychological science due to its
positive impact on processes relevant to human health and wellbeing (see Brown &
Multiple definitions of mindfulness exist in the literature, however there is broad
consensus that non-judgmental openness and acceptance are core characteristics
(Dimidjian & Linehan, 2003). In the current thesis, mindfulness is defined as an ongoing, receptive and non-judgmental awareness of present-moment experience. It has
been argued that this type of awareness is an inherently human quality that is active to
varying degrees throughout our waking hours (Kabat-Zinn, 1990). Of import for its
current application, it is also a quality that can be enhanced or cultivated with practice
(Cohen, Jensen, Stange, Neuberger, & Heimberg, 2017; Shoham, Goldstein, Oren,
Spivak, & Bernstein, 2017).

Mindfulness can be cultivated by repeatedly directing one’s full attention to
whatever is occurring in the present moment (Segal, Williams, & Teasdale, 2002). In
doing so, one becomes more in touch with one’s life as it unfolds, given life events occur only in the present (Hayes et al., 2011). The default mode of the human mind can be likened to an automatic pilot that deploys attention haphazardly or selectively (Kabat-Zinn, 1990; Mason et al., 2007). As a result, many aspects of our experience are taken for granted or pass by unnoticed. Mindfulness provides a framework for remaining fully present to whatever is being experienced in the here-and-now, enabling one to see past the filter of automatic thoughts and emotions to a deeper actuality; a state that is characterized by clarity, vividness, and flexibility (Brown & Ryan, 2003). It is not, as is often misconstrued, an act of clearing the mind of all thought, but rather a “de-coupling” of consciousness and cognitive content that facilitates a deeper level of engagement with life (Brown et al., 2007).

An inevitable consequence of fully embracing life as it unfolds in the present is that one will encounter a degree of physical and psychological pain. Indeed, difficulty of this kind is one of the hallmarks of a life lived to the full (Hayes et al., 2011). Human beings are naturally motivated to avoid what is perceived to be unpleasant or threatening, but in doing so we are often forced to disengage from activities and situations that help to make life rich and satisfying (Baer, 2015; Kashdan & Steger, 2007). Mindfulness, on the other hand, involves an openness to or willingness to have these experiences as they are rather than attempting to escape, suppress, or avoid them (Hayes et al., 2011). In this new attentional mode, individuals learn to view their thoughts, emotions, and physical sensations as passing phenomena rather than necessarily accurate reflections of reality or enduring characteristics of the self (Baer, 2003). Seeing these phenomena as transient also means that one can more easily accept them as non-threatening aspects of one’s experience in the present. It is this ability to accept experiences as they are that is thought to underpin many of the salutary effects of mindfulness on psychological wellbeing (Brown et al., 2007).
In addition to enhancing contact with life as it unfolds in the present, mindful awareness also lays a foundation for increased vitality, energy, and wellbeing through the self-regulation of behavior. In adopting a mindful mode of processing, arguably one is better positioned to make choices that are in line with one’s needs, values, and interests (Crane, Barnhofer, Hargus, Amarasinghe, & Winder, 2010; Hayes et al., 2011). A large body of literature shows the meeting of fundamental needs, such as those for autonomy, competence, and relatedness, leads to enhanced vitality and wellbeing (Deci & Ryan, 2000; Ryan & Deci, 2000). One could argue that the satisfaction of these needs in fact constitutes the opposite of the interpersonal factors of the ITS, where diminished feelings of competence and relatedness are proposed to contribute to an increased desire for death via suicide (c.f., Tucker & Wingate, 2014). Further, mindfulness enables greater connection with the aspects of life that one finds most meaningful and rewarding, given the enhanced psychological flexibility afforded by mindfulness means one is better able to step back from the stressors of daily life and re-connect with important personal goals and values (Crane et al., 2010; Crane, Winder, Hargus, Amarasinghe, & Barnhofer, 2012; Levin, Hildebrandt, Lillis, & Hayes, 2012).

Mindfulness is a life-enhancing attribute of consciousness that can be increased with practice, making it a natural candidate for suicide prevention. However, there is currently sparse literature examining the application of mindfulness training for this purpose. To address this, the current research program aims to investigate whether mindful awareness can mitigate the impact of proximal interpersonal risk factors for suicide and whether the mechanism underpinning these protective effects may be an enhanced sense of engagement with life. The effect of a mindfulness induction administered prior to, and during, the experience of interpersonal adversity is first tested to establish the buffering qualities of this life-sustaining resilience factor. A longitudinal research design is then used to examine whether the protective effects of mindfulness on
suicidal desire can be explained by increased zest for life under conditions of heightened risk and adversity.

1.5 An Experimental Analogue

A fundamental limitation of suicide research to date has been an inability to establish the causal nature of key risk factors, including the proximal role of perceived burdensomeness and thwarted belongingness specified by the ITS. To date, the theory has relied on the assumption that these risk factors are indicators of underlying causal processes. This has yielded important data about the relevance of these factors to suicidality and, as noted by the developers of the theory, is “a stepping-stone to the construction of etiological models” (Van Orden et al., 2010, p. 576). However, to realize etiological models that are meaningful and useful for the purposes of suicide prevention, it is necessary to ascertain that these interpersonal factors have the type of causal effects predicted by the theory.

Laboratory-based experimental methodologies are a valuable means of testing etiological claims made by theory. Historically, experimental and correlational approaches have been viewed as diametrically opposed due to the inevitable trade-off between external validity and experimental control (Cronbach, 1957). However, unifying these lines of enquiry may in fact enhance understanding. Experimental methodologies allow variables of interest to be manipulated in highly controlled conditions, enabling inferences about the causal effects of these variables on measured outcomes. While this level of control is simply not possible outside of a laboratory environment (Levin et al., 2012), it inevitably comes at the expense of external validity. That is, the extent to which the observed effects can be generalized to real-world conditions remains unclear. Correlational research, by contrast, allows psychological variables to be measured outside of the laboratory, capturing a broader range of the
variability inherent in human experience (Eysenck, 1997). Thus, what the correlational approach lacks in experimental control, it makes up for in external validity. When combined, these approaches provide unique perspectives on the same research question, increasing confidence in the effects under observation (Cronbach, 1957; Levin et al., 2012). For this reason, Eysenck (1997) regarded the unification of experimental (lab-based) and correlational (naturalistic) approaches as one of the most important tasks in contemporary psychology.

The experimental method may be particularly valuable within the field of suicide research. O’Connor and Nock (2014) argue that basic-science experimentation is crucial to advancing our understanding of the mechanisms underlying suicidal behavior and that the testing of theoretical models using such methods should be the rule rather than the exception. However, there is currently a dearth of experimental research in the suicide literature. This is in large part a consequence of the obvious safety concerns when examining variables causally implicated in suicidal behavior. To date the typical approach has been to avoid the use of experimental designs in higher risk populations rather than designing safety protocols that adequately address this risk in such samples. Nevertheless, when designed and implemented with care and precision, analogue research can be a safe and powerful means of testing putative causal relationships (Borkovec & Rachman, 1979; Chu et al., 2017). Within the context of the ITS, the development of behavioral proxies designed to test the effects of the interpersonal factors on suicide-relevant outcomes has been highlighted as an important avenue for research (Chu et al., 2017). Such an approach would not only enable the direct effects of the interpersonal factors to be tested, but would also allow for a more proximal (as opposed to distal) examination of risk, consistent with the original predictions of the theory. Following this line of enquiry, the first chapter in the current
thesis develops a novel experimental analogue paradigm to test the causal effects of two key ITS constructs.

Experimental methodologies are also pertinent to the study of life-sustaining factors that may offset risk for suicide. It has been argued that in order to fully test the buffering or resilience-enhancing qualities of protective factors one must demonstrate that the putative factor has a moderating effect, rather than a simple inverse association with negative outcomes such as suicidality (Johnson et al., 2010, 2011). Moderation effects clearly demonstrate that the protective factor in question exists on a separate dimension to risk and serves to attenuate the association between risk and outcome. Given the lack of clarity concerning the directionality of the effects observed in correlational designs, experimental methods provide a valuable opportunity for demonstrating the causal influence of protective factors in situations of risk and adversity. Moreover, in a clinically-focused context, such methodologies also provide a valuable tool for testing potential mechanisms of suicide prevention treatments, including those focused on enhancing resilience. The study of hypothesized mechanisms of action is another area that has received relatively limited research attention to date and is one that is arguably crucial for the further advancement of the field (O’Connor & Nock, 2014).

1.6 Thesis Aims and Chapter Outline

The primary aims of the present thesis were to first test the causal effects of two proximal risk factors for suicidal desire—perceived burdensomeness and thwarted belongingness—using a novel experimental paradigm, and second to identify life sustaining factors that may attenuate their impact. This empirical grounding is then used to inform a theoretical framework articulating how engagement with life can be enhanced to offset risk for suicidality, complementing traditional treatment approaches
that attempt to directly modify or ameliorate suicide risk factors. The scope of the present research program was limited to the effects of perceived burdensomeness and thwarted belongingness for several reasons. As outlined in Chapter 2, the dynamic nature of these constructs means they are particularly suited to manipulation in a laboratory setting. They are also prime targets for treatments seeking a reduction in suicidality (Stellrecht et al., 2006). Given the onset of first suicide attempts are unpredictable, it has been suggested that one important target for prevention efforts is at the point of ideation (Kessler, Borges, & Walters, 1999; O’Connor & Nock, 2014). Interventions implemented early in the ideation-to-action trajectory (Klonsky et al., 2016) may reduce the impact of factors posited to cause the development of suicidal states, providing an effective means of mitigating the likelihood of suicidality (O’Connor & Nock, 2014; Van Orden, Bamonti, King, & Duberstein, 2012). These interventions would presumably also be relevant following a suicide attempt in reducing the impact of the interpersonal factors on subsequent attempts. Hence, a focus on perceived burdensomeness and thwarted belongingness as proximal precipitants of suicidal desire would appear warranted.

The manner in which the above aims are to be achieved in the current research program is outlined as follows:

**Chapter 2** develops an experimental analogue task to test a core hypothesis of the ITS: that the joint presence of perceived burdensomeness and thwarted belongingness increases desire to escape and reduces persistence in the face of interpersonal adversity. When fundamental human needs for competence (c.f., perceived burdensomeness) and relatedness (c.f., thwarted belongingness) are blocked, mental health, wellbeing and performance decline (Deci & Ryan, 2000; Ryan & Deci, 2000), and self-defeating behaviors including suicidality increase (Tucker & Wingate, 2014; Van Orden et al., 2010). Thus, a decline in willingness to persist in the face of
interpersonal adversity is a potential, although obviously not sufficient, antecedent to suicide risk. Study one tests whether experimentally heightened perceived burdensomeness and thwarted belongingness has a deleterious effect on persistence within the context of a team task. Acknowledging a role for life-sustaining factors on the causal pathway to suicide, this study also examines whether higher levels of zest for life attenuates the impact of interpersonal adversity on willingness to persist. Then, moving beyond pre-existing individual differences in resilience, the second study presented in Chapter 2 tests whether inducing a state of mindfulness prior to the experimental task can mitigate the deleterious effects of perceived burdensomeness and thwarted belongingness on our proxy behavioral outcome. The studies presented in Chapter 2 have been published:


In Chapter 3, the idea that resilience as conferred by mindfulness can be trained is taken a step further. The study presented here investigates the protective effects of a mindfulness intervention delivered once perceived burdensomeness and thwarted belongingness are already experimentally heightened, an important step towards confirming the utility of mindfulness-based strategies as an intervention to reduce the likelihood of suicidality when risk is elevated. The study presented in Chapter 3 has been published:


**Chapter 4** examines the interrelationships among mindfulness, zest for life, and suicidal desire outside of the laboratory using a longitudinal survey design. The study presented in this chapter investigates whether mindful awareness protects against future suicidal desire indirectly by increasing zest for life under conditions of heightened risk and adversity. The study presented in Chapter 4 has been published:


**Chapter 5** shifts focus to a third life-sustaining resilience factor, perceived meaning. The drive to seek meaning is an inherently human characteristic and thus may be a critical factor underlying willingness to persist with life in the face of adversity. The study presented here tests whether experimentally manipulated perceptions of meaning buffer the impact of perceived burdensomeness and thwarted belongingness on task persistence relative to conditions where these interpersonal factors are not induced. Perceptions of meaningfulness are manipulated using a charity-based intervention delivered prior to the experimental task. The study presented in Chapter 5 has been submitted for publication:

The General Discussion (Chapter 6) reviews the findings of the preceding empirical chapters and describes a theoretical framework to explain how mindfulness may buffer against proximal suicide risk factors by enhancing meaningful engagement with life. This model suggests that contemporary theories of suicide, including the ITS, should be expanded to account for life-sustaining factors and their dynamic role relative to heightened risk. It also provides a template for treatments targeting an increase in suicide resilience and suggests avenues for future research that may further advance our understanding of the causal processes underlying suicide and ultimately lead to more effective prevention.
1.7 References


Chang, E. C., Martos, T., Sallay, V., Chang, O. D., Wright, K. M., Najarian, A. S.-M.,
& Lee, J. (2016). Examining optimism and hope as protective factors of suicide
risk in Hungarian college students: Is risk highest among those lacking positive
https://doi.org/10.1007/s10608-016-9810-0

resilience factors into the interpersonal theory of suicide: The role of hope and
self-forgiveness in an older adult sample. *Journal of Clinical Psychology*, 72(1),
58–69. https://doi.org/10.1002/jclp.22230

Predictors of the risk factors for suicide identified by the interpersonal-
297. https://doi.org/10.1016/j.psychres.2014.05.029

Interpersonal Theory of Suicide in a large community-based cohort. *Journal of

review and meta-analysis of a decade of cross-national research. *Psychological

immediate and long-term effects of an intensive meditation retreat. *Mindfulness*,

among individuals with opiate dependence: The critical role of belonging.
Addictive Behaviors, 32(7), 1395–1404.
https://doi.org/10.1016/j.addbeh.2006.09.012


https://doi.org/10.3109/00048674.2011.594786

https://doi.org/10.1080/15374416.2012.652001

Nock, M. K. (2016). Recent and needed advances in the understanding, prediction, and prevention of suicidal behavior. *Depression and Anxiety, 33*(6), 460–463.
https://doi.org/10.1002/da.22528

https://doi.org/10.1093/epirev/mxn002

https://doi.org/10.1016/j.brat.2008.11.001


https://doi.org/10.1016/j.jad.2012.04.035


and Hong Kong. *Journal of Affective Disorders, 211*, 12–19.

https://doi.org/10.1016/j.jad.2017.01.007


https://doi.org/10.1016/j.jpsychores.2009.02.006


https://doi.org/10.1080/13811118.2013.824839


Chapter 2  

Testing the Causal Effects of Risk and Resilience Factors

Research over the past 50 years has yielded important insights into the various correlates of suicidal thoughts and behaviors, yet far less is known about how these factors interact to motivate or mitigate suicidality. The two studies presented in the current chapter provide greater insight into the dynamic processes underpinning suicide by examining (1) the causal effects of experimentally-induced perceived burdensomeness and thwarted belongingness on a suicide-relevant analogue outcome; (2) the moderating effects of pre-existing differences in zest for life, a candidate resilience factor; (3) the temporal qualities of the resilience conferred by zest for life; and (4) the protective effects of manipulated resilience in the form of mindful awareness.

As outlined in Chapter 1, a number of ethical and practical obstacles have hindered the validation of etiological models that attempt to explain the emergence of suicidal behavior across individuals. The ITS is a leading contemporary theory that purports to explain the causal processes underpinning suicidal desire and how that desire transitions into lethal or near lethal suicidal behavior. To date, however, support for one of the theory’s central hypotheses—that the joint presence of perceived burdensomeness and thwarted belongingness is a proximal precursor to suicidal desire—has come almost exclusively from studies using cross-sectional designs, meaning the causal effects of these interpersonal factors remains untested. The experiments described in this chapter take an important step towards overcoming this limitation by temporarily inducing perceived burdensomeness and thwarted belongingness in the laboratory. The control afforded by experimental designs enables the rigorous testing of causal hypotheses, making them powerful allies in the

A second important focus of the current chapter is examining a potential role for life-sustaining resilience within the framework of the ITS. Simulating the effects of interpersonal adversity in the laboratory provides a prime opportunity to safely test moderating factors that may attenuate the impact of putative causal risk factors. A growing body of literature suggests that resilience factors play an important role in the aetiology of suicidal behavior through their life-sustaining influence in situations of stress and adversity (Johnson, Wood, Gooding, Taylor, & Tarrier, 2011). To examine a potential role for life-sustaining factors on the causal pathway to suicide, the first study in this chapter tests the moderating effects of individual differences in zest for life, a resilience factor that is posited to buffer the impact of proximal interpersonal factors on the desire for death. Identifying the presence of moderating factors would increase the specificity of the ITS’s causal predictions and enhance its clinical utility.

A third focus of the current chapter is the temporal qualities of the resilience conferred by zest for life. As outlined later in this chapter, the term resilience can imply an ability to withstand stress and adversity without any observable impact on functioning (analogous to immunity in somatic health) or an ability to rebound after initially succumbing to the effects of these stressors (see Davydov, Stewart, Ritchie, & Chaudieu, 2010 for a detailed review). The laboratory paradigm developed in the current chapter provides a unique opportunity to investigate the temporal profile of resilience as an important counterbalance to risk, given data can be collected repeatedly across the span of the experimental task. Elucidating these temporal qualities may lend important insights into
the nature of suicide resilience and inform clinical assessment and treatment. At a theoretical level, determining the temporal profile of the buffering effects of zest would help to hone predictions concerning the effects of the ITS’s proximal risk factors, since life-sustaining factors are proposed to attenuate the impact of these causal factors on suicidality. At a practical level, knowing whether the resilience conferred by zest is akin to the immunity response in physical health (i.e., an immediate and sustained buffering effect) or is an emergent quality that is more relevant over longer timeframes may help clinicians to more effectively manage the suicidal status of their patients (cf., Jobes, 2016).

The fourth focus of the current chapter is the manipulation of resilience within the context of interpersonal adversity. Testing the resilience conferred by zest for life at an individual-difference level is an important first step in establishing that this life-sustaining factor has the desired buffering qualities against the proximal interpersonal factors identified by the ITS. However, of arguably even greater importance is establishing how resilience can be enhanced to protect against suicidality irrespective of pre-existing factors such as zest for life. Recent conceptualisations view resilience as a dynamic and multidimensional process that unfolds over time (Amstadter, Myers, & Kendler, 2014; Chmitorz et al., 2018), implying that it can be modified with treatment (Chmitorz et al., 2018; Connor & Davidson, 2003). The literature also suggests that developing resilience does not require skills or resources that are out of the ordinary, but instead relies on intrinsic adaptive systems such as the capacity for self-regulation and meaning-making (Masten, 2009).

Clinical psychology has traditionally focused on the amelioration of negative characteristics to treat psychopathology, such as the distorted cognitions and avoidance
behaviors implicated in depression and anxiety (Wood & Tarrier, 2010). Although undoubtedly valuable, this approach neglects one half of the equation given an absence of positive life characteristics, in addition to the presence of negative characteristics, may be causally implicated in the aetiology of psychological disorder. For example, both optimism (Brissette, Scheier, & Carver, 2002) and gratitude (Wood, Maltby, Gillett, Linley, & Joseph, 2008) prospectively predict lower levels of stress and depression over time. The absence of positive characteristics has also been shown to predict the onset of future depressive episodes above and beyond factors such as previous and current depression, neuroticism, and physical illness (Wood & Joseph, 2010). Thus, these positive factors would appear to be not merely correlates of psychological distress, but causal factors contributing to disorder. With this emerging evidence base has come calls for a more balanced approach to psychopathology focusing on both the positive and negative aspects of human experience in order to increase the efficacy of psychological treatments (e.g., Waugh & Koster, 2015; Wood & Tarrier, 2010).

Enhancing resilience is increasingly a focus in the treatment of depression where it is suggested that individuals who increase their capacity to handle stress and reconnect with positive emotions are less likely to experience future depressive episodes (Dunn, 2012; Waugh & Koster, 2015). This approach assumes that individuals who have experienced depression are deficient in resilience, rather than lacking resilience as a stable characteristic, and it is this deficiency that makes them vulnerable to relapse. Training in qualities such as mindfulness (Davis & Hayes, 2011) and positivity (Fava, Ruini, Rafanelli, & Finos, 2004) may help to resolve this deficiency and in doing so reduce the likelihood of
depressive relapse. Resilience training therefore provides an opportunity to enhance clinical outcomes (Dunn, 2012; Fava & Tomba, 2009; Waugh & Koster, 2015).

Within the context of suicide prevention, resilience training could be used to establish a protective barrier that buffers the impact of risk and adversity on suicidal outcomes. Interventions promoting resilience in individuals who are not currently suicidal may reduce the impact of future life stressors on suicide risk, averting the need for more intensive clinical treatments. Indeed, evidence-based early intervention is a critical feature of effective prevention that enables vulnerable individuals, including those who may not otherwise have contact with the healthcare system, to be reached prior to a suicidal crisis occurring (Mann et al., 2005; Sinyor, Tse, & Pirkis, 2017; Torok, Calear, Shand, & Christensen, 2016; World Health Organization, 2010). Moreover, like a resilience-oriented approach to treating depressive relapse, preventive interventions may also be valuable for previously suicidal individuals whose suicidal crises have remitted but who remain vulnerable to future episodes.

Chapter 1 identified mindful awareness as a life-sustaining attribute of consciousness that may be pertinent to suicide prevention. Mindfulness has been associated with decreased suicide risk in several cross-sectional studies (Anastasiades, Kapoor, Wootten, & Lamis, 2016; Buitron, Hill, & Pettit, 2017; Lamis & Dvorak, 2013; Shorey et al., 2016) and is featured in some clinical interventions shown to mitigate suicidality (e.g., Barnhofer et al., 2015; Linehan et al., 2015). However, the causal effect of mindfulness training in promoting resilience against suicide risk has yet to be examined. To test whether training in mindfulness may confer an acute form of resilience that buffers against the interpersonal factors of the ITS, Study 2 uses a brief mindfulness induction administered
prior to the experimental task. This study is the first to examine a mindfulness-based preventative intervention delivered prior to the experience of the type of interpersonal adversity implicated in the onset of suicidal desire.

The studies presented in this chapter have been published:


http://doi.org/10.1037/abn0000167
2.1 Abstract

Suicide research can be enhanced by an ability to safely manipulate putative causal variables. The present studies developed an experimental task to modify risk factors identified by the interpersonal theory of suicide (perceived burdensomeness and thwarted belongingness) and examine their hypothesized suppressive effect on persistence in adversity in undergraduate university students. Variables that may moderate the impact of these risk factors on persistence (zest for life and mindful awareness) were incorporated as potential resilience factors. Study 1 ($N = 92$) found elevated burdensomeness and diminished belongingness significantly impaired persistence. Additionally, these predicted effects were moderated by individual differences in zest for life. In Study 2 ($N = 52$), individuals trained in mindfulness prior to the experimental task displayed greater persistence relative to controls. Findings provide experimental support for the role of perceived burdensomeness and thwarted belongingness in the manner predicted by the interpersonal theory, and demonstrate a way to experimentally test the effects of resilience factors that reduce the impact of these interpersonal factors.
2.2  Introduction

Suicide is a leading cause of death worldwide (World Health Organization, 2014). Factors that increase the risk of suicidal behavior include previous suicide attempts, social isolation, psychiatric illness, hopelessness, unemployment, and family conflict (Chu et al., 2015; Verona et al., 2001), and demographic factors such as being male, belonging to a lower socio-economic group, and being unmarried or divorced (Nock et al., 2008). The interpersonal theory of suicide (Joiner, 2005; Van Orden et al., 2010) provides a causal framework whereby many of these risk factors are thought to influence three key interpersonal constructs underlying proximal risk for suicidal behavior. According to the theory, suicidal desire arises when two fundamental human needs are thwarted: the need to belong (i.e., thwarted belongingness); and the need to contribute, manifesting as a perception that one is a burden on others (i.e., perceived burdensomeness). The theory also posits that to act on this desire one must have acquired the capability for suicide (i.e., acquired capability) by habituating to physical pain and the fear of death. These three constructs are associated with higher risk for suicidal behavior beyond other well-established risk factors (Cero, Zuromski, Witte, Ribeiro, & Joiner, 2015; Christensen, Batterham, Mackinnon, Donker, & Soubelet, 2014; Van Orden, Witte, Gordon, Bender, & Joiner, 2008).

Despite substantial empirical support, evidence for the interpersonal theory to date has two important limitations. First, there is little experimental evidence examining the effects of manipulating its causal constructs. Second, the interpersonal theory, like all theories of suicide (O’Connor & Nock, 2014), focuses more on causal risk factors than on resilience factors that could mitigate the influence of these proximal risk factors on
suicidality. One way to overcome the first limitation is through the use of an experimental task designed to manipulate perceived burdensomeness and thwarted belongingness and measure persistence or behavioral tolerance in the face of these interpersonal factors, with the former being potential, though not sufficient, antecedents of suicide risk. Unlike acquired capability, these interpersonal risk factors vary over time and context and hence are potential candidates for manipulation in a laboratory setting.

Our theoretical rationale for this experimental task follows two lines of reasoning. First, the idea that suicide is the most salient means of escaping a life that is deemed intolerable is reflected in a number of prominent theories of suicide. For instance, Baumeister's (1990) escape theory posits that the primary motivation for suicide is to escape from painful self-awareness. Similarly, O'Connor's (2011) Integrated Motivational-Volitional Model of Suicidal Behaviour proposes that defeat and humiliation appraisals give rise to feelings of entrapment, the solution to which is perceived to be escape via suicide. Thus, the desire to escape a situation that has the potential to be appraised as defeating is one important theme. Second, according to Van Orden et al. (2010), suicidality arises when one feels a burden on and lacks meaningful connections to others. Within the context of the interpersonal theory, not giving in to suicidal desire and persisting in the face of interpersonal adversity both require an interpersonal resilience. Thus, a second theme for our experimental task was persistence in the face of interpersonal adversity experienced as experimentally induced burdensomeness and diminished belongingness within the context of a team task. Thwarted satisfaction of the fundamental needs for competence and relatedness negatively impact on mental health, ongoing persistence and performance, and can motivate various self-defeating behaviors (Deci & Ryan, 2000) including suicide (Van
Ordin et al., 2010). Whilst not sufficient, a decline in persistence is a potential antecedent of suicide risk, and the current studies aim to test if, as predicted by the interpersonal theory of suicide, experimentally induced feelings of burdensomeness and thwarted belongingness decrease persistence and increase the desire to escape in the face of this interpersonal adversity.

In addition to a lack of experimental evidence, a second limitation of suicide research has been its relative neglect of protective or resiliency factors (Kleiman & Beaver, 2013; Klonsky & May, 2015; O’Connor & Nock, 2014). According to the buffering hypothesis (Johnson, Wood, Gooding, Taylor, & Tarrier, 2011), accounting for risk factors alone is insufficient, as suicidal individuals will also have varying degrees of resilience. Rather than representing simply the inverse of risk, factors that confer resilience are proposed to exist on a separate dimension and serve to attenuate the relationship between risk and suicidality. Arguably, only individuals who are both high on risk and low on resilience are likely to engage in suicidal behavior. If resilience does attenuate the relationship between risk and suicidality, accounting for factors that confer resilience may maximize the specificity of any predictive model. To examine a potential role for resilience within the framework of the interpersonal theory, the current studies account for individual differences in one potential suicide resilience factor; zest for life. In Study 1 we examine whether trait-level zest confers resilience against deficits in persistence caused by elevated perceived burdensomeness and thwarted belongingness. In Study 2 we examine whether training in a specific attention regulation strategy confers an acute form of resilience that increases persistence in the face of interpersonal adversity, irrespective of whether an individual is high or low on pre-existing resilience, such as zest for life.
2.3 Study 1

“Zest for life” represents a will to live that manifests as a sense of engagement with and positive outlook on life. These characteristics have been associated with greater life satisfaction (Park, Peterson, & Seligman, 2004) and lower suicidal ideation (Harrison, Stritzke, Fay, Ellison, & Hudaib, 2014). The notion that zest for life must be overcome in order for one to act on one’s desire for death is already implicit in the interpersonal theory, where it is suggested that perceived burdensomeness and thwarted belongingness may deplete the desire to embrace life over time (Joiner, 2005). Similarly, Shneidman (1996) argued that death-promoting and life-sustaining forces coexist and that the former must overcome the latter. Indeed, there is growing evidence to suggest that life-oriented factors influence the relationship between suicide risk and resilience (e.g., Brown, Steer, Henriques, & Beck, 2005; Harris, McLean, Sheffield, & Jobes, 2010; Harrison et al., 2014; Kleiman & Beaver, 2013; O’Connor et al., 2012). Thus, zest for life may act as a counterbalancing resilience factor that protects against the life-depleting effects of perceived burdensomeness and thwarted belongingness.

