Addressing Critical Gaps in the Study of Suicide: Testing Key Predictions of the Interpersonal Theory of Suicide about Perceived Burdensomeness, Thwarted Belongingness, and Capability for Suicide, and Accounting for the Role of Zest for Life

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This thesis is presented for the degree of Doctor of Philosophy of The University of Western Australia

School of Psychological Science

2017
Thesis Declaration

I, Sarah George, certify that:

This thesis has been substantially accomplished during enrollment 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.

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The research involving human data reported in this thesis was assessed and approved by The University of Western Australia Human Research Ethics Committee. Approval #s: RA/4/1/5850, RA/4/1/6915, RA/4/1/5635.

Written patient consent has been received and archived for the research involving patient data reported in this thesis.

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

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Date: March 24, 2017
Abstract

This thesis sought to address critical gaps in the literature on the interpersonal theory of suicide. First, three studies were conducted to test core assumptions of the theory regarding the role of its two putative proximal causes of suicidal desire – perceived burdensomeness and thwarted belongingness. It is assumed that it is the interpersonal nature of these factors that makes them especially pernicious (Joiner, 2005). However, this fundamental assumption of the theory is as yet untested, and research has not distinguished whether their mechanism of action is interpersonal or via failure per se. The theory also posits that perceptions of burdensomeness are sufficient to confer risk even when they are mistaken (Joiner, 2005) though the relative effects of perceived and actual thwarted interpersonal needs are unknown. Additionally, the interpersonal factors are thought to mutually influence each other (Joiner, 2005), yet their temporal reciprocal effects have not been examined. A novel experimental paradigm was employed to test these three predictions. Findings support the specific interpersonal emphasis of the theory and confirm that perceptions of burdensomeness have adverse effects even when they are inaccurate. Results also show that burdensomeness and thwarted belongingness mutually intensify each other, though thwarted belongingness influences risk for thoughts of escape from interpersonal adversity only indirectly via its amplifying effect on burdensomeness.

Next, this thesis addressed a limitation common to contemporary models of suicide which do not account for life-sustaining factors (e.g., Harrison, Stritzke, Fay, Ellison, & Hudaib, 2014). Using a longitudinal design, the influence of zest for life, defined as a sense of connection to and enthusiasm for life, was tested against the adverse effects of the two interpersonal factors. Findings reveal that while zest for life may be partly diminished by
burdensomeness and thwarted belongingness, it also provides a protective barrier between
the interpersonal factors and the prospective development of suicidal desire.

After confirming theoretical predictions about the interpersonal factors and highlighting
the key role of zest, the research next tested predictions about the third pillar of the
interpersonal theory – the acquired capability to enact lethal suicidal behavior. Before
conducting the first longitudinal test of the associations between theoretically-derived
facets of acquired capability and indices of risk along the ideation-to-action pathway
(Klonsky & May, 2015), it was necessary to first address significant shortcomings in
existing measures of acquired capability by developing and validating a new multi-facet
measure. Findings support proposals of the theory that the capability facets transform
suicidal desire into readiness for lethal behavior.

Since it is critical to also understand factors that can circumvent this lethal trajectory, a
final study investigated the interplay between zest for life and the acquired capability
facets along the pathway from ideation to readiness for action. Findings reveal that zest
for life has differential relationships with the acquired capability facets and that zest
exerts a particularly strong protective effect early in the suicidal ideation-to-action
pathway.

In conclusion, findings support key predictions of the interpersonal theory though some
modifications to the model as initially conceptualized are indicated.
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Finally, thank you to the hundreds of participants who took part in this research. This thesis would not be possible without your openness, and I hope that it will contribute to an enriched understanding of why people do and do not consider suicide.
**Authorship Declaration: Co-Authored Publications**

This thesis contains work that has been published and prepared for publication.

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Sarah played a significant role in all aspects of this paper, including undertaking background research, devising lab protocols, conducting data collection, data entry, data analysis, and drafting manuscripts. Some data collection was undertaken by honors students.

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Chapter Five

**Student contribution to work:**

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Chapter Six

**Student contribution to work:**

Sarah played a significant role in all aspects of this paper, including undertaking background research, conducting data collection, conducting all analyses, and preparing and revising manuscripts. Data collection for the prospective sample was conducted by a fellow graduate student, while data collection for the inpatient sample was conducted by Geoff Hooke and staff at Perth clinic.
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Chapter Seven

Student contribution to work:
Sarah played a significant role in all aspects of this