While resilience is often viewed as a set of attributes that confer immunity to stressors (Davydov et al., 2010), recent literature suggests that the relationship between risk and resilience over time may be multi-faceted. Specifically, resilience may comprise both an ability to tolerate a greater degree of aversive experience without impact on psychological wellbeing (i.e., a buffering factor), and an ability to bounce back following emotional and psychological distress (i.e., an adaptive capacity; Davydov et al., 2010; Tugade & Fredrickson, 2004). So as well as the ability to maintain wellbeing in the face of adversity, resilient individuals may also be better able to regain it once it is diminished.
Thus, a further aim of the current study was to elucidate these potential different facets of resilience over time.

To achieve the current aims we selected from a sample of university students individuals who were high or low on the proposed suicide resilience factor; zest for life. While university student samples are high functioning, a significant proportion report a history of suicide related behaviors (Bauer, Chesin, & Jeglic, 2014; George, Page, Hooke, & Stritzke, 2016), and this vulnerability indicates that they are pertinent to the study of suicide risk. We then developed a computerized multi-player team task to induce high or low levels of perceived burdensomeness and thwarted belongingness (PB-TB) and measure their effects on self-reported desire to quit the task, our operationalization of persistence in the face of interpersonal adversity. Given the interpersonal theory posits that the desire to escape from interpersonal adversity arises most strongly when perceived burdensomeness and thwarted belongingness co-exist (Van Orden et al., 2010), we predicted that the dual induction of these constructs would result in greater impairment in persistence relative to a low PB-TB condition where neither was induced.

Guided by the buffering hypothesis and the potential multi-faceted nature of resilience, we identified three possibilities for protective effects of zest for life within the high PB-TB condition. First, individuals scoring higher on zest may rate consistently lower desire to quit across time compared to individuals scoring lower on zest. Consistent with a multi-faceted view of resilience, a second possibility is that we may observe both an initial buffering and then an adaptive capacity emerging across time. Specifically, high zest individuals may rate lower desire to quit initially (i.e., a buffering) but subsequently increase their desire to quit to match low zest individuals as they also succumb to the
sustained experience of heightened perceived burdensomeness and thwarted belongingness. 
However, in the latter stages of the task, high zest individuals may adapt to this aversive 
experience and again display an increase in persistence relative to low zest individuals (i.e., 
an adaptive capacity). Finally, a third possibility was that we would observe no buffering 
but instead an adaptive capacity during the latter stages of the task.

2.4 Method

Participants

Ninety-two undergraduate psychology students (\(M_{\text{age}} = 19.84\) years, \(SD = 6.01\), 66% female) scoring in the top and bottom 15% of the distribution on a measure assessing zest 
for life participated and received course credit. The high and low zest participants were 
then randomly assigned to either a high or low PB-TB condition. All procedures were 
approved by the University’s Human Research Ethics Committee.

Experimental Task and Procedure

The Interpersonal Persistence Task is a three-player task that requires participants to 
judge whether two shapes presented randomly on screen are alike or different as quickly 
and as accurately as possible. Participants are informed that one point is awarded for a rapid 
and correct response and one point deducted for a slow or incorrect response. The aim of 
the task is to score as many points as possible, with points won and lost as an individual 
also going towards a cumulative team total. As a team, players are aiming to beat a target 
score which they are told is based on the average scores of previous teams who have 
completed the task in the past. Participants receive on-screen instructions and are given the
opportunity to play a practice round prior to the main task. Perceived burdensomeness and thwarted belongingness are simultaneously induced using two manipulations.

**Manipulation of Burdensomeness.** Perceived burdensomeness is induced using performance feedback delivered after each round via a feedback table showing participants their own points won and lost, the points won and lost by their teammates, and the team target score. However, the scoring parameters of individual players are manipulated to ensure that participants in the high PB-TB condition always score significantly lower than their teammates (i.e., a 40% success rate), while those in the low PB-TB condition always score equal to or better than their teammates (i.e., a 60% success rate). Thus, participants in the high PB-TB condition are encouraged to perceive they are not effectively contributing to their team’s performance and are therefore a burden on their fellow players.

**Manipulation of Belongingness.** Thwarted belongingness is induced using interpersonal feedback statements. Participants are told they are playing with two fellow students, one in the room opposite and one in a laboratory down the hall. However, in reality these ‘co-players’ are both computer-controlled. To increase the plausibility that ‘co-players’ are fellow students, other participants are tested concurrently in adjacent computer booths, or otherwise a confederate of the researcher plays the part of a fellow participant. At six time points participants are given the opportunity to type a brief message to each ‘co-player’. They are told prior to commencement that this feedback can enhance team performance. Once participants have typed their own feedback messages they receive pre-generated statements from their computer-controlled ‘co-players’. In the high PB-TB condition these statements are increasingly critical and impatient (consistent with their continued decline in performance), while in the low PB-TB condition the statements are
praising and supportive (consistent with their high performance). Thus, participants in the high PB-TB condition are encouraged to feel as though they are not valued by their teammates and therefore do not belong in the team.

The task runs for six blocks, each comprising three rounds of five trials. After each of the six blocks participants are asked to rate the extent to which they feel they are a burden on the team (burdensomeness), the extent to which their teammates make them feel like they belong in the team (belongingness), and their current desire to drop out of the task (persistence). Responses are made on a Likert scale ranging from 0 (not at all true for me) to 6 (very true for me), with higher scores indicating greater burdensomeness, belongingness, and desire to quit. Finally, participants rate the extent to which they were interested in and made an effort to do well on the task retrospectively upon completion, again on a 7-point scale.

Following the main task participants completed a questionnaire battery delivered using online software. A suspicion probe consisting of two written questions (‘Do you have any comments about the experiment?’ and ‘Do you have any comments about your teammates?’) was administered upon completion and prior to the debriefing in order to identify any participants who suspected their ‘co-players’ were not real. These questions were deliberately oblique and open-ended to minimize the chance that participants would indicate suspicion simply to reduce their negative affect experienced during the high PB-TB condition; that is, assuming the ‘nasty’ co-players were not real would provide some subjective relief from the discomfort. At debriefing (following the suspicion probe) participants were informed that they had been playing with computer-generated teammates and given details of available support services.
Questionnaires

**Zest for Life Scale** (ZLS; George, Stritzke, Page, & Brown, 2016). The ZLS is a 12-item measure covering two dimensions: (1) general zest (comprising general desire to live and positive outlook on life) and (2) engagement (reflecting current engagement with life). Agreement with questions such as ‘I am embracing life’ and ‘I try to enjoy life no matter what’ is rated on a 9-point Likert scale with responses ranging from 0 (*not all all*) to 8 (*very strongly*), with higher scores indicating greater zest for life. Internal consistency reliability in the current sample was excellent (\(\alpha = .98\)). The scale was administered initially for screening purposes and again during the testing phase to determine the reliability of the zest grouping. The correlation between the two administrations was high (\(r = .94\)), suggesting the scale provides a stable measure of this trait over time. Zest was positively associated with meaning in life (\(r = .77, p < .001\)) and negatively associated with suicide intent (\(r = -.39, p < .001\)), likelihood (\(r = -.32, p = .002\)) and readiness (\(r = -.39, p < .001\)) for suicide, and suicide ideation (\(r = -.59, p < .001\)).

**Meaning in Life Questionnaire** (MLQ; Steger, Frazier, Oishi, & Kaler, 2006). The 10-item MLQ has two subscales assessing the presence of, and search for, meaning in life. Only the presence subscale was included in the current study. The MLQ requires participants to rate agreement with items such as ‘I understand my life’s meaning’ on a 7-point Likert scale, ranging from 1 (*absolutely untrue*) to 7 (*absolutely true*). The scale has good psychometric properties (Steger et al., 2006; Steger & Kashdan, 2007) and internal consistency in the current sample was high (\(\alpha = .90\)).
**Interpersonal Needs Questionnaire** (INQ; Van Orden et al., 2012). The INQ is a 15-item measure with two sub-scales assessing base-level perceived burdensomeness and thwarted belongingness. It has good psychometric properties (Van Orden et al., 2008). Participants rate their agreement with statements such as ‘The people in my life would be better off if I were gone’ (burdensomeness) and ‘I rarely interact with people who care about me’ (thwarted belongingness) on a 7-point Likert scale ranging from 0 (*not at all true for me*) to 6 (*very true for me*), with higher scores indicating greater perceived burdensomeness and thwarted belongingness. Internal consistency in the current sample was high for both burdensomeness (α = .95) and belongingness (α = .93) scales.

**Kessler Psychological Distress Scale** (K-10; Kessler et al., 2002). The K-10 is a 10-item measure of general psychological distress that can distinguish individuals with a mood disorder from those without. It has good psychometric properties in non-clinical samples (Kessler et al., 2002). Items relating to mood disorder symptoms such as ‘About how often do you feel nervous?’ and ‘About how often do you feel depressed?’ are rated on a 5-point Likert scale ranging from 1 (*all of the time*) through to 5 (*none of the time*). All items are reverse scored such that higher scores indicate greater psychological distress. Normative bands for K10 scores in Australia are: low distress (10-15), moderate distress (16-21), high distress (22-29), and very high distress (30-50; Cvetkovski, Reavley, & Jorm, 2012). Internal consistency reliability in the current sample was good (α = .91).

**Self-Injurious Thoughts and Behaviors Interview** (SITBI; Nock, Holmberg, Photos, & Michel, 2007). An item assessing suicidal ideation was derived from the SITBI and required participants to indicate the number of times they had thought about suicide over the past 12 months, ranging from 0 (*never*) to 5 (*almost every day*). While the SITBI is
traditionally administered as a structured interview, a self-report format is psychometrically sound (Latimer, Meade, & Tennant, 2013).

**Intent, Likelihood, and Readiness for Suicide.** Intent, likelihood, and readiness for suicide were assessed using three items (“I have no intention of killing myself in the near future”, “It is very unlikely that I would die by suicide anytime soon”, and “If I wanted to kill myself, I feel ready to do so”) measured on a 9-point scale ranging from 0 (agree not at all) to 8 (agree very strongly). The intention and likelihood items are reverse-scored, such that higher scores suggest increased intention and likelihood for suicidal behavior.

### 2.5 Results and Discussion

**Data-Analytic Strategy**

Manipulation checks first identified participants who were suspicious of the procedure and then those that had switched zest groups between the screening and testing phases. Several potential confounding variables that required controlling for in the main analyses were also identified. The effects of the manipulation of burdensomeness, belongingness, and zest, on desire to quit ratings were then examined using 2 (high/low PB-TB condition) × 2 (high/low zest group) × 6 (time blocks 1-6) mixed-design analyses of variance (ANOVAs). Significant interaction effects were investigated using follow-up contrasts. Main and interaction effects involving time were further examined using linear trend analyses. This would reveal if induction effects were successfully sustained or would even increase over the course of the task. The relative strength of the contribution of perceived burdensomeness and thwarted belongingness on desire to quit ratings, while
controlling for confounding variables such as interest and effort in the task, was examined using hierarchical multiple regression.

**Screening and Participant Characteristics**

Data screening confirmed there were no significant univariate or multivariate outliers \( p < .01 \) and measures were normally distributed (see Table 1). Mean levels of suicide risk variables (intent, likelihood, readiness, and ideation) were higher in low relative to high zest participants, as was base-level perceived burdensomeness and thwarted belongingness. Relative to a normative criteria (Cvetkovski et al., 2012), high zest participants reported moderate levels of psychological distress, while low zest participants reported very high distress. To control for the potential influence of psychological distress on task performance, K10 scores were added as a covariate in the analyses. Examination of the zest grouping at time of testing revealed two high zest participants no longer scored in the high range on the ZLS and removing them resulted in ranges that did not overlap (High zest: range = 6.25 – 8.00; Low zest: range = 0.67 – 6.00).
Table 1

*General Sample Descriptives for Study 1 Split by Zest Group.*

<table>
<thead>
<tr>
<th></th>
<th>High Zest (N=46)</th>
<th>Low Zest (N=45)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Zest for life</strong></td>
<td>M = 7.15, SD = .89</td>
<td>M = 3.34, SD = 1.30</td>
</tr>
<tr>
<td><strong>Meaning in life</strong></td>
<td>M = 4.76, SD = 1.26</td>
<td>M = 2.92, SD = 1.16</td>
</tr>
<tr>
<td><strong>Perceived burdensomeness</strong></td>
<td>M = .30, SD = .49</td>
<td>M = 1.87, SD = 1.18</td>
</tr>
<tr>
<td><strong>Thwarted belongingness</strong></td>
<td>M = .91, SD = .73</td>
<td>M = 2.69, SD = 1.07</td>
</tr>
<tr>
<td><strong>Psychological distress</strong></td>
<td>M = 18.11, SD = 4.05</td>
<td>M = 30.96, SD = 6.15</td>
</tr>
<tr>
<td><strong>Suicide intent</strong></td>
<td>M = .44, SD = 1.69</td>
<td>M = 1.48, SD = 2.12</td>
</tr>
<tr>
<td><strong>Likelihood for suicide</strong></td>
<td>M = .44, SD = 1.70</td>
<td>M = 1.22, SD = 1.99</td>
</tr>
<tr>
<td><strong>Readiness for suicide</strong></td>
<td>M = 1.56, SD = 1.88</td>
<td>M = 3.11, SD = 2.45</td>
</tr>
<tr>
<td><strong>Suicide ideation</strong></td>
<td>M = 1.42, SD = .66</td>
<td>M = 2.76, SD = 1.39</td>
</tr>
</tbody>
</table>

**Manipulation Checks**

The suspicion probe identified 20 participants who indicated they may have guessed the nature of the study’s design and these cases were excluded. Examination of mean scores of players during the task confirmed that the scoring manipulation functioned as intended. That is, participants allocated to the high PB-TB condition scored significantly lower on average than their co-players during all six blocks, while those allocated to the low PB-TB condition scored better than their co-players. Participants in the high PB-TB condition were also significantly lower on effort, \( t(61.06) = 2.66, p = .01, d = .34, CI (.08, .59) \), and interest, \( t(69) = 4.67, p < .001, d = .56, CI (.30, .81) \), compared to those in the low PB-TB condition and therefore these variables were examined as covariates in subsequent analyses.

**Perceived Burdensomeness.** Descriptive statistics for burdensomeness ratings are displayed in Figure 1A. A mixed-design ANOVA examining the effects of condition and
zest group on burdensomeness ratings over time confirmed the high PB-TB condition yielded significantly higher levels of perceived burdensomeness overall compared to the low PB-TB condition, $F(1,66) = 134.96, p < .001, \eta^2_{\text{partial}} = .67, CI (.56, .74)$. There was also a significant Time × Condition interaction, $F(5,62) = 3.12, p = .014, \eta^2_{\text{partial}} = .20, CI (.03, .29)$. Following up the Time × Condition interaction revealed that burdensomeness ratings dropped significantly across time in the low PB-TB condition, $F(1,34) = 12.82, p = .001, \eta^2_{\text{partial}} = .27, CI (.08, .44)$ but remained at a stable high level in the high PB-TB condition, $F(1,32) = 2.71, p = .11, \eta^2_{\text{partial}} = .08, CI (0, .24)$. A significant effect of zest group, $F(1,66) = 5.53, p = .022, \eta^2_{\text{partial}} = .077, CI (.01, .19)$ revealed high zest participants reported lower burdensomeness compared to low zest individuals, irrespective of condition. No other main or interaction effects were significant. Thus, perceived burdensomeness was successfully induced in the high PB-TB condition by the end of the first block and remained at this high level throughout the remainder of the task.

**Thwarted Belongingness.** Descriptive statistics for belongingness ratings are displayed in Figure 1B. A mixed-design ANOVA examining the effects of condition and zest group on belongingness ratings across time confirmed participants in the high PB-TB condition reported significantly lower belongingness compared to those in the low PB-TB condition, $F(1,66) = 158.80, p < .001, \eta^2_{\text{partial}} = .71, CI (.60, .77)$. There was also a significant main effect of time, $F(5,62) = 12.29, p < .001, \eta^2_{\text{partial}} = .50, CI (.31, .58)$ and a significant Time × Condition interaction, $F(5,62) = 15.34, p < .001, \eta^2_{\text{partial}} = .55, CI (.37, .62)$. Following up the Time × Condition interaction revealed belongingness ratings increased slightly across time in the low PB-TB condition, $F(1,34) = 4.28, p = .046, \eta^2_{\text{partial}} = .11, CI (.01, .29)$ but dropped substantially across time in the high PB-TB condition,
\( F(1,32) = 36.25, p < .001, \eta^2_{\text{partial}} = .53, CI (.31, .66) \). There were no other significant main or interaction effects \((p > .05)\). Thus, thwarted belongingness was successfully induced in the high PB-TB condition by the end of block one and continued to increase across time\(^2\).

**Persistence**

Descriptive statistics for desire to quit (persistence) ratings are displayed in Figure 1C. A mixed-design ANOVA examining the effects of condition and zest group on persistence ratings across time confirmed that participants in the high PB-TB condition reported greater desire to quit relative to those in the low PB-TB condition, \( F(1,66) = 80.57, p < .001, \eta^2_{\text{partial}} = .55, CI (.41, .64) \). There was also a significant main effect of time, \( F(5,62) = 7.64, p < .001, \eta^2_{\text{partial}} = .38, CI (.18, .47) \), a significant effect of zest group, \( F(1,66) = 5.62, p = .021, \eta^2_{\text{partial}} = .08, CI (.01, .19) \), and significant Time \( \times \) Condition, \( F(5,62) = 11.75, p < .001, \eta^2_{\text{partial}} = .49, CI (.29, .57) \), and Zest \( \times \) Condition interaction effects, \( F(1,66) = 4.10, p = .047, \eta^2_{\text{partial}} = .06, CI (.01, .17) \). Follow-up tests revealed no significant main or interaction effects in the low PB-TB condition, however in the high PB-TB condition there was a significant effect of time, linear trend, \( F(1,32) = 13.56, p = .001, \eta^2_{\text{partial}} = .30, CI (.09, .47) \), and a significant effect of zest group, \( F(1,32) = 5.71, p = .023, \eta^2_{\text{partial}} = .15, CI (.01, .33) \). Thus, while participants in the low PB-TB condition remained at a stable low level of desire to quit, those in the high PB-TB condition increased

---

\(^2\) Additional analyses confirmed the same large effects of condition were evident for both burdensomeness \((F(1,88) = 156.35, p < .001, \eta^2_{\text{partial}} = .64)\) and belongingness \((F(1,88) = 239.76, p < .001, \eta^2_{\text{partial}} = .73)\) when suspicious participants were included. Nevertheless, these cases were excluded to minimize the possibility of demand characteristics.

\(^3\) Interest, effort, and K10 scores were added as covariates on the mixed-model ANOVAs examining the effects of condition and zest group on burdensomeness, belongingness, and persistence ratings. However, given this did not substantively alter the pattern of effects, the ANOVAs have been reported without these covariates.
significantly in desire to quit across time. Moreover, within the high PB-TB condition participants who were higher in zest for life reported significantly lower desire to quit compared to participants who were low on this resilience factor.

Figure 1. Interpersonal Persistence Task ratings in Study 1. Panel A) shows mean burdensomeness, Panel B) shows mean belongingness and Panel C) shows mean desire to quit (persistence). Error bars represent standard error of the mean.
To examine the relative contributions of burdensomeness and thwarted belongingness to desire to quit within the high PB-TB condition, a hierarchical multiple regression analysis was conducted. Mean interest and effort ratings were entered in step one as covariates and the remaining variables were entered in step two. Effort and interest in the task did not significantly influence persistence ratings, $F(2,31) = 2.82, p > .05$, but perceived burdensomeness and thwarted belongingness explained an additional 48.2% of the variance, $F(4,29) = 12.68, p < .001$, with the effect size for burdensomeness twice as large as for belongingness (Table 2).

Table 2

<table>
<thead>
<tr>
<th></th>
<th>95% Confidence Intervals</th>
<th>$\beta$</th>
<th>$R^2$</th>
<th>$R^2$ Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort</td>
<td>-.07</td>
<td>.32</td>
<td>-.68</td>
<td>-.01</td>
</tr>
<tr>
<td>Interest</td>
<td>-.34</td>
<td>.17</td>
<td>-.71</td>
<td>.58</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort</td>
<td>-.22</td>
<td>.22</td>
<td>-.66</td>
<td>.23</td>
</tr>
<tr>
<td>Interest</td>
<td>-.21</td>
<td>.12</td>
<td>-.44</td>
<td>.03</td>
</tr>
<tr>
<td>Burdensomeness</td>
<td>.75</td>
<td>.14</td>
<td>.46</td>
<td>1.04</td>
</tr>
<tr>
<td>Belongingness</td>
<td>-.44</td>
<td>.22</td>
<td>-.89</td>
<td>.01</td>
</tr>
</tbody>
</table>

* $p < .05$, ** $p < .01$, $^+ p = .053, N = 34$

What is the Relationship Between Task Persistence and Suicide Risk? Higher desire to quit the task was associated with higher likelihood for suicide ($r = .29, p = .017$). The positive association between desire to quit and suicidal intent was also just shy of
statistical significance \( r = .24, \ p = .052 \). The correlations between desire to quit and suicide ideation over the past 12 months \( r = .04, \ p = .75 \), and desire to quit and readiness for suicide \( r = .05, \ p = .67 \), were non-significant.

In sum, elevated levels of the interpersonal risk constructs perceived burdensomeness and thwarted belongingness resulted in greater desire to quit the Interpersonal Persistence Task as predicted. However, burdensomeness was a much stronger contributor. Results also revealed a consistent buffering effect across time in high zest individuals within the high PB-TB condition.

### 2.6 Study 2

While Study 1 supports the notion that higher levels of pre-existing zest for life may confer resilience against the impact of induced feelings of perceived burdensomeness and thwarted belongingness, this finding has limited relevance to intervention strategies seeking to strengthen resilience to the adverse experience of elevated levels of these interpersonal risk factors. In Study 2 we therefore turned our attention to *acute or malleable* forms of resilience that may be promoted to mitigate the decline in persistence, irrespective of pre-existing resilience. One trainable skill (Brown, Ryan, & Creswell, 2007) that holds promise as an attribute that may confer resilience to interpersonal antecedents to suicide risk is mindfulness; the ability to pay attention non-judgmentally to present-moment experience (Williams & Swales, 2004). Research suggests that mindfulness may enhance engagement with life by increasing vitality, vigour, and curiosity towards experiences (Baer & Lykins, 2011; Niemiec, Rashid, & Spinella, 2012) and by increasing one’s ability to cope with
adversity and continue striving for longer term goals (Erisman & Roemer, 2010; Teper, Segal, & Inzlicht, 2013).

According to the interpersonal theory, a desire for suicide emerges when an individual feels unable to persist with life in the face of thwarted interpersonal needs. Given mindfulness may enhance engagement with life and increase one’s capacity to self-regulate in response to adversity, training in this skill may increase persistence in the face of elevated perceived burdensomeness and thwarted belongingness. Thus, in Study 2 we examined the potential buffering effects of experimentally induced state mindfulness by using an established brief induction procedure (i.e., focused breathing; Arch & Craske, 2006) prior to completion of the Interpersonal Persistence Task. We also examined whether the protective effects of induced mindfulness would differ between individuals already higher or lower on baseline zest for life.

Participants were recruited based on individual differences in zest for life, and the Interpersonal Persistence Task was used to induce high levels of perceived burdensomeness and thwarted belongingness. All participants were allocated to the high PB-TB condition, however prior to commencing the task participants were randomly assigned to receive either a mindfulness induction (MI) or an unfocused attention (UA) control induction (Arch & Craske, 2006). It was predicted that the MI would confer an acute form of resilience that would increase persistence in the face of interpersonal adversity. Specifically, participants in the MI condition would display a stable low level of desire to quit across time relative to the UA controls despite rating equivalent high levels of perceived burdensomeness and thwarted belongingness. Additionally, given high zest individuals possess higher baseline resilience and are therefore already buffered against the deleterious effects of elevated
burdensomeness and diminished belongingness on persistence, we predicted they would be affected by the mindfulness induction to a lesser degree compared to low zest individuals. Specifically, our induced form of acute resilience would dilute the zest group differences seen in Study 1, such that the difference on the desire to quit variable would be diminished between high and low zest individuals.

2.7 Method

Participants

Fifty-two undergraduate psychology students ($M_{age} = 19.48$ years, $SD = 3.24$, 54% female) scoring in the top or bottom 15% of the distribution on the ZLS participated in exchange for course credit. Both high and low zest groups were allocated to the high PB-TB condition and then randomly assigned to receive either the MI or UA induction. Procedures were approved by the University’s Human Research Ethics Committee.

Materials

**Zest for Life Scale** (ZLS; George et al., 2016). The ZLS (as described in Study 1) was again administered to confirm the validity of the zest grouping. Internal consistency reliability was excellent ($\alpha = .98$) in the current sample.

Procedure

The procedure resembled Study 1, with the exception that participants completed an induction exercise at their separate computers prior to commencing the Interpersonal Persistence Task. Participants were told this was an exercise designed to prepare them for the computerized task and to follow the instructions as best they could. Each exercise
consisted of a short page of written information and a 10-minute audio recording delivered via headphones.

**Mindfulness Induction (MI).** The MI is adapted from the induction procedure of Arch and Craske (2006) and uses a focused breathing audio exercise based on techniques used in Mindfulness Based Stress Reduction (Kabat-Zinn, 1990) and Mindfulness Based Cognitive Therapy (Segal, Williams, & Teasdale, 2002). After initial instruction, participants are presented with a written sheet that describes mindfulness and its positive influence on psychological wellbeing (adapted from Erisman & Roemer, 2010). They then complete the focused breathing exercise which requires them to sit comfortably in their chair and focus their attention on the sensations of the breath. When any thoughts, emotions, or physical sensations arise participants are told to note them non-judgmentally and gently bring their awareness back to the breath. This procedure approximates more extensive mindfulness training and has been used successfully in a range of laboratory studies to date (Arch & Craske, 2006; Erisman & Roemer, 2010; Hooper, Davies, Davies, & McHugh, 2011; McHugh, Procter, Herzog, Schock, & Reed, 2012).

**Unfocused Attention (UA) Control Induction.** The UA control induction is also adapted from Arch and Craske (2006) and requires participants to let their thoughts flow as they normally would throughout the day. This exercise is proposed to reflect baseline awareness where an individual, in the absence of stimulus-driven attention, allows their mind to wander freely (i.e., the opposite of mindfulness where attention is directed purposively; Mason et al., 2007). Participants read written instructions explaining how thoughts of the past and future can negatively influence the way we feel in the present (adapted from McHugh et al., 2012) and so in the current exercise they will not allow their
mind to dwell on any one thought in particular, but rather let their thoughts roam freely. The aim here was to set a similar positive expectation to the MI instructions which emphasize the positive impact of mindfulness on wellbeing. The UA audio recording is matched as closely as possible to the MI induction audio, including the tone and style of the verbal instructions, and repeats instructions approximately every 60 seconds.

After the induction participants completed the Interpersonal Persistence Task in their same testing cubicles. Following the task the suspicion probe (as described in Study 1) was administered. At this point participants were also asked to rate their agreement with the statements (1) I found the preparation exercise instructions clear enough to understand and (2) I attempted to follow the preparation exercise instructions. These were rated on a 7-point Likert scale, ranging from 0 (not at all) to 6 (very strongly). Participants were then fully debriefed.

2.8 Results and Discussion

Data-Analytic Strategy

Manipulation checks first accounted for any suspicion, changes in zest grouping, or non-compliance with the induction procedure instructions. The effects of the two induction procedures and zest groupings on burdensomeness, belongingness, and desire to quit ratings were then examined using 2 (MI/UA condition) × 2 (high/low zest group) × 6 (time blocks 1-6) mixed-design ANOVAs. Main and interaction effects involving time were further examined using linear trend analyses. This would reveal if induction effects were sustained, increased, or diminished during the task. Because mindfulness is not expected to prevent the initial experience of adversity, but rather acts as a coping mechanism while the
adversity unfolds and then enhances persistence despite the adversity, we further clarified the impact of the induction procedures on task persistence over time by performing follow-up linear trend analyses split across the initial (Block 1 to Block 4) and latter (Block 4 to Block 6) stages of the task. This would reveal if the effect of the mindfulness induction is apparent throughout the task or would be more pronounced in the latter stage of the task.

**Screening and Participant Characteristics**

Data screening confirmed there were no univariate or multivariate outliers \((p < .01)\) and measures were normally distributed. Mean zest for life ratings were comparable to Study 1 (High zest group: \(M = 7.13, SD = .92\); Low zest group: \(M = 3.22, SD = 1.44\)). Examination of the zest grouping revealed one high zest participant and one low zest participant no longer scored in their respective ranges on the ZLS and removing them resulted in ranges that did not overlap (High zest: range = 5.33 – 8.00; Low zest range = 0.58 – 4.83).

**Manipulation Checks**

The suspicion probe identified 14 participants who were excluded. Two participants who did not engage with the induction procedure (based on observations during testing and ratings lower than three on the question assessing attempt to follow instructions) were also excluded. Mean ratings on the preparation exercise questions confirmed participants understood the instructions \((M = 5.52, SD = .75)\) and attempted to follow them \((M = 5.44, SD = .79)\).
Burdensomeness and Belongingness. Mixed-design ANOVAs revealed significant linear trends on both measures, confirming burdensomeness ratings increased across time, $F(1,30) = 10.87$, $p = .003$, $\eta^2$ partial = .27, $CI (.06, .44)$, while ratings of belongingness dropped across time, $F(1,30) = 100.98$, $p < .001$, $\eta^2$ partial = .77, $CI (.63, .83)$. No other main or interaction effects were significant ($p > .05$), indicating levels of these risk constructs were equivalent across both high/low zest groups and MI/UA conditions. Results have therefore been displayed in Figure 2 collapsed across zest groups.

Persistence

A mixed-design ANOVA comparing the effects of group and attention conditions on persistence ratings across time revealed a significant main effect of time, $F(5,26) = 4.96$, $p = .003$, $\eta^2$ partial = .49, $CI (.14, .58)$, and a significant Time × Condition interaction, $F(5,26) = 3.15$, $p = .023$, $\eta^2$ partial = .38, $CI (.04, .48)$. Follow-up linear trend analyses revealed desire to quit increased significantly across time in the UA condition, $F(1,16) = 49.41$, $p < .001$, $\eta^2$ partial = .76, $CI (.51, .84)$, but remained at a stable low level in the MI condition, $F(1,14) = 1.82$, $p = .20$, $\eta^2$ partial = .12, $CI (0, .36)^4$. Finally, the three-way interaction between time, attention condition, and zest group was not significant ($p = .11$), nor was the main effect of zest group ($p = .39$), indicating the response pattern was similar across high and low zest individuals. Given there were no significant differences between high and low zest individuals, mean persistence ratings have been displayed collapsed across zest groups (Figure 2).

---

4 Interest and effort were again added as covariates on all mixed-model ANOVAs. Given this did not alter the pattern of effects, results have been reported without these covariates.
To further clarify the protective effects of the MI induction, follow-up analyses were run in the initial versus latter stages of the task. This confirmed the MI/UA Condition × Time interaction effect was significant between Time 4 and Time 6, $F(2,29) = 7.82, p = .002, \eta^2_{\text{partial}} = .35$, but not between Time 1 and Time 4, $F(3,28) = .62, p = .61, \eta^2_{\text{partial}} = .06$. Moreover, the effect size for the linear trend in the MI condition was small between Time 1 and Time 4 ($\eta^2_{\text{partial}} = .17$) and non-existent between Time 4 and Time 6 ($\eta^2_{\text{partial}} = .001$). In contrast, the effect size for the linear trend in the UA condition was large both between Time 1 and Time 4 ($\eta^2_{\text{partial}} = .55$) and Time 4 and Time 6 ($\eta^2_{\text{partial}} = .56$). Thus, while the mindfulness induction had a protective influence across the entire span of the task, the action appeared to be most pronounced in the latter part of the procedure.
Figure 2. Interpersonal Persistence Task ratings in Study 2 collapsed across zest groups. Panel A) shows mean burdensomeness, Panel B) shows mean belongingness, and Panel C) shows mean desire to quit (persistence). Error bars represent standard error of the mean.

In sum, participants in the MI condition remained at a stable low level of desire to quit throughout the task compared to participants in the UA condition who diminished in
persistence over time. State mindfulness increased persistence in the face of heightened perceived burdensomeness and thwarted belongingness, irrespective of pre-existing zest for life.

2.9 General Discussion

As predicted, Study 1 revealed induced burdensomeness and thwarted belongingness had a deleterious impact on task persistence compared to a condition where these risk constructs were not induced. Complementing previous non-experimental research, these findings provide experimental evidence bearing upon the posited causal effects of perceived burdensomeness and thwarted belongingness on desire to escape from adversity when fundamental interpersonal needs are thwarted (Deci & Ryan, 2000). In addition, participants in the high PB-TB condition who were higher on pre-existing zest for life were buffered against these impairments in persistence over all six blocks relative to participants who were low on this resilience factor. Given a literature showing that individuals with stronger life-oriented beliefs are less likely to exhibit suicidality (Harrison et al., 2014; Johnson et al., 2011; Linehan, Goodstein, Nielsen, & Chiles, 1983), our data provide experimental support for zest as a time-limited resilience factor. To the extent that the attenuating effect of zest for life parallels other life-oriented beliefs, it could serve to dampen the relationship between the risk variables of the interpersonal theory and their erosive effects on persistence as a potential antecedent to suicidal desire. An extended buffering effect as observed suggests that not only are zestful individuals better able to persist despite experiencing high levels of perceived burdensomeness and thwarted belongingness, this resilience is sustained over time for the duration of the experiment.
The multiple regression analysis revealed that, consistent with the interpersonal theory, both perceived burdensomeness and thwarted belongingness contributed to the impairments in persistence observed in Study 1, above and beyond the influence of effort and interest in the task. However, burdensomeness was the stronger contributor. Previous cross-sectional evidence found perceived burdensomeness to be a more stable and robust predictor of suicidal desire (Christensen et al., 2014; Jahn, Van Orden, & Cukrowicz, 2013; Van Orden, Lynam, Hollar, & Joiner, 2006; Van Orden et al., 2008), whereas the influence of thwarted belongingness may differ across samples (Cero et al., 2015). Hence, it is not unexpected that when these variables are manipulated experimentally, the effect of perceived burdensomeness on the dependent variable is stronger than thwarted belongingness.

Moving beyond pre-existing individual differences in resilience, Study 2 showed enhancing state mindfulness conferred an acute form of resilience that protected against impairments in persistence in the face of interpersonal adversity. As predicted, participants in the MI condition exhibited a stable low level of desire to quit across time relative to the UA controls who increased significantly in desire to quit from block one to block six. While the mindfulness induction conferred protection across the entire span of the task, this protective effect was strongest during the latter stages of the procedure. This is consistent with the notion that mindfulness enhances persistence in adversity; that is, it does not prevent the experience of adversity, but rather kicks in as a coping mechanism as the adversity unfolds. These findings are consistent with research showing that even short periods of mindfulness training can reduce emotional reactivity (Arch & Craske, 2010; Farb et al., 2010). Importantly, they complement previous work suggesting clinical
interventions incorporating mindfulness training are associated with reduced risk for suicide (Forkmann et al., 2014).

Within their own frame of reference, the current findings support the notion that heightened perceptions of burdensomeness and thwarted belongingness have a significant detrimental impact on persistence. While quitting or desiring to quit a computer task is obviously very different from desiring to end one’s own life, the current findings suggest that a decline in persistence and goal pursuit during interpersonal adversity experienced as thwarted satisfaction of the fundamental needs for competence and relatedness may motivate self-defeating behaviours, which can impact on mental health and antecedents of suicide risk (Deci & Ryan, 2000; Van Orden et al., 2010).

**Theoretical and Clinical Implications**

Our studies have a number of theoretical and clinical implications. First, the observed detrimental effects of experimentally manipulated perceived burdensomeness and thwarted belongingness on desire to persist suggest that these constructs are causally related to persistence in an interpersonally challenging context. This is consistent with research showing that when fundamental needs for competence and relatedness are blocked, intrinsic motivation and persistence in goal-directed activities declines (Deci & Ryan, 1980; Ryan & Deci, 2000; Twenge, Catanese, & Baumeister, 2002; Vallerand & Reid, 1984). Further, in light of evidence suggesting perceived burdensomeness and thwarted belongingness mediate the relationship between thwarted interpersonal needs and suicidality (Tucker & Wingate, 2014), the current findings are consistent with the interpersonal theory’s prediction that these constructs are causal factors underlying the desire to not persist with,
and give up on life. Second, if perceived burdensomeness and thwarted belongingness are in fact causal risk factors, then suicide prevention efforts should include strategies to mitigate their impact. Study 2 provided experimental support for mindfulness training as a resilience factor that may confer protection against impairments in persistence caused by heightened perceived burdensomeness and thwarted belongingness. One caveat to the use of mindfulness training within the context of suicide prevention (cf., Chesin et al., 2015) is the possibility of unintended negative consequences, such as encouraging patients to focus on their negative thoughts. However, this could be addressed by encouraging ‘living talk’ that can provide a counterbalancing focus on life-sustaining thoughts (Britton, 2015). Third, the observed buffering effects of zest for life against potential antecedents of suicide risk suggests that theories of suicide need to shift from a sole focus on risk factors and better articulate how causal factors, such as perceived burdensomeness and thwarted belongingness, interact with resilience factors to moderate their impact. For instance, future research could examine whether, in addition to their direct effects on suicidal desire, these interpersonal risk factors also exert an indirect effect by diminishing zest for life over time. That is, whether zest for life is a proximal protective factor that is depleted when one perceives oneself to be a burden on, and disconnected from, others.

**Limitations and Future Directions**

The current studies had several limitations. First, while the mindfulness induction in Study 2 conferred stability on the persistence measure relative to controls, mean desire to quit ratings suggested that participants were also positively affected by the UA induction during the first four blocks of the task. Thus, it is possible the UA induction may have an active component, such as relaxation, that positively influences emotional reactivity (cf.,
Arch and Craske, 2006). Second, the joint induction of perceived burdensomeness and thwarted belongingness in the current studies limits the interpretation of any independent causal effects of these constructs on persistence. Specifically, while the multiple regression analysis provides insight into their relative contributions, it cannot be concluded that either construct in isolation would be sufficient to inhibit persistence on the task. The interpersonal theory proposes that the co-occurrence of perceived burdensomeness and thwarted belongingness leads to particularly heightened risk, but these constructs in isolation are also proposed to generate a less serious or passive form of suicidal desire (Van Orden et al., 2010). Thus, a task that differentially induces burdensomeness and thwarted belongingness would be a useful avenue for future research. Third, explicit questioning about perceptions of burdensomeness, belongingness, and desire to quit throughout the task may have influenced the manner in which participants responded to the experimental manipulation. While the fact that large effects of condition were evident by the first rating interval mitigates this concern somewhat, demand effects are a possible confound. It should also be acknowledged that the suspicion probe administered post task consisted of open-ended questions that may have underestimated participants’ hypotheses concerning the purpose of the experiment. Fourth, the absence of a mood measure is a limitation, as we were unable to clarify the impact of positive or negative affect on task performance. Further, in Study 2 it is possible that the mindfulness induction exerted a protective influence by altering mood, rather than by enhancing emotion regulation and non-reactivity. Finally, the smaller sample size in Study 2 limited the power to detect differences between high and low zest groups and hence the lack of an interaction involving group is difficult to interpret.
While Study 2 suggests that even brief mindfulness training may potentially mitigate the adverse effect of elevated perceived burdensomeness and thwarted belongingness in the short term, given that a number of studies have found clear differences between novice and more experienced mindfulness practitioners on measures of emotion regulation (Brefczynski-Lewis, Lutz, Schaefer, Levinson, & Davidson, 2007; Lutz et al., 2004), it remains to be seen whether greater practice brings greater benefit on the present experimental task. Future research may therefore examine the effects of more extensive mindfulness training on persistence, or differences between individuals who engage in a regular mindfulness practice versus those who do not. Finally, future research may also examine whether it is possible to attenuate the negative impact of perceived burdensomeness and thwarted belongingness on persistence once these risk factors have already taken their toll (e.g., during the task). Such a study may have even greater implications for clinical practice where at-risk individuals present with elevated levels of perceived burdensomeness and thwarted belongingness (cf., Levi-Belz & Gamliel, 2015) and require intervention to reduce their impact on the transition from suicidal desire to behavior.

In conclusion, the present findings provide experimental support that complements research investigating the role of perceived burdensomeness and thwarted belongingness in the causal pathway to suicide as proposed by the interpersonal theory. Results also reinforce the notion that contemporary theories of suicide, including the interpersonal theory, must better account for the interplay between risk and resilience factors. Trait zest for life and state mindfulness attenuated the deleterious impact of perceived burdensomeness and thwarted belongingness on task persistence. Thus, assessing levels of
zest in routine clinical practice may increase the accuracy of suicide risk assessment, while mindfulness training may be a useful intervention strategy enabling at-risk individuals to persist with living in the face of elevated perceptions that fundamental interpersonal needs are not satisfied.


Christensen, H., Batterham, P. J., Mackinnon, A. J., Donker, T., & Soubelet, A. (2014). Predictors of the risk factors for suicide identified by the interpersonal-


Chapter 3 A Mindfulness Intervention to Enhance Resilience during the Experience of Heightened Risk and Adversity

Chapter 2 developed a novel experimental paradigm to test the causal effects of perceived burdensomeness and thwarted belongingness and examine the moderating role of zest for life. Study 1 found that higher levels of zest attenuated the deleterious effects of the interpersonal factors, providing support for zest for life as a suicide resilience factor. Then, to further clarify the role of resilience during interpersonal adversity, focus shifted to determining whether persistence could be enhanced within the experimental context. Moving from individual differences in resilience to acute or modifiable resilience, Study 2 used a mindfulness induction to test the causal effect of mindfulness training delivered prior to the experience of interpersonal adversity (i.e., a pre-exposure intervention). Here it was found that mindfulness training increased persistence across the span of the task relative to a control condition where mindfulness was not induced, suggesting that increasing this life-sustaining factor might confer resilience to suicidality. Presumably, however, interventions to enhance resilience would also be important once risk is already elevated (i.e., a post-exposure intervention).

Suicidal thoughts and behaviors vary in severity, frequency, and duration over time scales ranging from minutes through to several hours and days (Bruffaerts et al., 2011; Bryan & Rudd, 2016; Glenn & Nock, 2014; Kleiman et al., 2017; Nock, Prinstein, & Sterba, 2009). Fluid vulnerability theory (Rudd, 2006) proposes that these fluctuations reflect the dynamic activation and deactivation of the suicidal mode, a conglomeration of idiosyncratic cognitive, affective, physiological, and behavioral mechanisms that is
influenced by both risk and protective factors. Suicidality, then, is inherently dynamic, fluctuating over time as a function of the continuous interplay between risk and resilience (Bryan & Rudd, 2016), implying that suicidal crises may be deactivated or mitigated by interventions that target an increase in resilience. An intervention delivered in the midst of interpersonal adversity would more closely parallel an intervention during an acute crisis than an intervention delivered prior to such an experience. Thus, the study presented in this chapter tests whether mindfulness training is effective as a resilience-enhancing intervention delivered during the experience of heightened perceived burdensomeness and thwarted belongingness.

The current experiment may also help to provide further clarity about the specific causal effects of mindfulness on suicide-relevant outcomes. A number of clinical treatments for suicidality feature mindfulness strategies as part of their broader packages (e.g., dialectical behavior therapy, Linehan, 1993; mindfulness-based cognitive therapy, Barnhofer et al., 2015). While randomized controlled trials have supported the effectiveness of these treatments in mitigating suicidal thoughts and behaviors (e.g., Barnhofer et al., 2015; Linehan et al., 2006, 2015), establishing the effects of mindfulness as an “active ingredient” of these packages is more difficult. Basic science approaches are a valuable asset in the advancement of science-informed practice because they enable the causal effects of treatment components to be tested at a level that is difficult to achieve in clinical outcomes research (Levin, Hildebrandt, Lillis, & Hayes, 2012). The experimental approach adopted in the current chapter enables a precise and highly controlled testing of mindfulness as a specific intervention strategy for mitigating the impact of the ITS’s proximal interpersonal factors.
The study presented in this chapter also aims for a more refined testing of thwarted belongingness as a causal contributor to the desire to escape from interpersonal adversity. According to the ITS, this interpersonal factor is a multidimensional construct comprising two latent factors: loneliness and an absence of reciprocally caring relationships. Loneliness is conceptualized as a perceived lack of social connection, expressed in affectively-laden cognitions such as “I feel disconnected from other people”, while an absence of reciprocally caring relationships is proposed to occur when individual’s lack social relationships in which they feel cared about and where they can express care for others. Together these dimensions imply a fundamental desire or need to connect with others that, when blocked, leads to a state of thwarted belongingness. The study reported in Chapter 2 showed there was a significant reduction in self-reported belongingness in the experimental condition as predicted, suggesting that participants perceived themselves as lacking connection with their fellow team members. However, it remains unclear whether participants had an initial desire to belong to the team that could be thwarted during the subsequent experimental task. The current study therefore takes a more refined approach by administering an additional self-report measure prior to the task to assess participants’ baseline need to belong. This enables us to determine whether there was an a priori need to belong during the upcoming team interaction that could be thwarted.

A further point of clarity concerns the potential impact of negative affect on self-reported desire to escape. The regression analysis reported in Chapter 1 (Study 1) confirmed that perceived burdensomeness and thwarted belongingness were significant contributors to desire to escape in the experimental condition above and beyond effort and interest in the task rated retrospectively upon completion. However, it is also possible that
desire to escape was influenced by heightened negative affect given the aversive nature of the task. This is plausible given the use of critical feedback has been shown to increase negative affect (Nummenmaa & Niemi, 2004) and negative affect has been linked to poorer task persistence (Hills, Hill, Mamone, & Dickerson, 2001). Further, the ITS posits that perceived burdensomeness and thwarted belongingness are proximal causal factors that influence the onset of suicidal desire beyond the influence of relatively more distal factors such as depressed mood (Van Orden et al., 2010). Thus, it is important that any experimental analogue aiming to test the causal predictions of the theory can show that these interpersonal factors explain unique variance in desire to escape while controlling for the influence of negative affect. The current study therefore includes an additional item at each task rating interval assessing participants’ current level of relaxation/distress on a bipolar scale. Negative affectivity is a component of psychological distress and thus an item assessing distress would presumably capture negative affect as well as other non-specific aspects of psychological suffering that may be experienced by participants during the task (Watson & Pennebaker, 1989). A bipolar measurement scale was used to minimize the chances of demand effects (i.e., by avoiding item wording that presupposes participants are experiencing some degree of distress) and to ensure the item was relevant to participants in the conditions where these interpersonal factors are not induced.

The study presented in this chapter has been published:

3.1 Abstract

According to the interpersonal theory of suicide, perceived burdensomeness and thwarted belongingness are proximal causal factors underlying suicidal desire. The current study examined whether a brief mindfulness intervention can attenuate the deleterious effects of these interpersonal factors on desire to escape, a potential antecedent to suicide risk. Participants ($N = 92$) completed a computerised team task designed to manipulate perceived burdensomeness and thwarted belongingness (high or low PB/TB) and were randomly assigned to one of four conditions: (1) low PB/TB without intervention, (2) high PB/TB without intervention, (3) high PB/TB with a brief mindfulness intervention administered at the halfway point, or (4) high PB/TB with a brief unfocused attention intervention administered at the halfway point. As expected, simultaneous induction of perceived burdensomeness and thwarted belongingness increased desire to escape in the initial stages of the task in all three high PB/TB conditions. However, the mindfulness intervention attenuated the effects of the interpersonal factors on desire to escape across the latter stages of the task relative to the unfocused attention intervention and the high PB/TB condition where no intervention was administered. Findings suggest that mindfulness interventions may protect against the type of interpersonal adversity causally implicated in suicidal desire.
3.2 Introduction

Suicide is a significant public health concern, with over 800,000 deaths occurring globally every year (World Health Organization, 2014). Research examining pathways to suicide and associated preventative targets is therefore a priority. According to the interpersonal theory of suicide, thwarted fundamental needs to contribute (i.e., perceived burdensomeness) and to establish and maintain meaningful interpersonal connections (i.e., thwarted belongingness) are proximal causal factors that decrease one’s motivation to persist with life and increase one’s desire for suicide (Van Orden et al., 2010). Hence, techniques to mitigate the impact of perceived burdensomeness and thwarted belongingness are needed. Science-informed practice operates best when there is clear causal evidence that an intervention (i) modifies the putative moderators and (ii) that changing the moderator causes a reduction in the clinically-relevant behavior (Page & Stritzke, 2015). One experimental paradigm (the Interpersonal Persistence Task; Collins, Best, Stritzke, & Page, 2016) permits manipulation of perceived burdensomeness and thwarted belongingness and measures their effects on desire to escape, a potential, although not sufficient, antecedent of suicide risk. This paradigm allows examination of the extent to which mindfulness training can attenuate desire to escape from interpersonal adversity and in doing so provides experimental evidence for mindfulness as an intervention for enhancing resilience to the interpersonal risk factors posited to causally underlie the desire for suicide.

Perceived burdensomeness and thwarted belongingness are linked to increased risk for suicidal behavior beyond other important risk factors such as depression, hopelessness, and previous suicide attempts (Christensen, Batterham, Soubellet, & Mackinnon, 2013;
Jahn, Cukrowicz, Mitchell, Poindexter, & Guidry, 2015; Joiner et al., 2009). However, the effects of thwarted belongingness and, to a lesser extent, perceived burdensomeness on suicidal ideation vary across samples (Cero, Zuromski, Witte, Ribeiro, & Joiner, 2015; Ma, Batterham, Calear, & Han, 2016). One potential explanation for these inconsistencies is that the interpersonal theory does not account for resilience factors; personal qualities that increase an individual’s ability to thrive even in a context of adversity (O’Connor & Nock, 2014). Given resilience may buffer or moderate the relationship between risk and suicidality (Johnson, Wood, Gooding, Taylor, & Tarrier, 2011), accounting for factors that confer resilience may increase the specificity of the theory’s causal predictions (Cheavens, Cukrowicz, Hansen, & Mitchell, 2016). Moreover, establishing whether enhancing resilience can attenuate the deleterious impact of the theory’s putative causal risk factors may aid suicide prevention efforts (Kleiman & Anestis, 2015).

A limitation in suicide research has been the difficulty in establishing the causal effects of suicide risk and resilience factors. Collins et al. (2016) recently developed an experimental paradigm to test the effects of heightened perceived burdensomeness and thwarted belongingness on the desire to escape from interpersonal adversity. A number of prominent contemporary theories conceptualize suicide as an attempt to escape from seemingly intolerable life circumstances driven by factors such as aversive self-awareness (Baumeister, 1990), loss (Williams & Pollock, 2000), and feelings of entrapment (O’Connor, 2011). According to the interpersonal theory, it is the perception that one is incapable of contributing to the lives of others and that one lacks meaningful social connections that are the proximal causes of a desire to escape from life. Thus, although
clearly not sufficient, an increased desire to escape from a situation of heightened interpersonal adversity is a potential antecedent to suicide risk (Collins et al., 2016).

Importantly, this experimental paradigm also provides an opportunity to safely identify ways to attenuate the impact of interpersonal risk factors. One intervention that holds promise here is mindfulness training. Mindfulness, the process of attending to current experience with awareness and acceptance, has been associated with reduced risk of suicidality in several cross-sectional studies (Anastasiades, Kapoor, Wootten, & Lamis, 2016; Chesin & Jeglic, 2016; Lamis & Dvorak, 2013) and is a key feature of clinical treatments shown to reduce risk for suicidality (e.g., Barnhofer et al., 2015; Linehan et al., 2006). Mindfulness may protect against suicidality by enhancing acceptance of negative thoughts and emotions and facilitating re-engagement with goal-directed activities even in the face of adversity (Garland, Farb, Goldin, & Fredrickson, 2015; Kabat-Zinn, 1990; Williams & Swales, 2004). This approach may be particularly valuable for combatting perceived burdensomeness and thwarted belongingness given these are posited to be powerful yet dynamic cognitive-affective states (Van Orden et al., 2010) that may pass or be attenuated in impact if one is able to adopt an attitude of acceptance and non-reactivity.

In the first experimental test of mindfulness as a suicide protective factor, Collins et al. (2016) found a state mindfulness induction administered prior to the experimental induction of perceived burdensomeness and thwarted belongingness stabilized the desire to escape from this adversity across time relative to a control condition without a prior mindfulness induction. That is, although both conditions yielded similar levels of desire to escape initially, participants in the mindfulness condition remained stable at this level over time (i.e., an arrested desire to escape) while participants in the control condition continued
to increase in desire to escape as the task progressed (i.e., an escalating desire to escape).

This provided experimental support for mindfulness as a resilience factor that may confer protection against the deleterious effects of interpersonal adversity on persistence.

Although these findings are promising, to establish the utility of mindfulness as an intervention strategy it is important to examine the effects of a state mindfulness induction delivered after perceived burdensomeness and thwarted belongingness are already elevated, rather than only prior to this experience.

The current study, therefore, examined the effect of a brief mindfulness intervention delivered mid-way through the experimental paradigm, after perceived burdensomeness and thwarted belongingness had already begun to exert their erosive effects on task persistence. Consistent with theory and previous evidence, we predicted a significant linear increase in desire to escape across the initial stages of the procedure. A brief mindfulness intervention was then delivered to examine whether the deleterious effects of heightened burdensomeness and thwarted belongingness can be attenuated. We predicted that the increase in desire to escape evident in the initial stages of the task would be attenuated in the latter stages of the task only in those individuals receiving a mindfulness intervention mid-way through. In contrast, participants in two control conditions (unfocused attention intervention and no intervention) would continue to increase in desire to escape across the span of the entire task.

3.3 Method

Participants
Ninety-two undergraduate students ($M_{age} = 19.16$ years, $SD = 3.95$, 71.70% female) from an introductory psychology class participated and received partial course credit. Because individuals who score higher on dispositional mindfulness (i.e., the tendency to pay attention mindfully in daily life) generally report higher levels of state mindfulness during mindfulness practice sessions, it was assumed that this trait variable might impact the effectiveness of the state mindfulness intervention (Lau et al., 2006). Thus, based on a screening measure assessing dispositional mindfulness (Freiburg Mindfulness Inventory; Walach, Buchheld, Buttenmüller, Kleinknecht, & Schmidt, 2006) administered to the entire cohort ($N = 839$), participants scoring in the middle 50% of the distribution were recruited to minimize individual differences on this variable. Participants were then randomly assigned to one of four conditions: (1) low perceived burdensomeness/thwarted belongingness (low PB/TB); (2) high perceived burdensomeness/thwarted belongingness (high PB/TB); (3) high perceived burdensomeness/thwarted belongingness plus mindfulness intervention (high PB/TB-MI); or (4) high perceived burdensomeness/thwarted belongingness plus unfocused attention intervention (high PB/TB-UA). All participants provided informed consent and the experimental procedures were approved by the University’s Human Research Ethics Committee.

**Procedure**

The Interpersonal Persistence Task (Collins et al., 2016) is a three-player computer task requiring participants to judge whether a pair of symbols appearing in random locations on screen are matched or mismatched. Participants are told they will win and lose points on the basis of both speed and accuracy. Points won and lost as an individual contribute to a cumulative team total, and as a team, participants are aiming to beat a target
score they are told is based on the average performance of teams who have previously completed the task. Two manipulations are used to induce perceptions of burdensomeness and thwarted belongingness.

**Perceived burdensomeness manipulation.** Perceived burdensomeness is induced using performance feedback. Participants are presented with a score summary table after each round showing their own points won and lost, points won and lost by their teammates, the team total score, and the team target score. These scores do not reflect actual performance, but rather are manipulated according to odds parameters. Specifically, the odds of winning or losing on any trial are predetermined such that participants allocated to the high PB/TB conditions always score lower than their teammates, while those allocated to the low PB/TB condition always score equivalent to or better than their teammates. This manipulation ensures participants in the high PB/TB conditions do not effectively contribute to overall performance and are therefore likely to consider themselves a burden on the team.

**Thwarted belongingness manipulation.** Belongingness is manipulated using interpersonal feedback statements. Participants are told they are playing with fellow students, however in reality both “co-players” are simulated by the computer. After every three rounds of five trials participants are given the opportunity to send feedback to each of their “co-players”. They are told prior to commencing that this feedback may assist team performance. Once they have entered feedback they receive comments from each of their “co-players”, including grammatical errors and colloquialisms consistent with a student population. In the high PB/TB condition comments are increasingly critical, while in the low PB/TB condition comments are supportive. Thus, participants in the high PB/TB
condition are made to feel as though they are not valued by their “co-players” and therefore their need to belong within the team may be thwarted.

To increase the plausibility of the manipulation, two participants are tested concurrently in adjacent booths and are told there is a third participant in a laboratory down the hall. Where necessary, a confederate of the researcher plays the part of a fellow participant. The task begins with on-screen instructions and participants are given the opportunity to complete a practice round. The main task then runs for six blocks, comprising three rounds of five trials each. Following each of the six time blocks participants rate the extent to which: (1) they feel a burden on their team (perceived burdensomeness); (2) they feel like they do not belong in the team (belongingness); and (3) if given the opportunity, they would rather drop out of the task (desire to escape) on a 7-point Likert scale ranging from 0 (not at all true for me) to 6 (very true for me). To account for levels of relaxation/distress experienced during the task, participants are asked to rate how they are feeling after each time block on a bi-directional scale ranging from 0 (relaxed) to 6 (distressed). After completion participants rate the extent to which they made an effort to do well and were interested in the task, also on a 7-point scale.

Participants in the high PB/TB-MI and high PB/TB-UA conditions also completed an intervention exercise following block three of the task (i.e., the halfway point). Both interventions were automated so the experimenter did not intervene for the duration of the task.

**Mindfulness intervention (MI).** The MI was adapted from the procedure of Arch and Craske (2006) and is based on strategies used in Mindfulness-Based Stress Reduction
(Kabat-Zinn, 1990) and Mindfulness-Based Cognitive Therapy (Segal, Williams, & Teasdale, 2002). The intervention consisted of written information explaining mindfulness and a 10-minute audio exercise. In the audio exercise participants are instructed to focus their attention on the sensations of the breath (i.e., focused breathing). They are also invited to adopt an accepting stance towards any thoughts, emotions, or physical sensations that may arise before bringing their awareness back to the breath. This procedure has successfully induced state mindfulness in a number of previous experimental studies (e.g., Arch & Craske, 2006; Erisman & Roemer, 2010; McHugh, Procter, Herzog, Schock, & Reed, 2012).

Unfocused attention (UA) intervention. The UA intervention required participants to let their mind wander freely as they normally would throughout the day. This form of unfocused attention reflects baseline awareness, the opposite of a mindful mode of processing (Mason et al., 2007). After initial written instruction participants viewed a screen with a reminder prompt (‘Please remain seated in your chair and let your thoughts flow’) and a moving bar showing the overall time elapsed. The intervention was matched in length to the mindfulness intervention (i.e., 10 minutes).

Following the computer task, participants completed an online questionnaire battery and a suspicion probe consisting of two written questions: (1) ‘Do you have any comments about the experiment?’, and (2) ‘Do you have any comments about your teammates?’ Following the approach of Collins et al. (2016), these questions were deliberately oblique to minimize demand effects; that is, a more direct question about the primary manipulation might lead participants to endorse suspicion more readily because the belief that their co-players were not real is instrumental in reducing their subjective discomfort generated by
their poor performance and negative feedback received during the task. Participants were then fully debriefed and provided with details of available support services.

Measures

Freiburg mindfulness inventory (FMI; Walach et al., 2006). The FMI is a 14-item measure of dispositional mindfulness with good psychometric properties (Kohls, Sauer, & Walach, 2009). It assesses both mindful awareness of present-moment experience and acceptance towards current thoughts, emotions, and body sensations. Items such as ‘I feel connected to my experience in the here-and-now’ and ‘I accept unpleasant experiences’ are rated on a 4-point Likert scale from 1 (rarely) to 4 (almost always), such that higher scores indicate greater dispositional mindfulness. The scale is suitable for use in populations with no prior experience of mindfulness meditation (Kohls et al., 2009). Internal consistency reliability in the current sample was good (α = .83).

Interpersonal needs questionnaire (INQ; Van Orden, Cukrowicz, Witte, & Joiner, 2012). The 15-item INQ measures base-level perceived burdensomeness (6 items; e.g., ‘The people in my life would be happier without me’) and thwarted belongingness (9 items; e.g., ‘I feel disconnected from other people’). Participants rate agreement with these items on a 7-point Likert scale from 0 (not at all true for me) to 6 (very true for me). The scale has good psychometric properties (Van Orden et al., 2012) and internal consistency reliability in the current sample was high for both burdensomeness (α = .92) and thwarted belongingness (α = .86) subscales.

Need to belong to the team. To account for perceived need to belong within the current experimental context—and hence the degree to which this need could be thwarted
during the task—prior to commencement participants were asked to indicate how important (during the upcoming team activities) it was that: (1) ‘others accept me as a person’; (2) ‘others care about me as a person’; and (3) ‘I feel as though I belong’. Items were rated on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating greater perceived need to belong. These items were adapted from a need to belong scale (Leary, Kelly, Cottrell, & Schreindorfer, 2013). Internal consistency reliability in the current sample was high ($\alpha = .87$).

**Kessler psychological distress scale (K10; Kessler et al., 2002).** The 10-item K10 measures psychological distress in non-clinical populations and has good psychometric properties (Kessler et al., 2002). Items assessing the prevalence of mood disorder symptoms such as nervousness and depression over the previous 4 weeks are rated on a 5-point Likert scale from 1 (none of the time) through to 5 (all of the time), so higher scores indicate greater psychological distress. The normative bands for K10 scores commonly used in the Australian population are: low distress (10-15), moderate distress (16-21), high distress (22-29), and very high distress (30-50) (Cvetkovski, Reavley, & Jorm, 2012). Internal consistency reliability in the current sample was good ($\alpha = .88$).

**Self-injurious thoughts and behaviors interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007).** To assess suicidal ideation, an item taken from the SITBI asked participants to indicate the number of times they had thought about suicide over the past 12 months, ranging from 0 (never) to 5 (almost every day). Although traditionally a semi-structured interview, application of SITBI items in a self-report format is psychometrically sound (Latimer, Meade, & Tennant, 2013).
**Intent, likelihood, and readiness for suicide.** Intent, likelihood, and readiness for suicide were assessed using three items (‘I have no intention of killing myself in the near future’, ‘It is very unlikely that I would die by suicide anytime soon’, and ‘If I wanted to kill myself, I feel ready to do so’) measured on a 9-point scale ranging from 0 (agree not at all) to 8 (agree very strongly). The intention and likelihood items are reverse-coded, such that higher scores indicate higher intention and likelihood for suicide in the future.

**Data Analyses**

The effects of the experimental manipulation on burdensomeness and belongingness ratings were first examined using 4 (low PB/TB; high PB/TB; high PB/TB-MI; high PB/TB-UA conditions) × 6 (Time Blocks 1-6) mixed-design analyses of variance (ANOVA). The effects of the experimental procedure on desire to escape ratings was also examined using a 4 (low PB/TB; high PB/TB; high PB/TB-MI; high PB/TB-UA conditions) × 6 (Time Blocks 1-6) mixed-design ANOVA, including linear and quadratic trends across time. A significant linear trend would confirm that the induction increased desire to escape across time as predicted. A significant quadratic effect would confirm whether desire to escape ratings, despite escalating in the initial stages of the task, were attenuated in the latter part of the procedure. Significant effects of time were also followed up separately for the period prior to the intervention (Time 1 – 3) and for the period from pre-to-post intervention (Time 3 – 6). Finally, a hierarchical multiple regression analysis was used to confirm burdensomeness and belongingness were the primary contributors to desire to escape within the experimental conditions after controlling for interest, effort, and distress.
3.4 Results

Data screening confirmed there were no univariate or multivariate outliers, and skew and kurtosis were within recommended limits in all experimental conditions (Field, 2013). On the desire to escape variable, skewness was relatively consistent across time and experimental conditions and remained above -1.0 at all six measurement intervals (maximum skew = -0.91 in the high PB/TB condition at Time 6). Participants also endorsed the full range of response options (0-6) on desire to escape from Time 2 onwards in all three experimental conditions.

Descriptive statistics are displayed in Table 1. Scores on the FMI were, as intended, in the middle of the distribution on this variable. Mean K10 scores were at the upper end of the ‘moderate distress’ range (Cvetkovski et al., 2012), and 35 participants (44.3%) reported suicidal ideation over the past year. Mean score on the need to belong to the team in the upcoming team task was high (4.10 out of 5), suggesting that on average participants thought it was important to feel they were part of the team in the upcoming task.

Table 1

Descriptive Statistics for the Questionnaire Variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived burdensomeness</td>
<td>0.84</td>
<td>0.99</td>
</tr>
<tr>
<td>Thwarted belongingness</td>
<td>1.32</td>
<td>0.89</td>
</tr>
<tr>
<td>Dispositional mindfulness</td>
<td>2.71</td>
<td>0.45</td>
</tr>
<tr>
<td>Suicide ideation</td>
<td>1.60</td>
<td>0.83</td>
</tr>
<tr>
<td>Suicide intent</td>
<td>2.12</td>
<td>2.44</td>
</tr>
<tr>
<td>Suicide likelihood</td>
<td>2.21</td>
<td>2.52</td>
</tr>
<tr>
<td>Psychological distress</td>
<td>19.89</td>
<td>5.57</td>
</tr>
<tr>
<td>Need to belong</td>
<td>4.10</td>
<td>0.65</td>
</tr>
</tbody>
</table>
Manipulation Checks

Thirteen participants indicated in the suspicion probe that they may have guessed the nature of the study design and were excluded. Participants in the three high PB/TB conditions rated significantly lower interest and effort compared to participants in the low PB/TB condition \(p < .05\), and therefore these variables were controlled for in the analyses. A \(4 \times 6\) ANOVA was used to examine the effects of condition and time on perceived burdensomeness ratings. There was only a main effect of condition, \(F(3, 75) = 72.33, p < .001, \eta^2_{\text{partial}} = .74\). Participants in all three high PB/TB conditions reported higher levels of burdensomeness than those in the low PB/TB condition (all \(p\) values \(< .001\)) (Figure 1A). This confirms the experimental manipulation increased perceptions of burdensomeness in all three high PB/TB conditions as intended. A \(4 \times 6\) ANOVA examining the effects of condition and time on belongingness ratings revealed a significant main effect of condition, \(F(3, 75) = 50.89, p < .001, \eta^2_{\text{partial}} = .67\). Follow-up contrasts showed that belongingness ratings were significantly lower in the three high PB/TB conditions compared to the low PB/TB condition (all \(p\) values \(< .001\)) (Figure 1B). This confirmed that the belongingness manipulation was successful. In addition, there was a significant main effect of time, \(F(5, 71) = 21.40, p < .001, \eta^2_{\text{partial}} = .60\), and a significant condition by time interaction, \(F(15, 219) = 3.36, p < .001, \eta^2_{\text{partial}} = .19\). Follow-up tests revealed a significant effect of time in each of the high conditions, \(F(5, 14) = 11.66, p < .001, \eta^2_{\text{partial}} = .81\); \(F(5, 15) = 11.68, p < .001, \eta^2_{\text{partial}} = .80\); \(F(5, 15) = 15.61, p < .001, \eta^2_{\text{partial}} = .84\) (high PB/TB, high PB/TB-MI, and high PB/TB-UA, respectively), but no effect of time in the low PB/TB condition, \(F(5, 15) = 1.26, p = .33, \eta^2_{\text{partial}} = .30\). Participants in the high PB/TB conditions diminished in
belongingness over time, whereas participants in the low PB/TB condition reported a stable high level of belongingness over time.

Table 2

*Mean Desire to Escape Ratings Across Time Blocks and Conditions.*

<table>
<thead>
<tr>
<th></th>
<th>Low PB/TB M (SD)</th>
<th>High PB/TB M (SD)</th>
<th>Mindfulness M (SD)</th>
<th>Unfocused M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>0.65 (1.23)</td>
<td>2.05 (1.27)</td>
<td>2.35 (1.45)</td>
<td>2.15 (1.42)</td>
</tr>
<tr>
<td>Time 2</td>
<td>0.55 (0.76)</td>
<td>2.95 (1.62)</td>
<td>3.80 (2.07)</td>
<td>2.90 (2.08)</td>
</tr>
<tr>
<td>Time 3</td>
<td>0.40 (0.60)</td>
<td>3.37 (1.67)</td>
<td>4.10 (2.07)</td>
<td>2.70 (1.98)</td>
</tr>
<tr>
<td>Time 4</td>
<td>0.45 (0.76)</td>
<td>3.05 (1.72)</td>
<td>3.75 (2.07)</td>
<td>2.65 (2.01)</td>
</tr>
<tr>
<td>Time 5</td>
<td>0.40 (0.68)</td>
<td>3.84 (2.01)</td>
<td>4.10 (1.94)</td>
<td>2.90 (2.20)</td>
</tr>
<tr>
<td>Time 6</td>
<td>0.40 (0.68)</td>
<td>4.16 (1.74)</td>
<td>4.40 (1.82)</td>
<td>3.40 (2.40)</td>
</tr>
</tbody>
</table>
Figure 1. Interpersonal Persistence Task ratings. Panel A shows mean burdensomeness; Panel B shows mean belongingness; and Panel C shows mean desire to escape ratings depicted as linear trends pre and post intervention. Error bars represent standard error of the mean.
Desire to Escape

Mean desire to escape ratings across time blocks are displayed in Table 2. A $4 \times 6$ ANOVA revealed significant main effects of condition, $F(3, 75) = 18.08, p < .001, \eta^2_{\text{partial}} = .42$, time, $F(5, 71) = 16.30, p < .001, \eta^2_{\text{partial}} = .53$, and a significant condition by time interaction, $F(15, 219) = 2.96, p < .001, \eta^2_{\text{partial}} = .17$. There were also significant linear, $F(3, 75) = 9.56, p < .001, \eta^2_{\text{partial}} = .28$, and quadratic trends, $F(3, 75) = 3.05, p = .03, \eta^2_{\text{partial}} = .11$, that interacted with condition. Follow-up analyses revealed the effect of time was significant in each of the high conditions: $F(5, 14) = 6.77, p = .002, \eta^2_{\text{partial}} = .71$, for the high PB/TB condition; $F(5, 15) = 8.70, p < .001, \eta^2_{\text{partial}} = .74$, for the high PB/TB-MI condition; and $F(5, 15) = 3.48, p = .027, \eta^2_{\text{partial}} = .54$, for the high PB/TB-UA condition. In contrast, the effect of time in the low PB/TB condition was non-significant, $F(4, 16) = 1.33, p = .30, \eta^2_{\text{partial}} = .25$. There was also a significant quadratic effect in the high PB/TB-MI condition, $F(1, 19) = 5.61, p = .029, \eta^2_{\text{partial}} = .23$, but not in the other high or low PB/TB conditions ($p’s > .05$). Thus, as can be seen in Figure 1C, participants in all high PB/TB conditions rated higher desire to escape relative to the low PB/TB condition and this desire to escape increased significantly across the span of the task. In contrast, in the MI condition there was an attenuation effect – desire to escape plateaued in the second half, with that inflection accounting for the significant quadratic effect. Relaxation/distress, interest, effort, and K10 scores were also added as covariates in all mixed-model ANOVAs. However, given this did not substantively alter the pattern of effects, results have been reported without these covariates.

Further examination of the effect of time pre and post intervention revealed that in the high PB/TB-MI condition, desire to escape increased significantly from Time 1 to Time
3, \( F(1, 19) = 27.87, p < .001, \eta^2_{\text{partial}} = .60 \), but then remained stable from Time 3 to Time 6, \( F(1, 19) = .77, p = .39, \eta^2_{\text{partial}} = .04 \). In contrast, for the high PB/TB-UA condition, desire to escape not only increased significantly from Time 1 to Time 3, \( F(1, 19) = 6.78, p = .017, \eta^2_{\text{partial}} = .26 \), but also post intervention, from Time 3 to Time 6, \( F(1, 19) = 8.39, p = .009, \eta^2_{\text{partial}} = .31 \). Similarly, in the standard high PB/TB condition, desire to escape increased significantly from Time 1 to Time 3, \( F(1, 18) = 16.40, p < .001, \eta^2_{\text{partial}} = .48 \), and again from Time 3 to Time 6, \( F(1, 18) = 5.18, p = .035, \eta^2_{\text{partial}} = .22 \). Thus, for participants in the MI condition, desire to escape did not further increase after the intervention, whereas in the other high PB/TB conditions, desire to escape continued to escalate until the end of the task.

Finally, a hierarchical multiple regression analysis confirmed that in the high PB/TB conditions, once burdensomeness and belongingness were added to the model, interest and distress were no longer significant predictors of desire to escape the task (Table 3). While effort was still significantly associated with lower desire to escape at Step 2, the standardized betas show that this effect was smaller than for burdensomeness and belongingness.
Table 3

Hierarchical Multiple Regression Within the High PB/TB Conditions, with Desire to Escape as the Outcome Variable, Interest, Effort and Distress entered in Step 1, and Burdensomeness and Belongingness Entered in Step 2.

<table>
<thead>
<tr>
<th></th>
<th>b</th>
<th>SE b</th>
<th>β</th>
<th>R²</th>
<th>R² Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort</td>
<td>.30</td>
<td>.15</td>
<td>-.22*</td>
<td>.37**</td>
<td></td>
</tr>
<tr>
<td>Interest</td>
<td>.32</td>
<td>.11</td>
<td>-.32**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distress</td>
<td>.61</td>
<td>.15</td>
<td>.45**</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort</td>
<td>.36</td>
<td>.14</td>
<td>-.26*</td>
<td>.50**</td>
<td></td>
</tr>
<tr>
<td>Interest</td>
<td>-.11</td>
<td>.11</td>
<td>-.12</td>
<td>.13**</td>
<td></td>
</tr>
<tr>
<td>Distress</td>
<td>.13</td>
<td>.19</td>
<td>.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burdensomeness</td>
<td>.64</td>
<td>.21</td>
<td>.41**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belongingness</td>
<td>-.48</td>
<td>.18</td>
<td>-.31*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, N = 59

Desire to Escape and Suicide Risk

Higher desire to escape the task was associated with higher intent (r = .35, p = .002) and likelihood (r = .45, p < .001) for suicide, and higher psychological distress (r = .36, p = .001). There was no significant association between desire to escape and readiness for suicide (r = .20, p = .078) or previous suicide ideation (r = .07, p = .55).

3.5 Discussion

We examined whether a brief mindfulness intervention can attenuate the effects of experimentally-induced perceived burdensomeness and thwarted belongingness on desire to
escape after these interpersonal factors are already elevated. As predicted, all three high PB/TB conditions displayed a linear increase in desire to escape across the initial stages of the task. This is consistent with literature showing the thwarting of fundamental needs for competence and relatedness has a negative impact on intrinsic motivation and persistence, thereby contributing to potential antecedents of suicide risk (Collins et al., 2016; Deci & Ryan, 2000; Ryan & Deci, 2000; Twenge, Catanese, & Baumeister, 2002; Van Orden et al., 2010). Following the mindfulness intervention, however, this linear increase was arrested, with desire to escape in this condition plateauing in the latter stages of the task. In contrast, desire to escape continued to escalate in both the unfocused attention intervention and no intervention control conditions across the entire span of the task.

Importantly, the intervention was successful despite the already heightened levels of perceived burdensomeness and thwarted belongingness. These findings are consistent with research showing that state mindfulness administered as a preventative intervention buffers against deficits in persistence across time (Collins et al., 2016), and that mindfulness-based clinical interventions reduce risk for suicidality (Chesin et al., 2015; Forkmann et al., 2014). Here we provide experimental evidence that mindfulness interventions may reduce suicide risk in part by moderating the deleterious impact of heightened perceived burdensomeness and thwarted belongingness as predicted by the interpersonal theory of suicide. The fact that all three high PB/TB conditions displayed comparably high levels of burdensomeness and thwarted belongingness across the task is consistent with the notion that mindfulness reduces negative reactivity to stressors, rather than directly altering the subjective experience of those stressors (Farb et al., 2010; Williams & Swales, 2004). That is, rather than conferring immunity to perceptions of burdensomeness and thwarted
belongingness, mindfulness may change one’s behavioral response in the face of these negative states and in doing so reduce one’s desire to escape from life.

Notably, while the current results suggest that the mindfulness intervention attenuated the desire to escape, the protective effects were similar in magnitude to those reported by Collins et al. (2016) who administered the induction prior to commencing the task. However, it is possible that mindfulness may be a better preventative than crisis intervention. Indeed, mindfulness training in the presence of stressful cognitive-affective states, such as perceived burdensomeness and thwarted belongingness, may undermine the effectiveness of the intervention (Lau et al., 2006; Williams & Swales, 2004). This is in part the justification for the initial recommendation that mindfulness-based interventions be used when patients are relatively well, rather than during a suicidal crisis (e.g., Williams & Swales, 2004). To provide further clarity on this important issue of timing, future research is needed that directly compares the effectiveness of mindfulness training delivered prior to the task with an intervention delivered in the midst of the experimental procedure.

The current study has a number of implications for theories of suicide and clinical interventions seeking to mitigate suicidal behavior. First, these findings are consistent with previous experimental evidence suggesting perceived burdensomeness and thwarted belongingness increase desire to escape as a potential antecedent to suicide risk and the interpersonal theory’s prediction that these constructs are causal factors underlying the desire to give up on life (Collins et al., 2016). Both perceived burdensomeness and thwarted belongingness explained additional variance in desire to escape the task above and beyond interest, effort, and general distress. Results also highlight that contemporary theories of suicide need to better account for resilience factors that may moderate the
impact of putative causal risk factors on suicidality. Clinically, the current findings provide experimental support for the utility of mindfulness-based treatments for individuals currently experiencing heightened levels of perceived burdensomeness and thwarted belongingness. Brief mindfulness training attenuated the effects of interpersonal adversity on desire to escape, suggesting treatments incorporating mindfulness strategies may mitigate the impact of interpersonal antecedents of suicide risk.

Limitations and Future Directions

The current findings should be interpreted in the context of some limitations. While the data suggest that mindfulness conferred protection against any further increase in the desire to escape post intervention, an alternative explanation is that participants in the MI condition who exhibited the strongest increase in desire to escape across the initial stages of the task had reached ceiling by Time 3, obviating further increases in the latter stages of the procedure. However, a ceiling effect is less likely for several reasons. First, responses on the desire to escape item were normally distributed for the duration of the task, with skewness well within established limits and remaining largely unchanged across all six time points. Second, the entire range of response options on the desire to escape item were endorsed by some participants from Time 2 onwards, suggesting there was further room to move for more participants into the upper portion of the scale in the latter stages of the procedure. Third, burdensomeness ratings remained high and belongingness ratings continued to diminish across time, implying that the experimental manipulation continued to exert an effect across the span of the entire task. Fourth, a consistent finding across multiple studies using the persistence paradigm is that desire to escape in non-mindfulness induction conditions continues to increase across the entire span of the task. Nevertheless, a
ceiling effect cannot be definitively ruled out and future research should seek to clarify this possibility. For instance, given the effects of the manipulation emerge early in the task, the mindfulness intervention could be administered following interval one. That is, current and previous data show that desire to escape ratings keep reliably increasing after interval two and beyond (Collins et al., 2016). Thus, the effects of a mindfulness intervention right after interval one would not be subject to potential ceiling effects, at least not during intervals two and three. Alternatively, the protective effect of the mindfulness intervention may emerge more clearly if the increasing trend of desire to escape in the control conditions continued post trial interval six and therefore future studies could extend the post intervention trial blocks to test this possibility.

A second limitation concerns the screening process selecting individuals scoring in the mid-range on dispositional mindfulness. Specifically, it remains unclear whether our mindfulness intervention would have had the same beneficial effects for individuals who are lower on dispositional mindfulness. If mindfulness is a suicide resilience factor, it is likely that individuals prone to suicidality would be less inclined to adopt a mindful mode of processing in daily life. To minimize individual differences in dispositional mindfulness, and the potential impact this may have had on the mindfulness intervention, we deliberately excluded individuals who scored in the extremes on this variable. Future research might therefore test the effects of a mindfulness intervention in individuals who are either low or high on dispositional mindfulness. It may be that people low in dispositional mindfulness show the greatest benefit from enhancing their mindfulness via an intervention. Alternatively, a moderate level of dispositional mindfulness may be required to benefit from such interventions to reduce interpersonal antecedents of suicidal desire.
A third limitation is the use of explicit questioning concerning perceptions of burdensomeness, belongingness, and desire to escape throughout the task raises the possibility of demand characteristics, although the large effects of condition evident by the first rating interval mitigate this concern somewhat. Lastly, it is still unclear what mechanism(s) underlie the protective effects of mindfulness. While the literature suggests that mindfulness may promote meaning-making and engagement with life despite adversity (e.g., Garland, Farb, Goldin, et al., 2015), the present study is unable to elucidate these potential mechanisms of action. Thus, future research may consider incorporating additional measures to provide further insight into the positive effects of mindfulness on persistence in adversity.

In conclusion, mindfulness interventions may mitigate suicide risk by attenuating the deleterious impact of thwarted interpersonal needs thought to be proximal causal antecedents of the wish to die.
### 3.6 References


https://doi.org/10.1007/s00737-016-0686-5


and trends in non-specific psychological distress. Psychological Medicine, 32(06), 959–976. https://doi.org/10.1017/S0033291702006074


Chapter 4 Does Mindfulness Confer Resilience by Enhancing Zest for Life?

Chapter 2 showed that zest for life at an individual difference level attenuates the impact of the interpersonal risk factors identified by the ITS, supporting its role as a suicide resilience factor. Taking the idea of resilience a step further, the second study reported in Chapter 2 showed that mindfulness training reduces desire to escape when delivered as a preventative intervention prior to the experience of interpersonal adversity. In Chapter 3, a brief mindfulness induction also enhanced resilience when delivered during the experience of interpersonal adversity, once perceived burdensomeness and thwarted belongingness were already elevated. However, the interrelationship between mindfulness and zest and the mitigating effect these factors have on suicidal desire outside of the laboratory has yet to be explored. The pattern of effects observed in Chapter 2 suggests that mindfulness may have compensated for deficiencies in pre-existing resilience. Specifically, the between-group differences across high and low zest individuals on persistence observed in Study 1 were diluted following the mindfulness induction in Study 2, with both high and low zest individuals who received the mindfulness induction remaining at a stable low level of desire to escape across time relative to controls. Taken together with the literature reviewed in Chapter 1 characterizing the life-sustaining influence of these factors and their overlap at a conceptual level, these data suggest that mindfulness and zest for life may be situated on a common pathway to suicide resilience.

A relationship between mindfulness and zest would be consistent with the protective role of desire for life as a counterbalance to the desire for death. A growing body of literature suggests that suicidal ambivalence is dynamic in nature, with individuals
regularly cycling between desiring to live and desiring to die (Brown, Steer, et al., 2005; Bryan & Rudd, 2016; Bryan et al., 2016; Rudd, 2006). Bryan et al. (2016) propose that effective treatments for suicidality work because they influence an individual’s wish to live in unique ways. For instance, both Dialectical Behavior Therapy (Linehan, 1993) and Cognitive Therapy (Brown, Have, et al., 2005) aim to strengthen the desire to (re)engage with life independently of the wish to die by identifying and building upon reasons for living and promoting life affirming beliefs and behaviors. This emerging literature highlights the value of enhancing the suicidal individual’s orientation towards living as an offset to the desire for death. Thus, strategies that can promote an orientation towards living are an important focus.

The study presented in this chapter uses a longitudinal design to test whether mindfulness prospectively predicts lower suicidal desire and whether this factor is protective because it enhances zest for life under conditions of heightened risk and adversity. There are currently few longitudinal studies examining the interplay between suicide risk and resilience over time (Johnson, Wood, Gooding, Taylor, & Tarrier, 2011), and thus the prospective design of the current study is a key strength. Moreover, the high external validity of this design complements the experimental work reported in the preceding chapters and enables us to examine whether these previously observed effects can be replicated outside of the laboratory. If the prospective mediation effect is confirmed, it would be consistent with a potential causal relationship between mindfulness and lower suicidal desire through zest for life.

The study presented in this chapter has been published:

https://doi.org/10.1016/j.jad.2017.09.043
4.1 Abstract

Background: Mindfulness is a trainable skill that may enhance resilience to suicidality among vulnerable groups such as young people. The current study examined whether mindfulness protects against suicidal desire in the face of heightened risk and adversity by increasing zest for life in a sample of university students. Methods: In a prospective design, participants (N = 233) were assessed at two time points over eight weeks. Online surveys included the Mindful Attention and Awareness Scale, Zest for Life Scale, Interpersonal Needs Questionnaire, Kessler Psychological Distress Scale, and items assessing suicidal ideation and suicidal intent. Results: Baseline mindfulness was associated with lower suicidal ideation and intent at follow-up. Moderated mediation analyses confirmed the effects of mindfulness on ideation and intent were mediated by zest for life and these indirect effects were stronger at higher versus lower levels of general (psychological distress) and suicide-specific (perceived burdensomeness and thwarted belongingness) risk. Limitations: Single item assessments of suicidal desire. Conclusions: Findings suggest that mindfulness protects against suicidal desire in conditions of heightened risk and adversity by enhancing one’s orientation towards a life worth living. Theories of suicide should consider the dynamic interplay between risk and life-sustaining resilience, while clinicians treating suicidality could use mindfulness strategies to strengthen the desire to (re)engage with life, thereby complementing direct amelioration of suicide risk factors.
4.2 Introduction

Suicide is the leading cause of mortality among people aged 15 to 44 years in Australia (ABS, 2015) and among younger age groups in other Western countries such as the United States (Glenn & Nock, 2014; Nock, 2016). Young people report higher psychological distress than the general population (Stallman, 2010) and are particularly vulnerable to the effects of interpersonally-oriented suicide risk factors, such as perceived burdensomeness and thwarted belongingness (Barzilay et al., 2015; Christensen, Batterham, Mackinnon, Donker, & Soubellet, 2014; Ream, 2015). Moreover, among younger age groups, university students are at especially heightened risk for suicide (King et al., 2015). A greater focus on enhancing resilience to offset these vulnerabilities may be critical to more effective prevention. The buffering hypothesis (Johnson et al., 2011) proposes that risk and resilience exist on separate dimensions and make unique contributions to the onset of suicidality. Resilience factors are psychological attributes, processes, or abilities that attenuate the negative impact of risk factors, thereby diminishing the probability of suicidal outcomes in situations of adversity. The current study tests the effects of two putative suicide resilience factors – mindfulness and zest for life – on suicidal desire in a sample of university students using a prospective design.

Mindfulness, the process of paying attention to present-moment experience with acceptance and non-judgment, is one factor that may be pertinent to suicide resilience since it focuses on the manner in which one reacts to and copes with stressors, rather than on directly ameliorating risk (Arch & Craske, 2006; Collins, Best, Stritzke, & Page, 2016; Desrosiers, Vine, Curtiss, & Klemanski, 2014). There has been limited research examining the protective role of mindfulness on the pathway to suicide. Some recent studies found
dispositional mindfulness, the tendency to be mindful in daily life, was associated with lower suicidal ideation in college students (Chesin & Jeglic, 2016; Lamis & Dvorak, 2013) and in individuals with comorbid substance use and borderline personality disorder (Shorey et al., 2016). Another study found higher levels of mindfulness moderated the impact of stress and depressive symptoms on suicidal ideation in female undergraduate students (Anastasiades, Kapoor, Wootten, & Lamis, 2016). However, these studies were cross-sectional and therefore it is unclear whether mindfulness acts as a resilience factor to prospectively reduce the likelihood of suicidality, or whether it is simply a correlate of risk. A number of randomized controlled trials have also shown that clinical treatments incorporating mindfulness training reduce suicidal cognitions and behaviors (e.g., Barnhofer et al., 2015; Forkmann et al., 2014; Gunderson, 2015; Linehan et al., 2006). However, these studies do not elucidate the specific effects of mindfulness as an active ingredient in the mitigation of suicidality.

A second resilience factor that may play an important role on the pathway to suicide is zest for life, a construct reflecting strong engagement with and a positive outlook on life. These attributes are associated with higher wellbeing (Peterson, Ruch, Beermann, Park, & Seligman, 2007) and lower suicidality (Collins et al., 2016; George, Stritzke, Page, & Brown, 2017; Harrison, Stritzke, Fay, Ellison, & Hudaib, 2014). Positive future outlook is an important component of zest, however zest is a broader construct than optimism and hope because it also captures current engagement with and enthusiasm about life. This combination of positive present- and future-focused engagement is arguably critical for adaptive coping in contexts of adversity and for maintaining a sense that life is worth living, even if one’s current circumstances are stressful or aversive (c.f., Linehan et al.,
Zest is also not simply the inverse of negative constructs such as depression, since factors that confer resilience exist on a separate dimension to risk and serve to buffer the association between risk factors and suicidal outcomes (Johnson et al., 2011). Thus, an absence of depression does not imply that one possesses a zest for life, and one can lack zest for life but not be depressed.

Recent experimental findings (Collins et al., 2016) showed that individuals who score higher on zest for life display greater persistence in the face of experimentally-induced perceived burdensomeness and thwarted belongingness (PB-TB), two interpersonal factors posited to be proximal antecedents of suicidal desire (Van Orden et al., 2010). Conversely, those who score lower on zest display less persistence in the face of this interpersonal adversity. Notably, this research found no differences in the persistence of high versus low zest individuals in the low adversity (i.e., low PB-TB) condition, indicating that the resilience conferred by zest was relevant only when risk was elevated. This is consistent with the buffering hypothesis which states that when risk is low, resilience factors are dormant or irrelevant, since in these conditions there is no impetus for suicidality (Johnson et al., 2011). Shifting focus to the enhancement of resilience, research using this experimental paradigm also showed that mindfulness training delivered both prior to (Collins et al., 2016; Study 2) and during (Collins, Stebbing, Stritzke, & Page, 2017) the experience of interpersonal adversity increased willingness to persist. Thus, mindfulness and zest for life are factors that confer resilience to the deleterious effects of interpersonal risk factors for suicide within the laboratory.

The present study aimed to further examine how mindfulness and zest for life and their potential interrelationship contribute to suicide resilience and prospectively affect
suicidal desire. Rather than directly buffering the relationship between risk and suicidal desire, mindfulness may act as a strategic and adaptive process of more effective coping with adversity, such that the perception of and attachment to a life worth living is not diminished by these negative circumstances. Mindfulness enhances emotion regulation and non-reactivity (Davidson, Goleman, & Schwartz, 1976; Davidson & McEwen, 2012; Teper, Segal, & Inzlicht, 2013), leading to increased wellbeing and satisfaction with life despite any co-occurring stress or negative affect (Baer & Lykins, 2011; Donald, Atkins, Parker, Christie, & Ryan, 2016; Hayes, Strosahl, & Wilson, 2011). Mindfulness also increases the capacity and desire to strive for personal goals and to live a meaningful life that is congruent with one's values (Baer & Lykins, 2011; Garland, Farb, Goldin, & Fredrickson, 2015). A life lived with meaning and purpose may in turn generate a vitality and zest for life, even in the face of adversity (Frankl, 1959; Hayes et al., 2011). Recent evidence suggests that even small increases in the desire for life may positively influence the dynamic relationship between suicide risk and resilience over time, decreasing the likelihood of suicidal outcomes (Bryan et al., 2016).

Specifically, we tested whether mindfulness protects against suicidal desire by increasing zest for life in the face of heightened risk and adversity. Using a prospective design, we specified a conditional process model whereby mindfulness exerts an indirect effect on suicidal desire through zest for life, with this mediation effect contingent upon the level of suicide risk that is present. As depicted in Figure 1, this model proposes that mindful awareness increases zest for life (path a) and that this heightened zest in turn acts as a buffer to reduce levels of suicidal desire at follow-up (path b). Given these buffering effects should be relevant only when risk is elevated, the strength of the indirect (resilience)
pathway between mindfulness and suicidal desire via zest for life is conditional upon the level of suicide risk factors. Our first hypothesis was that there would be a negative bivariate relationship between dispositional mindfulness at baseline and two indices of suicidal desire (ideation and intent) at follow-up. Second, in line with the buffering hypothesis, we hypothesized that the inverse relationship between baseline mindfulness and suicidal desire at follow-up would be mediated by zest for life and that these mediation effects would be stronger at higher versus lower levels of both general psychological distress and suicide-specific interpersonal adversity (i.e., perceived burdensomeness and thwarted belongingness).

Figure 1. Hypothesized moderated mediation model depicting how the indirect pathway from mindfulness to decreased suicidal desire through zest for life (paths a and b) is moderated by levels of suicide risk factors (psychological distress, perceived burdensomeness, thwarted belongingness).
4.3 Method

Participants and Procedures

University students (N = 233; 163 females; M<sub>age</sub> = 25.98, SD = 10.47, range: 17–74 years) completed an online survey at the beginning of the teaching semester and again at an eight-week follow-up<sup>5</sup>. The majority (65%) were undergraduates. Ethnicity included Caucasian-Australian (62%), European (15%), Asian (15%), and Other (8%). Participants were sent an initial invitation to participate via email and, after providing informed consent, generated their own unique identification code prior to completing the survey. Computer software with a forced-choice option was used to ensure no items were missed (Johnson, 2005). Participants had the option to view a list of available mental health resources at any point during or following completion of the questionnaires and were encouraged to make use of these resources in the event of any distress. At follow-up, participants were sent another link via email and asked to enter their unique identification code to enable data linkage with their original responses. All procedures were approved by the University’s ethics review board.

Measures

Mindful Attention and Awareness Scale (MAAS short version; Brown and Ryan, 2003; Van Dam et al., 2010). The MAAS (short version) is a 5-item measure assessing dispositional mindfulness, the tendency to be mindful in daily life. It is adapted from the 15-item MAAS (Brown & Ryan, 2003) and has equivalent psychometric properties (Van

<sup>5</sup> Participants also took part in a study on acquired capability for suicide (George et al., 2016). While some of the variables examined here have some overlap with this existing research, the analyses in the present research are original.
Dam et al., 2010). Items such as ‘It seems I am “running on automatic”, without much awareness of what I’m doing’ are rated on a 6-point Likert scale ranging from 1 (Almost Always) to 6 (Almost Never). Responses are averaged such that higher scores indicate higher dispositional mindfulness. Internal consistency reliability in the current sample was high both at baseline ($\alpha = .89$) and at follow-up ($\alpha = .92$).

**Zest For Life Scale** (ZLS; George et al., 2017). The 12-item ZLS measures engagement with, and positive outlook on, life. Agreement with questions such as ‘I am embracing life’ and ‘I try to enjoy life no matter what’ is rated on a 9-point Likert scale (‘not at all’ to ‘very strongly’), with higher scores indicating greater zest for life. The ZLS has good psychometric properties (Collins et al., 2016; George et al., 2017) and internal consistency reliability in the current sample was excellent at both baseline ($\alpha = .95$) and follow-up ($\alpha = .96$).

**Kessler Psychological Distress Scale** (K10; Kessler et al., 2002). The 10-item K10 measures emotional states occurring in the past four weeks using a 5-item Likert scale ranging from ‘none of the time’ to ‘all of the time’, with higher scores indicating heightened psychological distress and higher probability of a mental health disorder (Andrews & Slade, 2001). Normative bands for K10 scores in the Australian population are: low distress (10-15), moderate distress (16-21), high distress (22-29), and very high distress (30-50)(Cvetkovski, Reavley, & Jorm, 2012). Internal consistency reliability in the current sample was excellent at both time points ($\alpha = .92$ at baseline and $\alpha = .92$ at follow-up).

**Interpersonal Needs Questionnaire** (INQ; Van Orden et al., 2012). The INQ is a 15-item measure comprising two sub-scales assessing perceived burdensomeness and
thwarted belongingness. Participants rate their agreement with statements such as ‘*I think I am a burden on society*’ (burdensomeness) and ‘*I often feel like an outsider in social gatherings*’ (thwarted belongingness) on a 7-point scale ranging from 0 (not at all true for me) to 6 (very true for me). Higher scores indicate greater perceived burdensomeness and thwarted belongingness. The INQ has good psychometric properties (Van Orden, Witte, Gordon, Bender, & Joiner, 2008) and internal consistency in the current sample was high for both burdensomeness (baseline $\alpha = .92$; follow-up $\alpha = .94$) and belongingness (baseline $\alpha = .91$; follow-up $\alpha = .93$) subscales.

**Suicidal Ideation and Attempts** (SITBI; Nock et al., 2007). Two items assessing suicidal ideation and previous suicide attempts were derived from the SITBI. Frequency of suicidal ideation over the past 12 months was assessed with one item (‘*How many times in the past year have you thought about suicide?*’) measured on a 6-point scale, with the following response options (0) = Never, (1) = Once or twice a year, (2) = Once or twice a month, (3) = Once or twice a week, (4) = Three or four times a week, (5) = Almost every day. Lifetime history of suicide attempts was measured with one item (‘*How many times in your lifetime have you made an actual attempt to kill yourself in which you had at least some intent to die?*’) rated on a 5-point scale, with the following response options (0) = Never, (1) = Once, (2) = Twice, (3) = Three or four times, (4) = Five or more times. The SITBI is suitable for use in non-clinical samples, has good psychometric properties (Nock et al., 2007), and can be administered in self-report format (Latimer, Meade, & Tennant, 2013).

**Suicidal Intent.** Suicidal intent was assessed using a single item (‘*I have no intention of killing myself in the near future*’) measured on a 9-point scale (‘agree not at
all’ to ‘agree very strongly’). This item is reverse-scored so higher scores indicate higher suicidal intent.

**Follow-up Measures.** The measures included at follow-up (Time 2) were identical to the initial battery (Time 1), with the exception of the two SITBI items assessing suicidal ideation and suicide attempts which were altered to reflect incidents occurring only in the preceding four weeks.

**Overview of Analyses**

Descriptive statistics for risk and resilience variables were first used to characterize the study sample. Next, the bivariate relationships between variables at baseline and follow-up were examined using Pearson correlation coefficients. The effects of baseline mindfulness on suicidal desire at follow-up both directly and indirectly through zest for life at high, medium, and low levels of our three suicide risk factors were then tested using moderated mediation analyses (Preacher & Hayes, 2008). These conditional process models enable quantification of the conditional indirect effects between predictor and outcome variables (Hayes, 2013). To test the hypothesis that baseline mindfulness at Time 1 would act to prospectively influence the interaction between risk (psychological distress, perceived burdensomeness, thwarted belongingness) and resilience (zest for life) and levels of suicidal desire at Time 2, mindfulness (Time 1) was specified as the predictor, zest for life (Time 2) as the mediator, suicidal ideation and intent (Time 2) as the outcome variables, with psychological distress, perceived burdensomeness, and thwarted belongingness (Time 2) as the moderators. Models were tested separately for each of the two outcome and three moderator variables. Confidence intervals were generated for the
conditional indirect effects at low (1 SD below the mean), moderate (mean), and high (1 SD above the mean) levels of the moderators. All models were run specifying 5,000 bias-corrected bootstrap samples with 95% confidence intervals and baseline levels of the respective outcome variables (ideation and intent) included as statistical controls. Point estimates are considered significant if the 95% confidence interval does not contain zero.

4.4 Results

Sample Characteristics

Data were first screened for invalid or careless responding, resulting in the exclusion of three cases. Descriptive statistics for the final sample at baseline and follow-up are displayed in Table 1. At baseline, 50.9% of participants reported having thought about suicide at least once in the past year and 11.7% reported thinking about suicide at least once in the past month. A substantial proportion (14.8%) also reported at least one lifetime suicide attempt. Mean psychological distress fell at the lower end of the ‘high distress’ band ($M = 21.43, SD = 7.94$), while levels of perceived burdensomeness and thwarted belongingness were comparable to other university student samples (e.g., Collins et al., 2017).

Bivariate Relationships between Risk, Resilience, and Suicidal Desire

Bivariate correlations between risk and resilience variables and suicidal desire at Time 1 and Time 2 are displayed in Table 1. Higher mindfulness at baseline was associated with higher zest for life and lower suicidal ideation and intent at follow-up. Similarly,

---

6 Analyses were also run controlling for age, gender, and suicide attempt history. Given this did not alter the pattern of effects, results have been reported without these additional covariates.
higher levels of zest were associated with lower suicidal ideation and suicidal intent, while higher levels of the suicide risk factors (psychological distress, perceived burdensomeness, and thwarted belongingness) were associated with higher levels of ideation and intent, and lower levels of mindfulness and zest for life at both time points.
Table 1.  
Descriptive statistics and correlations between questionnaire variables at baseline and follow-up.

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mindfulness (T1)</td>
<td>4.07</td>
<td>0.99</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>2. Zest (T1)</td>
<td>5.44</td>
<td>1.68</td>
<td>.54*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Distress (T1)</td>
<td>21.43</td>
<td>7.94</td>
<td>-.65*</td>
<td>-.71*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Perceived burden (T1)</td>
<td>0.88</td>
<td>1.14</td>
<td>-.56*</td>
<td>-.61*</td>
<td>.75*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Thwarted belong (T1)</td>
<td>1.79</td>
<td>1.22</td>
<td>-.49*</td>
<td>-.70*</td>
<td>.62*</td>
<td>.58*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Suicidal ideation (T1)</td>
<td>1.88</td>
<td>1.16</td>
<td>-.43*</td>
<td>-.60*</td>
<td>.63*</td>
<td>.3*</td>
<td>.53*</td>
<td>.53*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Suicidal intent (T1)</td>
<td>0.59</td>
<td>1.47</td>
<td>-.27*</td>
<td>-.39*</td>
<td>.39*</td>
<td>.37*</td>
<td>.39*</td>
<td>.44*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Mindfulness (T2)</td>
<td>4.07</td>
<td>1.04</td>
<td>.71*</td>
<td>.48*</td>
<td>-.53*</td>
<td>-.44*</td>
<td>-.38*</td>
<td>-.31*</td>
<td>-.24*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Zest (T2)</td>
<td>5.53</td>
<td>1.75</td>
<td>.46*</td>
<td>.77*</td>
<td>-.59*</td>
<td>-.54*</td>
<td>-.64*</td>
<td>-.56*</td>
<td>-.33*</td>
<td>.50*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Distress (T2)</td>
<td>21.43</td>
<td>7.95</td>
<td>-.59*</td>
<td>-.64*</td>
<td>.81*</td>
<td>.66*</td>
<td>.58*</td>
<td>.51*</td>
<td>.35*</td>
<td>-.63*</td>
<td>-.74*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Perceived burden (T2)</td>
<td>0.98</td>
<td>1.21</td>
<td>-.52*</td>
<td>-.63*</td>
<td>.71*</td>
<td>.85*</td>
<td>.62*</td>
<td>.51*</td>
<td>.36*</td>
<td>-.48*</td>
<td>-.64*</td>
<td>.73*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Thwarted belong (T2)</td>
<td>1.81</td>
<td>1.28</td>
<td>-.40*</td>
<td>-.62*</td>
<td>.52*</td>
<td>.50*</td>
<td>.83*</td>
<td>.47*</td>
<td>.32*</td>
<td>-.41*</td>
<td>-.73*</td>
<td>.63*</td>
<td>.65*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Suicidal ideation (T2)</td>
<td>1.41</td>
<td>0.79</td>
<td>-.34*</td>
<td>-.53*</td>
<td>.56*</td>
<td>.50*</td>
<td>.50*</td>
<td>.73*</td>
<td>.47*</td>
<td>-.25*</td>
<td>-.53*</td>
<td>.53*</td>
<td>.53*</td>
<td>.52*</td>
<td></td>
</tr>
<tr>
<td>14. Suicidal intent (T2)</td>
<td>0.56</td>
<td>1.39</td>
<td>-.22*</td>
<td>-.35*</td>
<td>.35*</td>
<td>.36*</td>
<td>.39*</td>
<td>.43*</td>
<td>.64*</td>
<td>-.12</td>
<td>-.42*</td>
<td>.42*</td>
<td>.40*</td>
<td>.37*</td>
<td>.58*</td>
</tr>
</tbody>
</table>

*Note. T1 = Variable measured at baseline (Time 1); T2 = Variable measured at follow-up (Time 2)  
*p < .001
The Effects of Mindfulness on Suicidal Desire via Zest for Life

To test the effects of baseline mindfulness on suicidal desire at follow-up through zest for life at higher versus lower levels of risk, moderated mediation analyses were conducted separately for suicidal ideation and suicidal intent. For each of these outcome variables, analyses were run specifying psychological distress, perceived burdensomeness, and thwarted belongingness as moderators, respectively. Coefficients for the models are reported in Table 2.

Suicidal Ideation. The model incorporating baseline mindfulness as the predictor, zest for life as the mediator, and psychological distress as the moderator explained a significant 64.49% of the variance in suicidal ideation at follow-up, $F(5,224) = 38.24, p < .001$. There was a significant negative indirect effect of baseline mindfulness on suicidal ideation via zest for life at high (indirect effect = -.10, 95% CI: -.17, -.05) and moderate levels of distress (indirect effect = -.04, 95% CI: -.08, -.01) but not low (indirect effect = .02, 95% CI: -.01, .06) levels of distress (index of moderated mediation = -.01, 95% CI: -.02, -.01). There was no direct effect of mindfulness on suicidal ideation (direct effect = .03, $p = .45$, 95% CI: -.05, .10). Similarly, the model specifying perceived burdensomeness as the moderator explained a significant 62.76% of the variance in suicidal ideation at follow-up, $F(5,224) = 75.50, p < .001$. There was a significant negative indirect effect of baseline mindfulness on suicidal ideation through zest for life at high (indirect effect = -.10, 95% CI: -.18, -.04) and moderate levels of burdensomeness (indirect effect = -.05, 95% CI: -.10, -.02), but not low (indirect effect = -.01, 95% CI: -.05, .01) levels of burdensomeness (index of moderated mediation = -.04, 95% CI: -.08, -.01). The direct effect of mindfulness on suicidal ideation was non-significant (direct effect = .03, $p = .36$, 95% CI: -.04, .10).
Finally, the model incorporating thwarted belongingness as the moderator explained a significant 64.49% of the variance in suicidal ideation at follow-up, $F(5,224) = 81.36, p < .001$. There was a significant negative indirect effect of baseline mindfulness on suicidal ideation through zest for life at high (indirect effect = -.09, 95% CI: -.15, -.04) and moderate levels of thwarted belongingness (indirect effect = -.03, 95% CI: -.07, -.01) but not low (indirect effect = .02, 95% CI: -.01, .06) levels of thwarted belongingness (index of moderated mediation = -.04, 95% CI: -.07, -.02). The direct effect of mindfulness on suicidal ideation was non-significant (direct effect = .01, $p = .72$, 95% CI: -.05, .08).

Consistent with the hypothesis that mindfulness predicts lower suicidal ideation by increasing zest for life but only in the face of higher levels of adversity, baseline mindfulness had a significant negative indirect effect on suicidal ideation at follow-up through zest for life and these effects became stronger as the level of suicide risk factors increased. This was a consistent pattern across both general (psychological distress) and suicide-specific (perceived burdensomeness and thwarted belongingness) risk moderator variables. Next, a second series of models were tested using suicidal intent as the outcome variable.

**Suicidal Intent.** The model incorporating mindfulness as the predictor, zest for life as the mediator, and psychological distress as the moderator explained a significant 49.48% of the variance in suicidal intent at follow-up, $F(5,224) = 43.87, p < .001$. There was a significant negative indirect effect of baseline mindfulness on intent through zest for life at high levels of distress (indirect effect = -.17, 95% CI: -.37, -.03) but not moderate (indirect effect = -.09, 95% CI: -.22, .01) or low (indirect effect = -.01, 95% CI: -.12, .07) levels of distress (index of moderated mediation = -.01, 95% CI: -.02, -.01). There was no direct
effect of mindfulness on suicidal intent (direct effect = .12, \( p = .15 \), 95% CI: -.05, .29). A second model using perceived burdensomeness as the moderator explained a significant 50.22% of the variance in suicidal intent at follow-up, \( F(5,224) = 45.19, p < .001 \). There was a significant negative indirect effect of baseline mindfulness on suicidal intent through zest for life at high (indirect effect = -.24, 95% CI: -.46, -.08) and moderate levels of burdensomeness (indirect effect = -.14, 95% CI: -.28, -.05), but not low (indirect effect = -.06, 95% CI: -.16, .02) levels of burdensomeness (index of moderated mediation = -.08, 95% CI: -.18, -.01). The direct effect of mindfulness on suicidal intent was non-significant (direct effect = .09, \( p = .26 \), 95% CI: -.06, .25). Finally, the model specifying thwarted belongingness as the moderator explained a significant 49.66% of the variance in suicidal intent at follow-up, \( F(5,224) = 44.19, p < .001 \). There was a significant negative indirect effect of baseline mindfulness on suicidal intent via zest for life at high (indirect effect = -.22, 95% CI: -.39, -.10) and moderate levels of thwarted belongingness (indirect effect = -.12, 95% CI: -.24, -.05), but not low (indirect effect = -.03, 95% CI: -.14, .07) levels of thwarted belongingness (index of moderated mediation = -.07, 95% CI: -.15, -.02). The direct effect of mindfulness on suicidal intent at follow-up was non-significant (direct effect = .06, \( p = .42 \), 95% CI: -.09, .21).

These models again show the same consistent pattern when suicidal intent is used as the outcome variable. That is, the negative indirect effects of mindfulness on suicidal intent through zest for life become stronger as the levels of broad and suicide-specific risk factors increase.
Table 2.

Moderated mediation models predicting suicidal ideation and suicidal intent at follow-up.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coeff.</th>
<th>SE</th>
<th>t</th>
<th>p</th>
<th>95% CI</th>
<th>Predictor</th>
<th>Coeff.</th>
<th>SE</th>
<th>t</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Zest</td>
<td>-0.07</td>
<td>0.04</td>
<td>-2.11</td>
<td>.036</td>
<td>-1.15, -0.01</td>
<td>A Zest</td>
<td>-0.13</td>
<td>0.06</td>
<td>-2.23</td>
<td>.026</td>
<td>-2.4, -0.01</td>
</tr>
<tr>
<td>Mindfulness</td>
<td>0.03</td>
<td>0.04</td>
<td>0.75</td>
<td>.454</td>
<td>0.05, 0.10</td>
<td>Mindfulness</td>
<td>0.12</td>
<td>0.08</td>
<td>1.43</td>
<td>.155</td>
<td>0.05, 0.29</td>
</tr>
<tr>
<td>K10</td>
<td>0.01</td>
<td>0.01</td>
<td>0.94</td>
<td>.350</td>
<td>0.01, 0.02</td>
<td>K10</td>
<td>0.02</td>
<td>0.01</td>
<td>1.38</td>
<td>.169</td>
<td>0.01, 0.05</td>
</tr>
<tr>
<td>Zest × K10</td>
<td>-0.01</td>
<td>0.01</td>
<td>-4.27</td>
<td>.000</td>
<td>-0.02, -0.01</td>
<td>Zest × K10</td>
<td>-0.01</td>
<td>0.01</td>
<td>-2.86</td>
<td>.004</td>
<td>-0.02, -0.01</td>
</tr>
<tr>
<td>Baseline ideation</td>
<td>0.35</td>
<td>0.05</td>
<td>7.70</td>
<td>.000</td>
<td>0.26, 0.45</td>
<td>Baseline ideation</td>
<td>0.50</td>
<td>0.05</td>
<td>10.06</td>
<td>.000</td>
<td>0.40, 0.59</td>
</tr>
<tr>
<td>B Zest</td>
<td>-0.11</td>
<td>0.04</td>
<td>-2.97</td>
<td>.003</td>
<td>-1.9, -0.04</td>
<td>B Zest</td>
<td>-0.20</td>
<td>0.05</td>
<td>-3.91</td>
<td>.000</td>
<td>-3.0, -0.09</td>
</tr>
<tr>
<td>Mindfulness</td>
<td>0.03</td>
<td>0.04</td>
<td>0.92</td>
<td>.356</td>
<td>-0.04, 0.10</td>
<td>Mindfulness</td>
<td>0.09</td>
<td>0.08</td>
<td>1.13</td>
<td>.259</td>
<td>0.07, 0.25</td>
</tr>
<tr>
<td>Burden</td>
<td>-0.03</td>
<td>0.05</td>
<td>-0.65</td>
<td>.516</td>
<td>-1.4, -0.07</td>
<td>Burden</td>
<td>-0.06</td>
<td>0.09</td>
<td>-0.64</td>
<td>.521</td>
<td>-2.4, -0.12</td>
</tr>
<tr>
<td>Zest × Burden</td>
<td>-0.08</td>
<td>0.03</td>
<td>-2.78</td>
<td>.005</td>
<td>-1.14, -0.02</td>
<td>Zest × Burden</td>
<td>-0.12</td>
<td>0.03</td>
<td>-3.56</td>
<td>.000</td>
<td>0.18, -0.05</td>
</tr>
<tr>
<td>Baseline ideation</td>
<td>0.36</td>
<td>0.05</td>
<td>7.36</td>
<td>.000</td>
<td>0.27, 0.46</td>
<td>Baseline ideation</td>
<td>0.49</td>
<td>0.05</td>
<td>9.84</td>
<td>.000</td>
<td>0.39, 0.59</td>
</tr>
<tr>
<td>C Zest</td>
<td>-0.07</td>
<td>0.03</td>
<td>-2.06</td>
<td>.040</td>
<td>-1.3, -0.01</td>
<td>C Zest</td>
<td>-0.18</td>
<td>0.06</td>
<td>-3.05</td>
<td>.002</td>
<td>-2.9, -0.06</td>
</tr>
<tr>
<td>Mindfulness</td>
<td>0.01</td>
<td>0.03</td>
<td>0.36</td>
<td>0.715</td>
<td>-0.06, 0.08</td>
<td>Mindfulness</td>
<td>0.06</td>
<td>0.08</td>
<td>0.80</td>
<td>.424</td>
<td>0.09, 0.21</td>
</tr>
<tr>
<td>Thwarted belong</td>
<td>0.05</td>
<td>0.03</td>
<td>1.41</td>
<td>0.158</td>
<td>-0.02, 0.12</td>
<td>Thwarted belong</td>
<td>-0.01</td>
<td>0.08</td>
<td>-0.02</td>
<td>0.985</td>
<td>0.15, 0.05</td>
</tr>
<tr>
<td>Zest × Thwart belong</td>
<td>-0.09</td>
<td>0.02</td>
<td>-3.56</td>
<td>.000</td>
<td>-1.4, -0.04</td>
<td>Zest × Thwart belong</td>
<td>-0.10</td>
<td>0.03</td>
<td>-3.55</td>
<td>.000</td>
<td>0.16, -0.05</td>
</tr>
<tr>
<td>Baseline ideation</td>
<td>0.36</td>
<td>0.04</td>
<td>8.39</td>
<td>.000</td>
<td>0.28, 0.45</td>
<td>Baseline ideation</td>
<td>0.50</td>
<td>0.05</td>
<td>10.10</td>
<td>.000</td>
<td>0.40, 0.60</td>
</tr>
</tbody>
</table>

A = Psychological distress as the moderator
B = Perceived burdensomeness as the moderator
C = Thwarted belongingness as the moderator
K10 = Kessler Psychological Distress Scale
4.5 Discussion

We examined whether mindfulness protects against future suicidal desire by enhancing zest for life in the face of heightened risk and adversity. In line with our first hypothesis, baseline mindfulness was significantly inversely associated with suicidal ideation and suicidal intent at follow-up. This is consistent with previous cross-sectional studies showing dispositional mindfulness is associated with reduced suicide risk (Anastasiades et al., 2016; Chesin & Jeglic, 2016; Lamis & Dvorak, 2013; Shorey et al., 2016) and with experimental studies showing an induced state of mindfulness confers protection against the effects of interpersonal adversity implicated as causal antecedents of suicide risk (Collins et al., 2016; Collins et al., 2017; Joiner, 2005). Extending these findings, we found a prospective association between mindfulness and lower levels of suicidal desire.

We then turned to the question of how mindfulness might have this protective effect on suicidal desire. Previous evidence suggested that mindfulness may facilitate a greater level of engagement with life that serves to offset risk and reduce the likelihood of suicide (Collins et al., 2016). According to the buffering hypothesis, this form of life-sustaining resilience is relevant only when risk is elevated (Collins et al., 2016; Johnson et al., 2011). We therefore expected to see an indirect effect of mindfulness on suicidal desire through zest for life that was stronger at higher versus lower levels of suicide risk factors. Consistent with our hypothesis, zest for life mediated the indirect relationship between baseline mindfulness and suicidal desire at follow-up and these effects were conditional upon the level of broad and suicide-specific risk factors. Specifically, the indirect effect of mindfulness through zest for life was consistently strongest at high levels of general
psychological distress, perceived burdensomeness, and thwarted belongingness. At moderate levels of these risk factors the mediation effects were relatively weaker, although in five out of the six models tested, still statistically significant. As predicted, at low levels of the moderators there were no discernible effects of mindfulness on suicidal ideation and intent through zest for life. Importantly, the conditional process models confirmed that the interaction between zest and each of the three risk factors (distress, burdensomeness, and thwarted belongingness) explained unique variance in suicidal ideation and intent at follow-up.

The current findings suggest that mindful awareness increases zest for life and this heightened zest acts as a buffer to reduce the likelihood of suicidal desire in the face of risk and adversity. This aligns with the predictions of the buffering hypothesis and previous experimental evidence showing the moderating effects of resilience are relevant only when individuals are also experiencing heightened levels of suicide risk factors (Collins et al., 2016; Johnson et al., 2011). According to fluid vulnerability theory (Rudd, 2006), suicidality has both stable and dynamic properties, including the relative balance between the wish to live and the wish to die. Treatments for suicidality may be effective because they influence both stable and dynamic aspects of this suicidal ambivalence, by increasing the wish to live as an offset to the wish to die (Bryan et al., 2016). The current results suggest that treatments that increase mindfulness may help to shift these decisional balance processes towards living over dying by enhancing zest for life. This would be consistent with research showing reduced suicidality following mindfulness-based treatments, such as Mindfulness-Based Cognitive Therapy (Barnhofer et al., 2015; Forkmann et al., 2014) and Dialectical Behavior Therapy (Linehan et al., 2006, 2015). For instance, a primary goal in
DBT is to build a life worth living by enhancing factors such as emotion regulation (Linehan, 1993). The current study suggests that mindfulness may not only enhance the capacity to regulate emotion, but also facilitate a more vigorous embracing of life despite heightened risk and adversity, thereby mitigating the likelihood of seeking escape from this perceived adversity via suicide. Moreover, engaging suicidal patients in treatment can be challenging, perhaps due in part to their ambivalence over living versus dying (Britton, 2015; Britton, Patrick, Wenzel, & Williams, 2011; Britton, Williams, & Conner, 2008). To the extent that mindfulness-based strategies can enhance zest for life, this also might increase motivation to engage in treatment to assist in the pursuit of a life worth living (cf., Britton et al., 2011). Indeed, there is emerging evidence that mindfulness-based adjuncts to treatment are well received by suicidal individuals and enhance outcomes when used alongside more established interventions that include a structured risk management framework (Chesin et al., 2015).

The current results highlight that contemporary theories of suicide need to better account for the dynamic interplay between risk and resilience. Risk-focused theories, such as the interpersonal theory of suicide (Van Orden et al., 2010), should therefore consider incorporating life-oriented factors such as zest. For example, zest for life may attenuate the effects of perceived burdensomeness and thwarted belongingness, interpersonal factors thought to be proximal antecedents of suicidal desire (Van Orden et al., 2010). One recent conceptualization of suicide that explicitly accounts for the dynamic interplay of risk and resilience factors is the fluid vulnerability theory (Rudd, 2006). The current findings suggest that mindfulness influences the dynamic balance between risk and resilience by...
raising baseline zest for life, thereby increasing the threshold for acute activation of the suicidal mode (cf., Bryan et al., 2016).

The current study should be interpreted in the context of some limitations. First, our measures of suicidal ideation and intent were single item scales for which certain psychometric properties cannot be estimated. While we found consistent results across two measures reflecting key points along the motivational-volitional pathway to suicide (i.e., thoughts of suicide and intention to act on these thoughts; O’Connor, 2011), future research could consider other indicators of risk along the ideation-to-action pathway measured over a longer follow-up period, such as suicide attempts (Klonsky, May, & Saffer, 2016). Second, while a key strength of our study was its prospective design, ideally variables would be measured also at a third time point. This would enable confirmation of the direction of the effects of the mediator (zest for life) and moderator variables (distress, perceived burdensomeness, and thwarted belongingness) on suicidal desire. It should also be noted that participants were from a single university, predominately females, and of Caucasian-Australian and Asian ethnicities. Consistent with other university student samples (e.g., Collins et al., 2016a; Johnson et al., 2010), levels of psychological distress and suicidality in this sample were elevated relative to the normative population (King et al., 2015; Stallman, 2010). However, the generalizability of these findings to other vulnerable groups remains unclear and thus future research could examine whether the moderated mediation effects hold true in a clinical sample. Especially during recovery following a suicide attempt, mindfulness-based treatments might assist in helping patients to re-engage in a more zestful life. To the extent that zest for life is elevated and stabilized, it protects against momentary fluctuations in the dynamic balance of the wish to live and
the wish to die (cf., Bryan et al., 2016). Finally, future research might also examine the specific mechanism(s) underpinning the relationship between mindfulness and zest for life. Mindfulness-to-meaning theory (Garland et al., 2015) proposes that the ability to bring mindful awareness to current experiences enables one to reappraise stressful events and savor positive emotions, leading to an increased sense of meaning and purpose. This increase in perceived meaningfulness may in turn generate a vitality and excitement for life as one perceives that one has a reason for living (Frankl, 1959). Alternatively, it is possible that mindfulness has an acute effect on emotion-focused factors such as grit (Duckworth, Peterson, Matthews, & Kelly, 2007), helping one to persevere towards valued goals even in adverse conditions. Over time this goal-oriented behavior may serve to enhance meaning and zest for life and protect against suicide (cf., Kleiman et al., 2013). Future research could examine whether factors such as perceived meaning and grit explain the relationship between mindfulness and zest for life.

In conclusion, mindfulness prospectively predicts lower suicidal desire in university students and these protective effects are mediated by enhanced zest for life, but only when risk as measured by psychological distress and interpersonal adversity is heightened. Theories of suicide should better account for the dynamic interplay between risk and resilience factors, while treatments for suicidal behavior should consider incorporating mindfulness strategies as an adjunct to more traditional approaches targeting the direct amelioration of suicide risk factors.
4.6 Ruling Out a Reverse Moderated Mediation Model

The preceding section established that the effects of mindfulness at baseline on suicidal desire at follow-up were mediated by zest for life at moderate and high levels of general and suicide-specific risk factors. However, it is also plausible that baseline zest for life prospectively predicts lower suicidal desire at follow-up through mindful awareness. That is, possessing greater enthusiasm for and engagement with life may mean one is more mindfully attuned to present moment experiences which in turn might reduce the likelihood of suicidal desire in the face of heightened risk and adversity. The current subsection aims to test this potential reverse moderated mediation model in order to further clarify the temporal ordering of the candidate life-sustaining resilience factors examined. The analyses reported here were not included in the original published study.

4.6.1 Additional Analyses

To test the potential alternative sequencing of variables, moderated mediation models were used to examine the effects of baseline zest for life on suicidal desire at follow-up through mindfulness at higher versus lower levels of risk. Apart from this re-ordering of mediator and predictor variables, the analyses replicated exactly the approach used in the preceding section. Specifically, analyses were again conducted separately for suicidal ideation and suicidal intent as outcome variables, and psychological distress, perceived burdensomeness, and thwarted belongingness as risk moderators, respectively.

The model incorporating baseline zest for life (Time 1) as the predictor, mindfulness (Time 2) as the mediator, and psychological distress (Time 2) as the moderator explained a significant 57.61% of the variance in suicidal ideation at follow-up, $F(5,224) =$
60.88, \( p < .001 \). However, baseline ideation was the only significant predictor in the final model (\( b = .41, p < .001 \)) and the moderated mediation effect was non-significant (index of moderated mediation = .00, 95% CI: -.01, .01). Similarly, the model specifying perceived burdensomeness as the moderator explained a significant 22.88% of the variance in suicidal ideation at follow-up, \( F(5,224) = 56.97, p < .001 \). Baseline ideation was again the only significant predictor in the final model (\( b = .41, p < .001 \)) and the index of moderated mediation was non-significant (index of moderated mediation = .00, 95% CI: -.02, .02). Finally, the model incorporating thwarted belongingness as the moderator explained a significant 57.52% of the variance in suicidal ideation at follow-up, \( F(5,224) = 60.67, p < .001 \). Baseline ideation (\( b = .42, p < .001 \)) and thwarted belongingness (\( b = .28, p < .01 \)) were the only significant predictors in the final model, while the moderated mediation effect was again non-significant (index of moderated mediation = -.01, 95% CI: -.03, .01).

The model incorporating baseline zest for life as the predictor (Time 1), mindfulness (Time 2) as the mediator, and psychological distress (Time 2) as the moderator explained a significant 49.46% of the variance in suicidal intent at follow-up, \( F(5,224) = 43.85, p < .001 \). Baseline intent was the only significant predictor in the final model (\( b = .54, p < .001 \)) and the moderated mediation effect was non-significant (index of moderated mediation = .01, 95% CI: -.01, .01). The model specifying perceived burdensomeness as the moderator explained a significant 46.40% of the variance in suicidal intent at follow-up, \( F(5,224) = 38.78, p < .001 \). Baseline intent (\( b = .54, p < .001 \)) and mindfulness at follow-up (\( b = -.21, p < .05 \)) were the only significant predictors. The moderated mediation effect was non-significant (index of moderated mediation = -.01, 95% CI: -.05, .03). Finally, the model incorporating thwarted belongingness as the moderator explained a significant
45.54% of the variance in suicidal ideation at follow-up, $F(5,224) = 37.46, p < .001$.

Baseline ideation was the only significant predictor in the final model ($b = .55, p < .001$) and the moderated mediation effect was again non-significant (index of moderated mediation = -.01, 95% CI: -.06, .02).

4.6.2 **Concluding Remarks**

Consistent with the hypothesis proposed in the initial longitudinal study (Section 4.5), the alternative moderated mediation models tested in this subsection confirmed that there was no effect of zest for life at baseline on suicidal ideation or suicidal intent at follow-up through mindfulness conditional upon the level of broad and suicide-specific risk factors. These analyses provide further clarity on the temporal sequencing of the candidate life-sustaining factors and their respective positioning on a potential pathway to suicide resilience. While a prospective design cannot speak directly to a causal relationship between variables, when taken together with the previously reported experimental studies, the pattern of effects observed in the current chapter increases confidence that mindfulness may indeed reduce suicidal desire in situations of risk and adversity by enhancing zest for life.
4.7 References


Chapter 5  Perceived Meaningfulness: A Critical Component?

The studies described in the preceding chapters used experimental and longitudinal methods to examine mindfulness and zest for life as factors that may be causal contributors to suicide resilience. Together they supported the conclusion that enhancing these candidate life-sustaining factors can increase resilience against the deleterious impact of putative proximal suicide risk factors. The current chapter extends these findings by exploring the role of a third life-sustaining factor, perceived meaningfulness. In this study, the effects of a meaning-making intervention on resilience to the interpersonal factors of the ITS is examined using the experimental paradigm developed in Chapter 2.

The motivation to seek and maintain a sense of meaning and coherence about one’s existence is a fundamentally human characteristic. The literature reviewed in Chapter 1 suggests that meaning is a central organising principle enabling people to make sense of their worlds, pursue and fulfil rewarding goals and aspirations, and ultimately feel that their lives are valuable and worthwhile. The perception that one’s life is meaningful is therefore a powerful determinant of psychological health and wellbeing. An established framework of meaning also provides a foundation for resilience in the face of obstacles and stressors (Weathers, Aiena, Blackwell, & Schulenberg, 2016). Through various meaning-making processes, individuals are able to understand how adverse life events fit into a broader life narrative, leading to greater adjustment and coping (Park, 2010). Interventions designed to support and facilitate this process of meaning-making in adversity may therefore enhance resilience to factors posited to be proximal causal antecedents to the desire for death.
A feature of empirically-supported treatments for suicide is the emphasis placed on reasons and motivations for living, with the ultimate aim of helping suicidal individuals (re)build a life that they consider meaningful and purposeful and thus worth sustaining (Linehan, 1993). Central to this process is the establishment of new meaning frameworks and a set of life goals that are derived from these (Debats, 1996). However, the causal impact of experimentally-modified perceptions of meaning as a buffer against putative proximal suicide risk factors has yet to be examined. The study presented in the current chapter addresses this gap in the literature by testing the effects of a meaning intervention delivered prior to the experience of experimentally-induced perceived burdensomeness and thwarted belongingness.
5.1 Abstract

The interpersonal theory of suicide proposes that perceived burdensomeness and thwarted belongingness (PB-TB) are proximal causes of suicidal desire. Here we test whether experimentally induced perceptions of meaningfulness can confer resilience against interpersonal adversity and enhance persistence, the erosion of which is a potential antecedent to suicide risk. Undergraduate university students (N = 93) were randomly allocated to complete a team task under conditions of high or low task-extrinsic meaning and high or low PB-TB. Participants in the high task-extrinsic meaning condition were given the opportunity to donate to a charity as part of their experimental participation, whereas those in the low task-extrinsic meaning condition were not. Consistent with the buffering hypothesis that suicide resilience is active only when adversity is heightened, participants in the high task-extrinsic meaning condition who reported higher levels of perceived meaningfulness displayed greater willingness to persist in the face of experimentally-induced high PB and TB compared to those in the low task-extrinsic meaning condition and those in conditions where the interpersonal adversity was not induced (low PB and TB). Meaning-making interventions might therefore mitigate the impact of proximal interpersonal antecedents of suicidal desire.
5.2 Introduction

The interpersonal theory of suicide (ITS; Joiner, 2005) proposes that a desire for suicide arises when two fundamental human needs are thwarted: the need to contribute and the need to belong. These proximal causal factors manifest as perceptions that one is a burden on others (perceived burdensomeness) and that one is lacking meaningful interpersonal connections (thwarted belongingness). An individual experiencing heightened levels of these aversive states views suicide as a means of escape from this interpersonal adversity. The notion of suicide as an escape from psychological pain is reflected in several contemporary theories (e.g., Baumeister, 1990; O’Connor, Platt, & Gordon, 2011) and highlights the importance of persistence in adversity. However, the ITS does not account for factors that may enhance one’s ability to persist in the face of such adversity and hence reduce the impact of its putative causal factors. The current study uses an experimental paradigm (Collins, Best, Stritzke, & Page, 2016) to test the role of perceived meaningfulness as a life-sustaining factor that may increase persistence and reduce one’s desire to escape in the face of experimentally-induced perceived burdensomeness and thwarted belongingness.

Perceived burdensomeness and thwarted belongingness are associated with increased risk for suicidal desire in diverse samples including adolescents (Barzilay et al., 2015), young adults (Joiner et al., 2009), psychotherapy outpatients (Van Orden, Lynam, Hollar, & Joiner, 2006), and community cohorts (Christensen, Batterham, Soubelet, & Mackinnon, 2013). Recent experimental evidence also supports the causal effects of these constructs on desire to escape as a potential antecedent to suicide risk (Collins et al., 2016; George, Collins, Cao, Stritzke, & Page, 2017). However, the ITS does not consider
resilience factors that may protect against suicidality in the face of heightened risk and adversity. Resilient individuals are at lower risk of suicidal behavior (Roy, Sarchiapone, & Carli, 2007), and factors conferring resilience have been posited to buffer the impact of risk factors on suicidality (Johnson, Wood, Gooding, Taylor, & Tarrier, 2011). For example, self-forgiveness attenuates the relationship between perceived burdensomeness and suicidal ideation (Cheavens, Cukrowicz, Hansen, & Mitchell, 2016). Identifying such modifiable resilience factors may enhance the effectiveness of suicide prevention efforts by providing targets for intervention that complement the direct amelioration of suicidal ideation and its interpersonal antecedents (Collins, Stritzke, Page, Brown, & Wylde, 2018).

The perception that life has meaning and is therefore worth sustaining is arguably a key factor underlying persistence in adversity (Park, 2010). Conversely, a thwarting of the pursuit of meaning can lead to apathy, hopelessness, and diminished motivation (Baumeister, Vohs, Aaker, & Garbinsky, 2013; Frankl, 1959; Kashdan & McKnight, 2009; Ryan & Deci, 2000). One pathway to meaningfulness involves possessing goals that transcend self-interest and current circumstances (Reker, 2000). These goals form part of a framework that facilitates understanding how life experiences, including adverse events, are part of a greater scheme (Baumeister et al., 2013; Garland, Farb, Goldin, & Fredrickson, 2015; Reker, 2000). The ability to find meaning in negative life experiences is acknowledged to be a powerful coping mechanism (King, Hicks, Krull, & Del Gaiso, 2006) and provides a foundation for resilience in the face of obstacles and stressors (Kashdan & McKnight, 2009). A strong meaning framework may therefore provide a buffer against the negative effects of interpersonal adversity on suicidal behavior (Heisel & Flett, 2004; Kleiman & Beaver, 2013).
In a study of older adults, meaning in life mediated the relationship between high levels of perceived burdensomeness and the prospective prediction of suicidal ideation, suggesting that perceptions of burdensomeness may contribute to suicidality by reducing perceptions of meaning (Van Orden, Bamonti, King, & Duberstein, 2012). Similarly, the presence of meaning in life mediated the relationship between perceived burdensomeness, thwarted belongingness, and suicidal ideation over an eight-week period (Kleiman & Beaver, 2013). Moreover, presence of meaning at baseline predicted reduced risk for suicidality at follow-up beyond other resilience factors such as gratitude and social support. Thus, interventions targeting an increase in perceptions of meaning may enhance resilience to proximal interpersonal antecedents of suicidal desire.

The primary aim of interventions to increase meaning in life is to help individuals reinterpret the meaning of past and current life events, identify new life goals, and resolve obstacles that may hinder the realization of these goals. Meaning-making interventions of this type have had positive outcomes on several indices of psychological wellbeing. For instance, randomized control trials in end-stage cancer patients found that increasing meaning improved wellbeing (Mok, Lau, Lai, & Ching, 2012) and, importantly, reduced suicidal ideation at the end of treatment and at six months follow up (Lapierre, Dube, Bouffard, & Alain, 2007). However, these interventions targeted well-being in individuals who are dealing with a terminal illness rather than specifically mitigating suicide risk in individuals with high levels of perceived burdensomeness and thwarted belongingness.

One way to safely test the value of meaning-making interventions that may enhance resilience to the interpersonal adversity thought to causally underlie suicidal desire is to enhance perceptions of meaningfulness experimentally, and examine the effect on
persistence during conditions of experimentally-induced perceived burdensomeness and thwarted belongingness. The Interpersonal Persistence Task (Collins et al., 2016) is a computerized team task designed to induce a state of perceived burdensomeness and thwarted belongingness. In conditions where burdensomeness and thwarted belongingness are experienced as high, the desire to persist over time is diminished. This is consistent with research showing that a thwarting of fundamental human needs for competence and relatedness has a detrimental impact on motivation and psychological wellbeing (Deci & Ryan, 2000; Ryan & Deci, 2000), and can lead to self-defeating behaviors including suicide (Twenge, Catanese, & Baumeister, 2002; Van Orden et al., 2010). Indeed, recent evidence suggests that perceived burdensomeness and thwarted belongingness mediate the relationship between the need for competence and relatedness and suicidal ideation (Tucker & Wingate, 2014).

In the current study we use the Interpersonal Persistence Task (Collins et al., 2016) to examine the influence of perceived meaningfulness on the desire to escape interpersonal adversity. We manipulate perceptions of meaningfulness by asking participants to select a charitable cause to donate to a small amount of money provided by the experimenter as part of their experimental participation. The aim of this donation is to provide participants with a “silver lining” that may enhance their ability to find meaning even when their experience of the task may be negative (Taylor, 1989). Altruistic behaviors such as charitableness are important sources of meaning across the lifespan by increasing one’s sense that life has purpose and value (Baumeister et al., 2013; Hill et al., 2013; Ryan, Huta, & Deci, 2008). Moreover, altruism is associated with greater resilience, persistence, and adaptation in the face of stress (Kashdan & McKnight, 2009; Southwick, Vythilingam, & Charney, 2005).
Thus, linking participation in the experiment to a charitable donation may infuse the task with a sense of meaning that protects against deficits in persistence caused by elevated perceived burdensomeness and thwarted belongingness.

The aim was to test whether increasing perceptions of meaningfulness would buffer desire to escape under conditions of heightened perceived burdensomeness and thwarted belongingness (high PB-TB). It was hypothesized that participants in a condition given the opportunity to donate to a charitable cause they selected from a choice of six options popular among young people (high task-extrinsic meaning) would be protected against deficits in persistence compared to participants in a condition not given an opportunity to donate (low task-extrinsic meaning). Given perceptions of meaning are, by definition, personal in nature (Frankl, 1959), participants receiving the task-extrinsic meaning induction would be expected to vary in the extent to which they derive meaning from the charitable donation and the influence this has on their perceptions of meaning during the task. Thus, we expected the buffering effects of the meaning manipulation to vary as a function of perceived meaningfulness during the team task, such that only participants in the high task-extrinsic meaning condition who also rated their level of perceived meaningfulness as high would report lower desire to drop out of the task and escape the interpersonal adversity. In contrast, in the low task-extrinsic condition, perceived meaningfulness ratings would be unrelated to task persistence. As the buffering hypothesis proposes that resilience is relevant only when adversity is heightened (Johnson et al., 2011), we expected there to be no relationship between perceived meaningfulness and desire to quit in either high or low task-extrinsic meaning conditions when perceived burdensomeness and thwarted belongingness were not induced (low PB-TB). Finally,
because negative affect can reduce persistence at goal-directed activities (Hills, Hill, Mamone, & Dickerson, 2001), we also accounted for the influence of general psychological distress on the desire to escape.

5.3 Method

Participants

Ninety-three undergraduate students (\(M_{\text{age}} = 19.45\) years, \(SD = 5.47\), 66 females) were recruited based on scores on a screening questionnaire assessing attitudes and behaviors towards charitable causes (Webb, Green, & Brashear, 2000). Those scoring in the upper 40% of the distribution, indicating a positive view of charitable causes and that helping others was important to them, were invited. This ensured that participants would be susceptible to a meaning-making induction based on the opportunity to donate to a charity. To personalise the available charity options, participants had to have endorsed at least one of six charity organisations on the screening measure, which were the same six options available during the experiment. Participants were randomly allocated to one of four experimental conditions: (1) low perceived burdensomeness-thwarted belongingness + low task-extrinsic meaning (low PB-TB/low task-extrinsic meaning); (2) high perceived burdensomeness-thwarted belongingness + low task-extrinsic meaning (high PB-TB/low task-extrinsic meaning); (3) low perceived burdensomeness-thwarted belongingness + high task-extrinsic meaning (low PB-TB/high task-extrinsic meaning); or (4) high perceived burdensomeness-thwarted belongingness + high task-extrinsic meaning (high PB-TB/high task-extrinsic meaning). All procedures were approved by the University’s Human Research Ethics Committee.
Experimental Task and Procedure

We used an adapted version of the Interpersonal Persistence Task (Collins et al., 2016), a three-player reaction-time task where participants aim to beat a target score by judging whether two characters appearing on screen are alike or different. One point is awarded for a fast and accurate judgment, and one point is deducted for a slow or inaccurate judgment. Points won and lost contribute to the participant’s individual score and also the team’s total score. The task consists of six time blocks divided into three rounds of five trials. After each round, a summary table is displayed showing individual scores, the team total score, and the current target score. While participants are led to believe they are playing with two fellow students, in reality their “co-players” are computer-controlled and points won and lost are manipulated according to odds ratios.

Burdensomeness and Belongingness Manipulations. To manipulate perceived burdensomeness, participants receive predetermined performance feedback. Participants in the high PB-TB condition are told they are scoring substantially lower than their teammates, while participants in the low PB-TB condition are told they are scoring equal to or better than their teammates. Further, the team total score in the high PB-TB condition is always lower than the team target score, thereby suggesting that the participant’s subpar performance is preventing the team from reaching the goal. Belongingness is manipulated using interpersonal feedback statements. After each time interval, participants provide feedback to, and receive feedback from, their teammates via electronic messaging. Participants are unaware that the feedback they receive is computer-generated. In the high PB-TB condition participants receive critical feedback, whereas in the low PB-TB condition participants receive supportive feedback.
**Participant Ratings.** After receiving the co-player comments, participants rate the extent to which: (1) they feel a burden on their fellow team members (*perceived burdensomeness*); (2) the other players make them feel part of the team (*belongingness*); (3) they feel their participation within the task is meaningful (*perceived meaning*); and (4) if they had a choice, they would rather drop out of the task (*desire to quit*) on a scale from 0 (*not at all true for me*) to 6 (*very true for me*). Relaxation/distress is also rated on a scale from 0 (*relaxed*) to 6 (*distressed*). At the end of the task, participants rate the extent to which they found the task interesting and made an effort to do well on a scale from 0 (*not at all true for me*) to 6 (*very true for me*).

**Meaning Manipulation.** Participants in the high task-extrinsic meaning condition were told that a proportion of a $500 donation would be made on their behalf to a charity selected from a pool of six recognizable and reputable charities reflecting a wide range of causes (e.g., social welfare, animal welfare, environmental protection). To increase the salience of the manipulation (cf., Genevsky, Västfjäll, Slovic, & Knutson, 2013), a board in the testing room displayed information sheets for each of the six charities consisting of an emotive image and a short mission statement. Participants were also asked to reflect on the reason(s) why contributing to their chosen charity held personal significance for them and to record this on the information sheet. During the Interpersonal Persistence Task, participants received on-screen reminder messages of their charitable donation after receiving co-player feedback (i.e., “*Remember, a donation will be made on your behalf to your chosen charity at the end of the experiment*”). Participants in the low task-extrinsic meaning condition were not given an opportunity to donate to a charity and received no reminder messages during the task.
Questionnaires

**Charitable Behavior Questionnaire (CBQ; Webb, Green, & Brashear, 2000).** The 9-item CBQ was used to screen for participants who would be susceptible to the meaning manipulation. The CBQ measures attitudes towards helping behavior (e.g., “Helping troubled people with their problems is very important to me”; $\alpha = .88$) and charitable organizations (e.g., “My image of charitable organizations is positive”; $\alpha = .75$). Participants respond on a scale from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating more positive attitudes towards helping others and charitable organizations.

**Need to Belong to the Team.** To establish baseline desire to belong to the team, three items were adapted from an existing scale (Leary, Kelly, Cottrell, & Schreindorfer, 2013). Participants indicated their level of agreement on a scale from 1 (strongly disagree) to 5 (strongly agree), to the following statements: “When participating in the upcoming team activities in this experiment it is important to me that: (1) others accept me as a person; (2) others care about me as person; and (3) I feel as though I belong.” Higher scores indicate greater desire to belong to the team ($\alpha = .85$).

**Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006).** The 10-item MLQ consists of two subscales that measure the presence of, and the search for, meaning in life. The current study utilized only the presence subscale (e.g., “I understand my life’s meaning”; $\alpha = .89$). Responses range from 1 (this statement is absolutely untrue) to 7 (this statement is absolutely true), with higher scores indicating greater meaning.
Interpersonal Needs Questionnaire (INQ; Van Orden, Cukrowicz, Witte, & Joiner, 2012). The 15-item INQ assesses perceived burdensomeness (6 items; e.g., “I think I make things worse for the people in my life”; $\alpha = .91$) and thwarted belongingness (9 items; e.g., “I feel disconnected from other people”; $\alpha = .90$) on a scale from 0 (not at all true of me) to 6 (very true of me), with higher scores indicating greater perceptions of burdensomeness and thwarted belongingness.

Suicidal Behavior. Past suicidal behavior was measured using two items from the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007): “How many times in the last year have you thought about suicide?” with answers ranging from 1 (never) to 6 (almost every day); and “How many times in your lifetime have you made an actual attempt to kill yourself in which you had at least some intent to die?” with answers ranging from 0 (never) to 5 (five or more times).

Current Suicide Risk. Current intent, likelihood, and readiness for suicide were assessed using three items (“I have no intention of killing myself in the near future”, “It is very unlikely that I would die by suicide anytime soon”, and “If I wanted to kill myself, I feel ready to do so”) on scales from 0 (agree not at all) to 8 (agree very strongly). The intention and likelihood items are reverse scored so higher scores indicate greater intention and likelihood for suicide in the future.

Kessler Psychological Distress Scale (K10; Kessler et al., 2002). The 10-item K10 measures symptoms of psychological distress in the last four weeks (e.g., “About how often did you feel depressed”) on a scale from 1 (none of the time) to 5 (all of the time). Scores range from 10 to 50 with higher scores indicating higher distress. Normative bands for K10
scores in Australia are: low distress (10-15), moderate distress (16-21), high distress (22-29), and very high distress (30-50; Cvetkovski, Reavley, & Jorm, 2012). Internal consistency reliability in the current sample was good ($\alpha = .89$).

**Procedure**

To increase the plausibility of the manipulation, two participants (or a participant and a confederate of the researcher) completed the experiment concurrently in adjacent testing booths and were told there was a third player in the laboratory down the hall. After initial briefing, participants provided informed consent and completed the Need to Belong Measure. During the initial briefing, participants allocated to the high task-extrinsic meaning condition reviewed an information board and chose one charity from six options. They then briefly reflected on why the charity held personal significance for them and recorded this on the charity information sheet. The charity information sheet was then displayed beside the computer throughout the experiment as a visual reminder of the meaningful outcome.

Following the main task, participants completed the questionnaires via online software. A suspicion probe was then administered, consisting of two open-ended questions (“Do you have any comments about the experiment?” and “Do you have any comments about your teammates?”) designed to identify participants who may have guessed the nature of the study design. Participants were then debriefed and given contact details of support services.
5.4 Results

Data Screening and Participant Characteristics

Data were normally distributed and no univariate outliers were identified. Two cases were identified as multivariate outliers, however the exclusion of these participants did not alter the outcomes of any subsequent analyses. Descriptive statistics for the questionnaire data are displayed in Table 1. The Need to Belong score was high, suggesting a strong baseline desire to belong to the team during the upcoming team task. Consistent with other undergraduate samples (Collins et al., 2016, 2018), K10 scores indicated moderate levels of psychological distress. Thirty-five individuals (37.6%) had thought about suicide at least once in the past year and eight (8.6%) had made at least one suicide attempt in their lifetime.

Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need to belong</td>
<td>4.02</td>
<td>0.80</td>
</tr>
<tr>
<td>Presence of meaning in life</td>
<td>4.79</td>
<td>1.25</td>
</tr>
<tr>
<td>Perceived burdensomeness</td>
<td>0.64</td>
<td>0.86</td>
</tr>
<tr>
<td>Thwarted belongingness</td>
<td>1.13</td>
<td>0.99</td>
</tr>
<tr>
<td>Psychological distress</td>
<td>20.29</td>
<td>6.08</td>
</tr>
<tr>
<td>Suicidal intent</td>
<td>0.49</td>
<td>1.67</td>
</tr>
<tr>
<td>Suicide likelihood</td>
<td>1.02</td>
<td>2.52</td>
</tr>
<tr>
<td>Suicide readiness</td>
<td>0.33</td>
<td>1.08</td>
</tr>
</tbody>
</table>
Manipulation Checks

Nine participants whose responses on the suspicion probe suggested that they may have guessed the nature of the study design were excluded from subsequent analyses. Mixed-design analyses of variance (ANOVA) were conducted to check that the experimental manipulation had the intended effects on burdensomeness and belongingness ratings.

**Perceived burdensomeness.** A $2 \times 2 \times 6$ mixed-design ANOVA examined the effects of condition (high/low PB-TB) and meaning manipulations (high/low task-extrinsic meaning) across time (blocks 1-6) on perceived burdensomeness. There was a significant main effect of condition, $F(1, 80) = 314.60$, $p < .001$, $\eta^2_{\text{partial}} = .78$, confirming that the PB-TB manipulation successfully induced perceived burdensomeness (Figure 1A). There was also a Condition $\times$ Time interaction, $F(3.89, 311.08) = 7.86$, $p < .001$, $\eta^2_{\text{partial}} = .09$. In the high PB-TB condition, burdensomeness ratings were higher and increased over time, $F(3.51, 150.82) = 4.52$, $p = .003$, $\eta^2_{\text{partial}} = .10$, whereas in the low PB-TB condition, burdensomeness ratings were lower and decreased over time, $F(2.91, 96.67) = 5.26$, $p = .003$, $\eta^2_{\text{partial}} = .12$. There were no significant effects of task-extrinsic meaning manipulation ($p$'s > .05).

**Thwarted belongingness.** A $2 \times 2 \times 6$ mixed-design ANOVA examined the effects of condition (high/low PB-TB) and meaning manipulations (high/low task-extrinsic meaning) across time (blocks 1-6) on belongingness ratings. A significant main effect of condition, $F(1, 80) = 289.52$, $p < .001$, $\eta^2_{\text{partial}} = .78$, confirmed that the PB-TB manipulation successfully diminished belongingness as intended (Figure 1B). There was
also a significant Condition × Time interaction, $F(3.44, 275.33) = 24.78$, $p < .001$, $\eta^2_{\text{partial}} = .24$. Figure 1B shows that belongingness ratings significantly decreased over time in the high PB-TB condition, $F(3.19, 137.20) = 28.83$, $p < .001$, $\eta^2_{\text{partial}} = .40$, but remained consistently high in the low PB-TB condition, $F(2.79, 93.28) = 1.81$, $p = .153$, $\eta^2_{\text{partial}} = .05$. There were no significant effects of task-extrinsic meaning manipulation ($p$’s > .05).

Figure 1. Interpersonal Persistence Task ratings. Panel A shows mean burdensomeness and Panel B shows mean belongingness. Error bars represent standard error of the mean.
Perceived Meaning as a Moderator of Persistence Under Conditions of Interpersonal Adversity and High Task-Extrinsic Meaning

Descriptive statistics for perceived meaningfulness and task persistence are displayed in Table 2. A 2 × 2 × 6 mixed-design ANOVA examined the effects of condition (high/low PB-TB) and meaning manipulations (high/low task-extrinsic meaning) across time (blocks 1-6) on the desire to quit. There were significant main effects of PB-TB condition, \( F(1, 82) = 53.23, p < .001, \eta^2_{\text{partial}} = .39 \), and time, \( F(3.32, 271.95) = 14.78, p < .001, \eta^2_{\text{partial}} = .15 \), which were qualified by a significant Condition × Time interaction, \( F(3.32, 271.95) = 22.12, p < .001, \eta^2_{\text{partial}} = .21 \). Desire to quit was significantly greater and became stronger over time in the high PB-TB condition, \( F(3.47, 152.63) = 24.99, p < .001, \eta^2_{\text{partial}} = .36 \), but remained consistently low in the low PB-TB condition, \( F(2.49, 94.80) = 1.68, p = .185, \eta^2_{\text{partial}} = .04 \).

Table 2

Perceived Meaningfulness and Persistence (Desire to Quit) Ratings Averaged Across the Six Time Blocks by PB-TB Condition and Task-Extrinsic Meaning Condition

<table>
<thead>
<tr>
<th>Low PB-TB</th>
<th>High PB-TB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Meaning</td>
<td>High Meaning</td>
</tr>
<tr>
<td>( M (SD) )</td>
<td>( M (SD) )</td>
</tr>
<tr>
<td>Perceived Meaningfulness</td>
<td>4.86 (1.25)</td>
</tr>
<tr>
<td>Desire to Quit</td>
<td>0.66 (1.07)</td>
</tr>
</tbody>
</table>

*Note.* PB = Perceived Burdensomeness; TB = Thwarted Belongingness
To test our primary hypothesis that manipulated perceptions of meaning would confer resilience against experimentally-induced perceived burdensomeness and thwarted belongingness, we examined the relationship between perceived meaningfulness ratings and desire to quit (persistence) as a function of high/low meaning condition using the PROCESS macro for SPSS specifying 5,000 bias-corrected 95% confidence interval bootstrap samples (Hayes, 2013). The analysis was first isolated within the high PB-TB/low task-extrinsic meaning and high PB-TB/high task-extrinsic meaning conditions (i.e., where the interpersonal adversity was experimentally induced). Average perceived meaningfulness was the independent variable, low/high task-extrinsic meaning condition (dummy coded: low meaning condition = -1, high meaning condition = 1) was the moderator variable, and mean desire to quit was the outcome variable. Mean interest, effort, distress, burdensomeness, and belongingness ratings were entered as covariates. The overall model explained 63.62% of the variance in persistence, $F(8, 36) = 8.38, p < .001$, with meaning condition, effort, and burdensomeness significant unique predictors (Table 3). The meaningfulness rating by high/low task-extrinsic meaning condition interaction term explained an additional 8.78% of the variance in persistence, $F(1,36) = 6.87, p = .013$. This interaction is depicted in Figure 2A. Simple slope analyses confirmed that meaningfulness ratings were a strong positive predictor of task persistence in the high task-extrinsic meaning condition ($R^2_{\text{Linear}} = .54, t = -3.21, p = .003$) but not in the low task-extrinsic meaning condition ($R^2_{\text{Linear}} = .02, t = -.12, p = .91$).

Repeating the analysis in the low PB-TB/low task-extrinsic meaning and low PB-TB/high task-extrinsic meaning conditions (i.e., where no interpersonal adversity was experimentally induced) showed there was no effect of meaning manipulation condition.
and the meaningfulness rating by high/low task-extrinsic meaning condition interaction term was non-significant, $F(1,30) = .05, p = .83$ (see Table 3 and Figure 2B). Thus, when interpersonal adversity was low, there was no relationship between perceived meaningfulness and desire to quit in either high or low task-extrinsic meaning condition.
Table 3

*Moderated Regression Analyses Predicting Persistence (Desire to Quit) Across High and Low PB-TB Conditions*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>High PB-TB</th>
<th>b</th>
<th>SE b</th>
<th>t</th>
<th>p</th>
<th>Low PB-TB</th>
<th>b</th>
<th>SE b</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest</td>
<td>0.19</td>
<td>0.18</td>
<td>1.08</td>
<td>.288</td>
<td></td>
<td>-0.11</td>
<td>0.20</td>
<td>-0.54</td>
<td>.590</td>
<td></td>
</tr>
<tr>
<td>Effort</td>
<td>-0.59</td>
<td>0.14</td>
<td>-4.23</td>
<td>.002</td>
<td></td>
<td>-0.32</td>
<td>0.37</td>
<td>-0.86</td>
<td>.396</td>
<td></td>
</tr>
<tr>
<td>Distress</td>
<td>-0.01</td>
<td>0.19</td>
<td>-0.01</td>
<td>.989</td>
<td></td>
<td>0.28</td>
<td>0.19</td>
<td>1.47</td>
<td>.152</td>
<td></td>
</tr>
<tr>
<td>Burdensomeness</td>
<td>0.76</td>
<td>0.22</td>
<td>3.37</td>
<td>.002</td>
<td></td>
<td>0.24</td>
<td>0.29</td>
<td>0.83</td>
<td>.413</td>
<td></td>
</tr>
<tr>
<td>Belongingness</td>
<td>0.16</td>
<td>0.35</td>
<td>0.48</td>
<td>.641</td>
<td></td>
<td>0.12</td>
<td>0.68</td>
<td>0.17</td>
<td>.866</td>
<td></td>
</tr>
<tr>
<td>Meaning Condition</td>
<td>1.70</td>
<td>0.53</td>
<td>3.23</td>
<td>.003</td>
<td></td>
<td>-0.02</td>
<td>0.12</td>
<td>-0.16</td>
<td>.870</td>
<td></td>
</tr>
<tr>
<td>Meaningfulness Ratings</td>
<td>-0.60</td>
<td>0.30</td>
<td>-2.01</td>
<td>.052</td>
<td></td>
<td>-0.21</td>
<td>0.34</td>
<td>-0.62</td>
<td>.538</td>
<td></td>
</tr>
<tr>
<td>Meaning Condition x Meaningfulness Ratings</td>
<td>-0.56</td>
<td>0.21</td>
<td>-2.62</td>
<td>.013</td>
<td></td>
<td>0.03</td>
<td>0.20</td>
<td>0.14</td>
<td>.890</td>
<td></td>
</tr>
</tbody>
</table>

*Note:* PB = Perceived Burdensomeness; TB = Thwarted belongingness
Figure 2. Persistence (desire to quit) as a function of perceived meaningfulness ratings and high/low task-extrinsic meaning conditions. The lines are regression slopes for the simple effects. Panel A shows that under conditions of heightened interpersonal adversity (high PB-TB), higher perceived meaningfulness predicts lower desire to quit in the high, but not low, task-extrinsic meaning condition. Panel B shows that when interpersonal adversity is absent (low PB-TB), there is no relationship between perceived meaningfulness and desire to quit in either high or low task-extrinsic meaning conditions.

5.5 Discussion

The aim of the current study was to examine whether manipulated perceptions of meaningfulness can enhance resilience to experimentally-induced perceived burdensomeness and thwarted belongingness. As predicted, participants in the high task-extrinsic meaning condition who rated higher levels of perceived meaningfulness displayed greater persistence in the face of these interpersonal risk factors. Conversely, in the low task-extrinsic meaning condition where participants were not given the opportunity to contribute to a charity, and in the conditions where interpersonal adversity was not induced, perceived meaningfulness was unrelated to task persistence. The moderating effects of task-extrinsic meaning explained unique variance in desire to
quit while controlling for the effects of perceived burdensomeness, thwarted belongingness, and general psychological distress. These findings are consistent with previous evidence linking meaning with greater persistence, adaptation, and recovery in the face of stress (Kashdan & McKnight, 2009; Park & George, 2013; Ryan et al., 2008; Southwick et al., 2005), and importantly, longitudinal research showing meaning in life predicts lower suicidal ideation over an eight week period above and beyond the ITS risk factors (Kleiman & Beaver, 2013). The current study extends these findings by providing experimental evidence showing manipulated perceptions of meaning confer protection against the deleterious effects of interpersonal adversity on willingness to persist, the erosion of which is a potential antecedent to suicide risk.

It is important to note that the meaning intervention was successful in buffering the effects of interpersonal adversity only to the extent that the charity donations were perceived as meaningful and relevant to participation in the goal-directed activity being undertaken. The literature suggests that what an individual considers meaningful is deeply personal (Brandstätter, Baumann, Borasio, & Fegg, 2012; Frankl, 1959) and thus, although we attempted to personalize the induction, imposing a single source of meaning (i.e., a contribution to one of six pre-selected charities) in the current experimental context was apparently insufficient to enhance perceptions of meaning in some individuals. This would be consistent with literature showing that when extrinsic motivators are not freely chosen or lack personal significance, the fundamental need for autonomy is thwarted, leading to diminished motivation in goal-directed activities (Deci & Ryan, 2000). This highlights the importance of tailoring meaning-making interventions to the individual to ensure goals are chosen and pursued with autonomy. Clinicians seeking to increase suicide resilience might therefore engage clients in a collaborative process of identifying and pursuing personally meaningful goals.
The current findings reinforce the notion that life-sustaining factors play an important role in buffering the effects of interpersonal antecedents to suicidal desire. Contemporary theories of suicide, including the ITS, should therefore consider the role of life-sustaining factors in order to provide a more comprehensive account of suicidal behavior. Such a model might include factors such as mindfulness, perceived meaning, and zest for life situated along a common pathway to suicide resilience. Attending to the present moment with openness and acceptance can increase one’s ability to find meaning in adversity and to pursue valued goals with grit (c.f., Duckworth, Peterson, Matthews, & Kelly, 2007; Garland et al., 2015). Striving towards personal goals may in turn increase vitality and engagement with life as one perceives one has a reason for living (Frankl, 1988). This enhanced engagement with and zest for life might provide an important counterbalance to the death-promoting effects of interpersonal adversity and in doing so confer resilience to suicidality (Collins et al., 2018).

The current study had some limitations that suggest directions for future research. First, the meaning induction was successful in buffering the effects of interpersonal adversity only when the charity donation was perceived as personally meaningful and relevant to the team task. Future studies might allow participants to select a personal reason for participating in the task and in doing so potentially increase the effectiveness of the intervention. This approach has been used successfully by Branstetter-Rost, Cushing, and Douleh (2009) who found that participants tolerated longer periods of acute pain when they imagined that they were enduring the discomfort for a self-chosen reason of significance. A second limitation is that the dual induction of perceived burdensomeness and thwarted belongingness in the current application means the independent effects of these constructs on task persistence cannot be determined. Although the ITS proposes that it is the joint presence of the interpersonal factors which drives suicidal desire, recent reviews point to a more complex picture where perceived
burdensomeness may exert a stronger effect on suicidal *desire* compared to thwarted belongingness (Chu et al., 2017; Ma, Batterham, Calear, & Han, 2016) but thwarted belongingness may be more relevant as a predictor of suicidal *behavior* in the context of acquired capability for suicide (Chu et al., 2017). Future research could independently manipulate the ITS risk factors in order to tease apart their independent and interactive effects on desire to escape. Third, as noted by Collins et al. (2016), the use of explicit questioning throughout the task concerning perceptions of burdensomeness and thwarted belongingness increases the chances of demand characteristics. Although this concern is mitigated by the large effects of condition evident by the first rating interval before demand effects can exert their potential influence, future research may consider using alternative measures of these interpersonal constructs.

In conclusion, the current study found that manipulated perceptions of meaningfulness confer protection against desire to escape in the face of heightened perceived burdensomeness and thwarted belongingness. This suggests that interventions designed to increase one’s sense that life has meaning and purpose could make a valuable contribution to suicide prevention. The current findings also highlight that contemporary theories of suicide should account for the role of life-sustaining factors such as perceived meaning in order to increase the specificity of their causal predictions.
5.6 References


Journal of Personality Assessment, 95(6), 610–624.
https://doi.org/10.1080/00223891.2013.819511


https://doi.org/10.1016/j.cpr.2016.04.008


https://doi.org/10.1037/1040-3590.19.3.309


https://doi.org/10.1080/17439760.2013.830762


https://doi.org/10.1080/13811118.2013.824839


https://doi.org/10.1007/978-3-319-41397-6_8
Chapter 6 General Discussion

A dual focus on risk and resilience is essential for advancing our understanding of why some people choose to end their own lives in the face of adversity, while others are able to persist and even thrive in such conditions. The current research program aimed to (i) test the causal effects of two interpersonal factors posited to be proximal antecedents to the desire for suicide and (ii) identify life-sustaining factors that may attenuate their impact. The multi-method approach adopted here provides a richer source of data than would be available with a single method of investigation, with convergence of findings across experimental and longitudinal studies increasing confidence in the conclusions drawn. The current findings will be reviewed within the context of a theoretical model that draws links between the various life-sustaining (resilience) and death-promoting (risk) factors investigated.

6.1 A Mindfulness-Grounded Model of Suicide Resilience

Figure 1 depicts a proposed theoretical model outlining how the life-sustaining factors examined in the current thesis might confer resilience to suicide. In line with the predictions of the ITS, perceived burdensomeness and thwarted belongingness appear here as proximal causal antecedents of suicidal desire. When present in combination, these interpersonal factors act to increase one’s desire to escape life through suicide. However, the current model diverges from the ITS in its inclusion of zest for life as a resilience factor that attenuates the impact of the interpersonal factors on the desire for death. Additionally, the model specifies that zest for life is influenced by the life-sustaining factors mindfulness and perceptions of meaning. As an adaptive mode of consciousness, mindfulness may enable one to more effectively engage with life, even in the midst of adversity. This heightened engagement is proposed to in part arise from perceptions of meaning associated with the pursuit of personal goals and living in line
with one’s deeply-held values. Mindfulness is also proposed to contribute directly to enhanced vitality and engagement with life independently of perceptions of meaning. In sum, the current model describes a form of suicide resilience derived from a meaningful engagement with life grounded in open, flexible, and non-judgmental awareness of the present moment. In the following subsections, the evidence for each of these model components will be reviewed in turn.

![Figure 1. A mindfulness-grounded model of suicide resilience depicting how life-sustaining resilience may buffer the effects of proximal interpersonal risk factors on suicidal desire.](image)

### 6.1.1 Causal Effects of Interpersonal Adversity

The ITS hypothesizes that the joint and ongoing presence of perceived burdensomeness and thwarted belongingness is a proximal cause of active suicidal desire. Substantial evidence links these interpersonal factors with suicidality in diverse...
samples (e.g., Christensen et al., 2013; Joiner et al., 2009; Ma et al., 2016; Van Orden, Cukrowicz, Witte, & Joiner, 2012), however their causal effects have never been directly tested (Chu et al., 2017). That is, while this research has strong external validity, its internal validity is less strong and hence its ability to support causal inferences is limited. The experimental paradigm developed in Chapter 2 induced perceived burdensomeness and thwarted belongingness in the laboratory using performance and interpersonal manipulations within the context of a goal-oriented team task. In so doing, we developed a paradigm that has strong internal validity, enabling causal inferences to be made about these theoretical constructs. The interpersonal factors were induced with consistently strong effect sizes across all studies using the persistence task (Chapters 2, 3, & 5), implying that participants experienced these negative cognitive-affective states to a significant degree. Belongingness ratings consistently diminished across time, while burdensomeness ratings tended to remain at a stable high level across the span of the task. Importantly, Chapter 3 confirmed that participants possessed an initial desire to belong to the team that could be thwarted during the subsequent experimental procedure, suggesting that it was a state of thwarted belongingness induced by the task, rather than simply social isolation or perceived social exclusion.

Having developed a paradigm that could successfully modify perceived burdensomeness and thwarted belongingness, it was then necessary to determine whether these interpersonal factors had the type of causal effects predicted by the ITS. As expected, in the experimental conditions where perceived burdensomeness and thwarted belongingness were induced, participants rated significantly greater desire to escape, with effect sizes consistently large in magnitude (Chapters 2, 3 & 5). The multiple regression analyses confirmed that these interpersonal factors explained a large proportion of the variance in desire to escape within the experimental conditions,
beyond interest and effort (Chapter’s 2, 3 & 5), and general psychological distress (Chapter’s 3 & 5). Burdensomeness was by far the stronger interpersonal predictor across studies, while thwarted belongingness explained a smaller proportion of the variance in desire to escape. This is congruent with recent meta-analytic reviews showing perceived burdensomeness is consistently a stronger predictor of suicidal desire across studies than thwarted belongingness (Chu et al., 2017; Ma et al., 2016). The fact that the current experimental findings align with this existing correlational evidence base supports the external validity of the interpersonal persistence paradigm. That is, it is reassuring that in a controlled experimental context the same pattern emerged with respect to the relative strength of the interpersonal factors in predicting a proxy behavioral outcome. In sum, it can be concluded that—in line with the predictions of the ITS—the combined presence of heightened experimentally-induced perceived burdensomeness and thwarted belongingness has a significant detrimental impact on willingness to persist.

When interpreting these findings, an obvious question that emerges is the extent to which self-reported desire to escape or persist at the experimental task can be generalized to suicidal behavior outside of the laboratory. Considering that the relevant clinical outcome here is suicide, striking a balance between the internal validity of an experimental paradigm designed to test causal hypotheses of theories of suicide and external validity presents a greater challenge than when the clinical outcome is not death. Indeed, it is an ethical imperative when experimentally manipulating variables hypothesised to be causally and proximally related to suicidal desire that this is done safely. These important ethical and methodological constraints have contributed to the dearth of experimental studies in the suicide research literature (Kleiman et al., 2017). The current thesis addressed this gap in the literature by developing an experimental analogue where putative causal variables can be temporarily manipulated to measure
their effects on a conceptually and theoretically relevant construct within a safe and highly controlled environment.

The study reported in Chapter 2 proposed that self-reported desire to escape rated during the interpersonal persistence paradigm may reflect the same core behavioral tendency that underlies the desire to escape from life when fundamental interpersonal needs to contribute and to belong are perceived as unmet (Collins, Best, Stritzke, & Page, 2016). Within this frame of reference, the current findings support the notion that the joint presence of perceived burdensomeness and thwarted belongingness decreases persistence and increases desire to escape from interpersonal adversity. Given that a primary aim was to test the predictions of the ITS, these outcomes are important in their own right. Although the external validity of the experimental research is lower, when consolidated with the prior non-experimental literature, the current findings advance our understanding of the causal factors proposed to underlie proximal risk for suicidal desire and bring us a step closer to realising an etiological model that can be harnessed to more effectively prevent death by suicide.

It is important to emphasize that, while the experimental studies reported here can inform understanding of persistence and perceptions in the face of interpersonal adversity, they cannot speak directly to who would be at risk for engaging in suicidal behavior. Expressing a desire to escape from a computer task is obviously a long way from desiring to end one's own life. Inevitably then, our ability to generalize the current experimental findings to real-world scenarios is limited. Nevertheless, the experimental studies reported in the current thesis do provide some preliminary empirical support for the relevance of willingness to persist at the task to clinical outcomes beyond the laboratory. Higher desire to escape was consistently associated with higher self-reported intent and likelihood for suicide in the future rated following task completion (Chapters 2, 3 & 5). There were no significant associations between desire to escape and suicidal
ideation, perhaps because ideation was assessed with reference to the past year and thus may be less likely to correlate with participants’ acute experience during the task. (In contrast, intent and likelihood for suicide are measured more proximally to the immediately preceding task experience.) The correlations between desire to escape and readiness for suicide were also non-significant, suggesting this risk factor is not as closely related to one’s desire to persist in the face of interpersonal adversity. This is perhaps not unexpected given the current paradigm manipulated perceived burdensomeness and thwarted belongingness rather than acquired capability; a construct that implies greater readiness for suicide (Van Orden et al., 2010). In sum, these data provide reassurance that performance on the interpersonal persistence task is not unrelated to clinical phenomena and encourage the continued use of this laboratory model for examining the effects of putative suicide risk and resilience factors.

Another issue of relevance to the generalizability of the current findings is the type of samples that were used. In line with Van Orden et al.’s (2010) proposition that the same causal processes underlie all forms of suicidality, irrespective of clinical status, the studies presented in the current thesis were conducted in a university student population. A primary advantage of conducting research in this population is that many of the ethical and safety concerns relating to the testing of higher risk individuals in a clinical context are avoided. Additionally, a consistent finding across all studies was that the university students tested were at increased risk for suicide relative to many other groups. It could therefore be argued that university students, while generally high functioning, are a highly relevant population within which to examine the impact of suicide risk and resilience. The excellent safety profile of this paradigm combined with the fact that the samples included many participants with current suicidal ideation and a significant proportion with a prior history of suicide attempts also suggests that such experimental approaches using behavioral proxies may be safe for use with clinical
samples, provided research protocols are explicit in incorporating thorough assessment and debriefing processes.

The protocol used in the current experimental studies placed a key emphasis on safety and support, including the provision of referral options for treatment services available both on and off site. Prior to commencement, participants were briefed on the behavioral task being undertaken and were told explicitly that they could cease their involvement in the task at any point. Following completion of the experiment, participants were debriefed individually in a private room to increase the likelihood that any concerns would be voiced, enabling the experimenter to take appropriate action. It is important to emphasise that of the 329 participants tested across the four experimental studies reported in the present thesis, only one elected to discontinue the task, and this was for reasons other than distress. Moreover, during the course of several years of testing there have been no reportable adverse events or ethical concerns raised by any person involved in the research. Thus, even in a vulnerable population such as university students, our experimental paradigm appears to be a safe means of testing the causal effects of putative proximal suicide risk factors within the laboratory.

6.1.2 The Buffering Role of Zest for Life

The current experimental studies help to advance our understanding of the causal effects of perceived burdensomeness and thwarted belongingness, two interpersonal factors proposed to underlie proximal risk for suicidal desire. However, if risk and resilience exist on separate dimensions and interact dynamically to affect the likelihood of suicidal outcomes (Johnson, Wood, Gooding, Taylor, & Tarrier, 2011), restricting focus to these interpersonal factors alone can explain only half of the picture. Indeed, recent literature examining the predictions of the ITS suggests that observed inconsistencies in the effects of perceived burdensomeness and thwarted belongingness across samples may be explained by unidentified moderator variables (Cero, Zuromski,
Witte, Ribeiro, & Joiner, 2015; Chu et al., 2017; Ma et al., 2016). Resilience factors that serve to attenuate the relationship between risk and suicidality are prime candidates for potential moderators that may help to clarify under what circumstances perceived burdensomeness and thwarted belongingness are more likely to generate a desire for suicide, thereby increasing the specificity of the theory’s causal predictions.

Taking a resilience-informed approach (Chmitorz et al., 2018; Johnson et al., 2011), the current mindfulness-grounded model proposes that the death-promoting action of perceived burdensomeness and thwarted belongingness on suicidal desire is attenuated by zest for life, a construct that represents a strong level of present- and future-focused engagement with life. According to the buffering hypothesis, resilience factors serve to attenuate the relationship between risk and suicidal outcomes (Johnson et al., 2011). Conversely, when risk and adversity are not heightened, resilience remains dormant or irrelevant given there are no acute drivers of suicidality (c.f., Chmitorz et al., 2018). In Chapter 2, individuals scoring higher on pre-existing zest displayed greater willingness to persist in the face of experimentally-induced perceived burdensomeness and thwarted belongingness compared to individuals who scored lower on zest. In the condition where risk was not elevated, there were no zest group differences in persistence. This pattern was then replicated in Chapter 4 using a longitudinal data set. In the study in Chapter 4, zest for life mediated the prospective relationship between dispositional mindfulness at baseline and suicidal ideation and intent at follow-up, but only at higher levels of general (psychological distress) and suicide-specific (perceived burdensomeness and thwarted belongingness) risk (Collins, Stritzke, Page, Brown, & Wylde, 2018). That is, the resilience conferred by zest for life was active under conditions of heightened risk and adversity, serving to reduce the likelihood of suicidal desire. These data provide both experimental and longitudinal support for the idea that zest for life is a resilience factor that attenuates the deleterious effects of suicide risk.
factors on the desire for death. Thus, within the causal framework of the ITS, perceived burdensomeness and thwarted belongingness might generate suicidal desire only when zest for life is diminished or absent.

The current research program also provided insight into the temporal qualities of the resilience conferred by zest for life. Not only were high zest individuals protected against the deleterious effects of perceived burdensomeness and thwarted belongingness, but this resilience was sustained over time for the duration of the experimental procedure (Chapter 2). This was the case despite the fact that the interpersonal factors remained elevated (perceived burdensomeness) or continued to increase (thwarted belongingness) across the span of the task. The current findings suggest that zest for life may confer a stable and potent form of resilience against the proximal factors of the ITS, preventing the emergence of suicidal desire under conditions of heightened risk and adversity.

6.1.3 Enhancing Resilience

One strength of the proposed mindfulness-grounded model is that it articulates how resilience to suicide might be enhanced. Identifying ways to increase resilience independently of ways to decrease risk is a valuable focus for prevention research, yet it is an approach that has received limited attention to date. The second study reported in Chapter 2 examined the protective effects of mindfulness training delivered as a preventative intervention before the experience of interpersonal adversity (Collins et al., 2016). In this study, participants allocated to receive a mindfulness induction prior to completing the interpersonal persistence task were more willing to persist at this goal-directed activity compared to those who received a control (unfocused attention) induction, despite rating equivalently high levels of perceived burdensomeness and thwarted belongingness. In Chapter 3, a brief mindfulness intervention was delivered during the experience of interpersonal adversity, more closely paralleling intervention
during a suicidal crisis (Collins, Stebbing, Stritzke, & Page, 2017). In this study, heightened levels of the interpersonal factors caused a decline in persistence during the early stages of the task. However, this decline was arrested in the latter stages of the task in a condition receiving a mindfulness intervention compared to two control conditions where mindfulness was not induced. These studies indicate that a state of mindful awareness attenuates the deleterious impact of perceived burdensomeness and thwarted belongingness, and that this form of resilience can be enhanced both prior to, and during, situations of heightened risk and adversity.

The current research program also investigated the protective effects of a third modifiable life-sustaining factor, perceived meaningfulness. In Chapter 5, manipulated perceptions of meaning moderated the deleterious effects of the proximal interpersonal factors of the ITS on persistence. For participants who received a meaning-making intervention before completing the interpersonal persistence task, higher perceptions of meaning predicted greater willingness to persist in the face of elevated perceived burdensomeness and thwarted belongingness. Conversely, there was no relationship between perceptions of meaning and persistence in the condition where no meaning intervention was administered, or in conditions where the interpersonal factors were not induced. These data suggest that enhanced perceptions of meaning contribute to resilience in the face of elevated interpersonal risk and provide experimental support for the inclusion of perceived meaning on a common pathway to suicide resilience.

Elucidating the buffering qualities of mindfulness and meaning using the interpersonal persistence paradigm provides important insight into their potential causal effects on resilience to suicide risk factors. However, the current mindfulness-grounded model proposes that these factors act to mitigate suicidality by increasing one’s level of engagement with and zest for life. The longitudinal study reported in Chapter 4 showed that the protective effects of mindfulness on suicidal desire were explained by zest for
life, and these mediation effects were stronger at higher levels of risk and adversity. Importantly, the additional analyses included in Chapter 4 (Section 4.6) ruled out an alternative sequencing of variables whereby zest for life might contribute to lower suicidal desire via increased mindfulness, supporting the temporal ordering of the life-sustaining factors depicted in the current model and their potential causal effects on suicide resilience.

The current mindfulness-grounded model further articulates that mindful awareness provides the necessary foundation for suicide resilience by contributing to enhanced zest for life both directly and indirectly through perceived meaning in life. Chapter 5 advanced the notion that meaning is a central organizing principle that is fundamental to human health and wellbeing. Thus, whether or not one perceives one’s life to be meaningful is arguably integral to a model of suicide resilience hinging upon the idea that the desire to embrace life provides a critical counterbalance to the death-promoting action of suicide risk factors. Further, given mindfulness is a basic mode of consciousness that has wide ranging generalized effects on human health and wellbeing (Brown & Ryan, 2003), it is likely that intermediary constructs, such as perceived meaning, help to explain the relationship between mindful awareness and zest for life.

There is now a large body of literature supporting a link between mindfulness, meaning, and wellbeing in adversity. Mindfulness involves non-judgmental awareness of, and openness to, present experiences, including those that are stressful or aversive. Rather than languishing in these conditions, this broadened awareness allows one to consciously disengage maladaptive modes of responding and engage adaptive processes such as cognitive re-appraisal and savoring of the positive aspects of experience (Creswell, 2017; Garland, Farb, Goldin, & Fredrickson, 2015b). Through these processes one is not only able to survive situations of adversity, but also thrive in them; for instance, by developing a renewed appreciation of life or an understanding of how
persisting through difficult circumstances can increase personal strength (Bryant & Smith, 2015; Garland, Farb, Goldin, & Fredrickson, 2015a; Park, 2010). A greater capacity to regulate emotional and behavioral responses in the face of stress also enables greater focus on, and contact with, important personal goals and behavior that is congruent with deeply-held values, further increasing one’s sense that life has meaning and purpose (Baer & Lykins, 2011; Carlson, 2015; Crane, Barnhofer, Hargus, Amarasinghe, & Winder, 2010; Crane, Winder, Hargus, Amarasinghe, & Barnhofer, 2012; Garland et al., 2015a, 2015b). These meaning-making processes appear critical for persisting rather than escaping in the face of adversity (Park, 2010).

According to the current model, however, the perception that one’s life is meaningful and purposeful is only protective against suicide risk to the extent that it increases one’s sense of engagement with and zest for life. The quest for meaning is a universal human motive that, when unfulfilled, can lead to stress, hopelessness, and a diminished will to live (Frankl, 1988; Newman, Nezlek, & Thrash, 2017; Reker & Fry, 2003). Conversely, striving towards meaningful goals generates a vitality and zest for life as one perceives that one has a reason for living, both in the present and into the future (Frankl, 1988; Heisel & Flett, 2004; Krause, 2007; Steger, 2013, 2017). However, one could conceivably derive zest for life from sources other than perceptions of meaningfulness. Indeed, the current model proposes that mindful awareness also increases zest directly by facilitating contact with life as it unfolds from moment to moment. This increased sense of synchronicity with one’s environment and current experiences leads to a deeper appreciation of life’s richness, enhancing vitality and vigour independently of perceived meaningfulness (Carlson, 2015; Chambers & Hassed, 2015). That is, mindfulness enhances moment-to-moment contact with life itself, outside of the conceptual and evaluative filters through which perceptions of meaning arise (Chambers & Hassed, 2015; Hayes, Strosahl, & Wilson, 2011). In sum,
the current model proposes that mindfulness enhances meaningful engagement with life by facilitating reappraisal of adversity and the pursuit of valued goals, as well as by enhancing the natural vitality that comes from living an engaged, connected life (Chambers et al., 2014).

The mindfulness-grounded model described here parallels much of the broader resilience and wellbeing literatures, while also providing a unique perspective on the enhancement of resilience to putative proximal suicide risk factors. Mindfulness-Based Strengths Practice (MBSP; Niemiec, Rashid, & Spinella, 2012) focuses on the interaction between the universal human qualities of mindfulness and character strengths such as persistence and zest. MBSP uses mindfulness meditation to capitalize on an individual’s unique strengths and in doing so enhance his or her sense of meaning in life, coping, and general wellbeing. Acceptance and Commitment Therapy (ACT; Hayes et al., 2011) similarly uses mindfulness training to increase psychological flexibility, defined as the process of consciously contacting the present moment while changing or persisting with behavior in the service of one’s values (Biglan, Hayes, & Pistorello, 2008). According to ACT, a sense of engagement with life emerges as a person makes contact with personally meaningful events in the present (Hayes et al., 2011). In a suicide prevention context, Wingate et al. (2006) suggest that broadened thought-action repertoires, such as those cultivated by mindfulness training, might enable individuals to find positive meaning in adversity so that escape through suicide is no longer considered the only option.

Despite these similarities, the current model can be distinguished from this prior resilience and wellbeing literature in that it is the first to identify three life-sustaining factors that may work in synchrony along a common pathway to enhance resilience to putative proximal suicide risk factors. Importantly, the studies reported here show that mindfulness and zest for life have the predicted protective effects against the
interpersonal factors of the ITS whether examined within the laboratory or observed outside of the laboratory. This convergence across experimental and non-experimental findings increases confidence that these factors are causal contributors to suicide resilience, rather than simply correlates of reduced risk. Moreover, the inclusion of zest for life as a resilience factor that attenuates the impact of the proximal interpersonal factors of the ITS raises the possibility that this construct may be a trans-theoretical or general resilience factor, conferring protection against all forms of suicide risk.

6.1.1 Zest for Life as a General Resilience Factor

The resilience literature has more recently discussed the possibility of general resilience factors that serve to protect an individual against multiple forms of risk and adversity, rather than focusing on factors that protect against a single type of pathology or dysfunction (Davydov, Stewart, Ritchie, & Chaudieu, 2010; Kalisch, Müller, & Tüscher, 2015). This idea of general resilience is based on the high degree of overlap at the functional, behavioral, and neurobiological levels across disorders that have traditionally been regarded as categorically distinct (Koole, Schwager, & Rothermund, 2015). It is also a notion that would presumably translate to a suicide research context. Different theories of suicide emphasise the importance of different causal risk factors, however there may be common resilience factors that buffer the impact of these varied risk factors on suicidality independently of their respective theoretical models. Indeed, suicide is arguably a response to what is interpreted to be intolerable psychological pain and therefore the battle of the individual to persist with living in the face of this adversity, irrespective of its type or source, may be the final common resilience pathway protecting against suicidality (Baumeister, 1990; Klonsky & May, 2015; O’Connor, 2011; Williams & Swales, 2004).

Zest for life may be one general resilience factor that buffers the impact of all forms of suicide risk, including the proximal factors perceived burdensomeness and
thwarted belongingness investigated in the current research program. This notion would be consistent with the ambivalence model of suicide that posits the desire for life is an essential counterbalance to the desire for death (Brown, Steer, et al., 2005), since zest represents a strong level of engagement with life in the present and excitement about what life has to offer in the future. Additionally, given the current proposed model’s emphasis on meaningful engagement with life grounded in mindful awareness, the general resilience properties of zest would also be consistent with literature suggesting mindfulness increases mental health transdiagnostically through factors such as emotional and cognitive non-reactivity, awareness and acceptance, and psychological flexibility (Gu, Strauss, Bond, & Cavanagh, 2015). Enhancing these factors using mindfulness training enables the individual to navigate life’s inevitable challenges and capitalize on opportunities to engage with life in a meaningful way, characteristics that have been described as cornerstones of mental health and wellbeing (Kashdan & Rottenberg, 2010). These transdiagnostic effects of mindfulness and associated meaningful engagement with life suggest that the resilience-enhancing effects of zest might indeed cut across existing theoretical models of suicide.

The alignment of the current findings with other prominent theories of suicide such as three-step theory (Klonsky & May, 2015) and the integrated-motivational volitional model of suicidal behavior (O’Connor, 2011) lends further support to the notion that zest for life is a general suicide resilience factor. Three-step theory (Klonsky & May, 2015) proposes that active suicidal ideation is only likely when pain, arising from varied factors (including burdensomeness and thwarted belongingness), exceeds connection (which can include to people, but also other forms of meaning or purpose that keep someone invested in living), implying life-sustaining factors such as zest may act as a buffer to offset risk. Similarly, the integrated motivational-volitional model proposes that appraisals of defeat and humiliation give risk to feelings of entrapment
(where suicide is viewed as the only solution to painful life circumstances, characterized by the presence of factors including perceived burdensomeness and thwarted belongingness) which in turn creates an intention to engage in suicidal behavior and finally the behavior itself (O’Connor, 2011). According to the theory, various stage-specific moderators serve to impede or facilitate the transition through these phases. Life-sustaining factors such as zest may be salient attenuators, at least during the earlier motivational stages where there is arguably still significant ambivalence over whether to live or die. The congruence of the current findings with these other leading contemporary theories presents an opportunity to further advance our understanding of suicide and its prevention by identifying a form of resilience that may hold true trans-theoretically. A focus on potential general resilience factors such as zest is likely to lead to more efficient and effective resilience-informed suicide prevention strategies.

6.2 Practical Implications of the Mindfulness-Grounded Model of Suicide Resilience

Historically, suicide risk assessment protocols have focused on identifying the presence of one or more established risk factors to ascertain the likelihood of suicidal behavior and provide a template for ongoing management (Bryan & Rudd, 2006; Gutierrez, 2006; Joiner, Walker, Rudd, & Jobes, 1999). However, these protocols are notoriously unreliable and prone to false-positives (Bryan & Rudd, 2006); weaknesses that may be due in part to a lack of consideration of resilience or life-sustaining factors that serve to offset risk (Gutierrez, 2006). As has been emphasized throughout the current research program, risk and resilience are not simply opposite ends of the same spectrum but exist on separate dimensions. Hence, the presence or absence of risk does not necessarily imply the presence or absence of resilience, and vice versa (Heisel & Duberstein, 2006; Simon, 2006). Assessing life-sustaining factors such as zest for life may therefore enhance clinical risk assessment by helping to identify particularly
vulnerable individuals presenting with both heightened risk factors and diminished resilience, or conversely those with both heightened risk and heightened resilience who might be less likely to exhibit suicidality. This focus on life-sustaining resilience is particularly pertinent in light of recent reviews which caution against using the ITS constructs as sole clinical predictors of suicide given their modest associations with suicidal thoughts and behaviours (Chu et al., 2017; Ma et al., 2016). Nevertheless, the current research suggests that perceived burdensomeness and, to a lesser extent, thwarted belongingness may indeed be useful clinical predictors provided they are considered in conjunction with potential trans-theoretical resilience factors such as zest for life which serve to moderate the effects of the interpersonal factors.

The current research program also has implications for preventative interventions. A resilience-oriented approach is a valuable augmentation to traditional risk-centric strategies because it capitalizes on the notion of suicidal ambivalence and the idea that risk and resilience exist on separate dimensions. This approach can be particularly advantageous within clinical settings because it implies that resilience can be enhanced independently of the level of risk that is present. Indeed, the literature would suggest that people who are considered at high risk for suicide are not only able to develop resilience, but that this enhanced resilience can have the same protective effect among these subgroups as would be predicted from studies among lower risk community samples (Johnson et al., 2011). In circumstances where perceptions of burdensomeness and thwarted belongingness are difficult or slow to change, clinicians can shift their focus to building meaningful engagement with life that can counterbalance or attenuate the impact of these interpersonal factors. Even in the instance where risk can be successfully modified, facilitating greater connection with life may be one of the primary mediators of effective treatment for suicidal thoughts and behaviors (Bryan, Rudd, Peterson, Young-McCaughan, & Wertenberger, 2016).
Enhancing resilience in the form of meaningful engagement with life thus has the potential to greatly increase the efficacy of clinical treatments targeting a reduction in suicidality.

A dual focus on mindfulness training and its application to the pursuit of meaningful engagement with life is a particular emphasis of the current model. Existing evidence-based treatments such as ACT use mindfulness strategies to increase psychological flexibility and behaviors that are in line with personal values (Hayes et al., 2011), factors that are also proposed to increase one’s sense that life has meaning and purpose. Other “third-wave” cognitive behavioral therapies similarly focus on mindfulness and values (Kahl, Winter, & Schweiger, 2012), while meaning-centred programs (e.g., Henry et al., 2010; Spek et al., 2017) focus more specifically on establishing and pursuing meaning and purpose in life. These approaches provide a ready-made template for applying the current mindfulness-grounded model in practice, enhancing its clinical utility.

The personal nature of the meaningful living emphasized in these therapeutic approaches is also underlined in the current research. The intervention in Chapter 5 was protective only for individuals who identified with the charitable donation and thus rated their participation in the task as more meaningful. Altruism may be a salient source of meaning in life given prosocial traits and behaviors are arguably essential for human development and survival (Goetz, Keltner, & Simon-Thomas, 2010; Seppala, Rossomando, & Doty, 2014). Meaning derived from these sources may be particularly powerful because it taps into universal human values to connect and support (Baumeister, Vohs, Aaker, & Garbinsky, 2013); values that might hold special relevance as buffers against the interpersonally-oriented risk factors of the ITS. However, it is possible that some individuals would not consider altruistic values and goals to be a current priority, thereby limiting their relevance as a source of meaning in
life. Hence, it is important that clinicians tailor their meaning-making interventions to the individual and monitor the effect of such interventions on perceptions of meaning throughout treatment.

The timing of resilience-enhancing interventions is another important consideration. In a suicide prevention context, maximum effectiveness will be achieved when intervention is targeted at all points along the spectrum of early prevention through to crisis intervention and relapse prevention (World Health Organization, 2014). The current research used mindfulness training to enhance resilience both prior to (Chapter 2) and during (Chapter 3) the experience of interpersonal adversity. A meaning-focused intervention similarly enhanced persistence when delivered prior to the experimental procedure (Chapter 5). Mindfulness was also shown to prospectively predict lower suicidal desire through increased zest for life, with these protective effects strongest when risk was high (Chapter 4). Moreover, the current findings suggest that resilience can be enhanced irrespective of pre-existing resilience resources (Chapter 2). Thus, facilitating meaningful engagement with life using mindfulness training may be relevant as a suicide prevention measure at multiple points along the intervention continuum.

The emphasis on mindfulness training in the current model lends itself particularly well to increasing suicide resilience as an early preventative intervention. Mindfulness training is time and cost-effective, given it can be administered to large numbers of people in a short space of time, is relatively straightforward to learn and practice, and lacks the stigma of many other mental health interventions (Steffen, Austin, & DeBarros, 2016). Schools are an ideal environment for mindfulness-focused early prevention programs since they provide access to a large cross-section of the population in an environment that is highly conducive to skills training. Large-scale randomized controlled trials have shown that school-based programs focusing on
mental health literacy, suicide risk awareness, and skills training significantly reduce suicidal ideation and attempts (Aseltine, James, Schilling, & Glanovsky, 2007; Wasserman et al., 2015; Wilcox et al., 2008; Zalsman et al., 2016). However, these interventions are risk-centric and cover aspects such as recognizing and addressing signs of depression, general stress management, and reducing social skills deficits. The current research suggests that incorporating interventions such as mindfulness training has the potential to further enhance the efficacy of early preventive programs by increasing suicide resilience independently of any reduction in future risk. These kinds of programs have tremendous potential in reducing the rising rates of suicide seen across many sectors of the global population (World Health Organization, 2014). Intervening early to reduce the impact of future life stressors on suicidality can also avert the need for more intensive clinical treatments, reducing the burden on healthcare systems.

The current findings also hold relevance for mindfulness-based resilience training as a potential crisis intervention. Chapter 3 showed that a brief mindfulness induction enhanced resilience when delivered during the experience of interpersonal adversity, after desire to escape had already increased. This suggests that mindfulness might be effective as an intervention when interpersonal risk factors are currently elevated, such as during a suicidal crisis. Although mindfulness strategies are included in broader evidence-based treatment packages shown to mitigate suicidality (Linehan, 1993; Linehan et al., 2015), concerns have been raised about the safety of mindfulness training as a stand-alone intervention when patients are acutely suicidal. Mindfulness, by definition, requires taking an open and non-judgmental stance towards current experiences, including thoughts and feelings that may be highly aversive or distressing. This kind of self-focus can cause a paradoxical increase in rumination and perceived intensity of suicidal thoughts; iatrogenic effects that may increase rather than decrease
the likelihood of suicidality in vulnerable individuals (Williams & Swales, 2004). However, more recent literature suggests that mindfulness training may indeed be safe and efficacious for patients who are currently suicidal, particularly when combined with an evidence-based risk management protocol (Chesin et al., 2015) and a motivational-interviewing style use of “living talk” that can counterbalance any suicidal thinking (Britton, 2015). This kind of “living talk” is made explicit in the current mindfulness-grounded model through its emphasis on identifying and pursuing goals and values that increase one’s sense of meaning and purpose in life. Thus, mindfulness training may be a safe and effective resilience-enhancing treatment during suicidal crises that works to increase meaningful engagement with life even when risk continues to be heightened. Continued exploration of the use of mindfulness-based approaches for this purpose would therefore appear warranted.

In a relapse prevention context, mindfulness training has been used successfully to reduce the risk of recurrence in clinical depression (Segal, Williams, & Teasdale, 2002) and more recently has shown promise in breaking the link between depressive symptoms and suicidal ideation in patients with histories of suicidal depression (Barnhofer et al., 2015). According to these approaches, mindfulness ameliorates suicide risk by reducing the reactivation of maladaptive and self-defeating patterns of thinking. However, in line with recent approaches that aim to reduce the likelihood of depressive relapse by targeting an increase in resilience (Dunn, 2012; Waugh & Koster, 2015), the current research program suggests that another key mechanism by which mindfulness-based relapse prevention programs may exert their effects is by increasing suicide resilience in the form of meaningful engagement with life. Clinicians might therefore use mindfulness strategies to help patients who have previously experienced suicidal ideation increase their engagement with and zest for life, and in doing so reduce the likelihood of a future recurrence in suicidal thinking. This type of suicide resilience
training has the potential to enhance outcomes beyond the current deficit-focused model of relapse prevention.

### 6.3 Future Directions

The current research program tested the effects of mindfulness, meaning and zest for life using both experimental and longitudinal methods, and in doing so provided support for these as factors situated along a common pathway to suicide resilience. However, the proposed indirect link between mindfulness and zest for life through meaning in life has yet to be formally tested. Future research might test a mediation model where these life-sustaining factors are examined in sequence. Experience sampling (e.g., daily diary) approaches could also be valuable for examining the potential causal links between these variables and suicide resilience over time. Further, the current research program was tested in samples of university students, a group who are vulnerable to the effects of suicide risk factors and who report significant levels of suicidal thoughts and behaviors. However, future research could test the causal sequence of mindfulness, meaning, zest and suicide resilience using a clinical sample. Such a study could be conducted over the course of a treatment program targeting an increase in meaningful engagement with life using mindfulness training as a primary intervention. This would enable the effects of mindfulness, meaning, and zest to be examined as mediators of treatment outcomes, along with any concomitant reduction in suicide risk factors (c.f., Bryan et al., 2016).

The acute versus longer term effects of mindfulness training on the ability to persist through adversity is another area that warrants attention. The current model proposes that mindfulness has an effect on meaning-making in adversity, however the mechanism(s) underpinning this process remain unclear. Given mindful awareness is proposed to enhance self-regulation capacity (Brown & Ryan, 2003), it is possible that
mindfulness training has an acute effect on one’s ability to pursue goals with grit in the face of adversity (Duckworth, Peterson, Matthews, & Kelly, 2007; Kleiman, Adams, Kashdan, & Riskind, 2013). It may be this increased capacity for goal-pursuit over shorter time scales that increases one’s sense of meaningful engagement with life over the longer term. This would be consistent with recent evidence showing that present-focused attention during daily stressors leads to greater values-consistent behavior and perceived self-efficacy after controlling for the effects of negative affect (Donald, Atkins, Parker, Christie, & Ryan, 2016). Alternatively, mindfulness may have an immediate effect on perceptions of meaning through processes such as cognitive reappraisal (Garland et al., 2015b). Future research might examine the relative effects of mindfulness training on perceptions of meaningfulness and emotion-focused factors such as grit using the interpersonal persistence paradigm.

As previously outlined, the current mindfulness-grounded model also points to the possibility that zest for life is a global resilience factor given its congruence with other leading theories, such as the three-step and integrated motivational-volitional models of suicide. The experimental paradigm developed in the current research program provides a valuable opportunity to examine the causal processes articulated in these other prominent theories and to determine whether the buffering role of zest for life holds true trans-theoretically. The design of the interpersonal persistence task can be easily adjusted to facilitate these investigations. For example, researchers can vary the type and intensity of the manipulations used to create conditions of adversity and/or the type of variables that are assessed during the procedure (e.g., George, Collins, Cao, Stritzke, & Page, 2017). This kind of research would be an exciting step forward for a field that has traditionally focused on the identification of individual predictors of suicidality rather than integrating findings across theoretical models.
Finally, the role of mindfulness-grounded resilience further along the motivational-volitional pathway to suicide is another aspect worthy of research attention. Mindfulness has been shown to positively impact both acceptance and non-reactivity in the face of stress and adversity (Creswell, 2017), suggesting that it may be applicable to the behavioral as well as motivational aspects of suicide. For instance, it is possible that mindfulness moderates the relationship between suicidal desire and suicidal behavior. That is, although individual’s may be experiencing suicidal thinking, mindful awareness may enable them to notice those thoughts as simply thoughts, rather than facts to be acted upon, thereby mitigating the transition between ideation and attempts. It is also possible mindful awareness has a positive impact on the mental rehearsal and rumination implicated in the development of acquired capability for suicide outlined in the ITS (Van Orden et al., 2010), serving to buffer the impact of this factor on subsequent suicidality. A higher level of meaningful engagement with life achieved through mindfulness training might also have a direct impact on acquired capability for suicide. That is, even in the instance that one’s fear of death has been diminished and capacity for suicide heightened, the presence of meaningful engagement with life may serve to reinvigorate the inherent human drive for living over dying and in doing so reduce the impact of this volitional factor on suicidal behavior.

6.4 Conclusion

Finding ways to more effectively prevent death by suicide has been described as a global imperative (World Health Organization, 2014). Despite significant advances over the past several decades, these efforts have been hampered by an inability to test the causal effects of key risk factors for suicide and a relative lack of focus on resilience factors that can attenuate the impact of risk and adversity on suicidality. The current research program addressed these limitations using a multi-method approach. The causal effects of two factors posited to underlie proximal risk for suicidal desire –
perceived burdensomeness and thwarted belongingness – were first tested using a novel experimental paradigm. Consistent with the predictions of the ITS, these interpersonal factors had a significant deleterious effect on potential antecedents to suicide risk within the laboratory. Three candidate life-sustaining factors that may serve to attenuate the impact of proximal risk factors on suicidal desire were then examined using experimental and longitudinal methods. Findings have been synthesized into a mindfulness-grounded model of suicide resilience which proposes that mindful awareness contributes to zest for life both directly and indirectly through perceptions of meaning in life, with this heightened zest acting as a buffer to reduce the likelihood of suicidality in the face of risk and adversity. This model articulates how life-sustaining resilience can be integrated within leading contemporary theories of suicide, increasing the specificity of their causal predictions. It also informs prevention efforts by outlining how suicide resilience can be enhanced using mindfulness training, an approach that may improve the effectiveness of interventions that have traditionally focused on the direct amelioration of risk factors.

Continued examination of the role of resilience on the causal pathway to suicide is vitally important if we are to make headway into preventing the growing number of deaths by suicide across the globe. As demonstrated in the current research program, a potent form of resilience is one that is derived from factors that are inherently life-sustaining and motivate an individual to persist through, rather than seek an escape from, situations of risk and adversity. In essence, this type of suicide resilience hinges upon the building of a meaningful and vital life that is incompatible with suicidality. Suicide, then, is as much about living as it is about dying.
6.5 References


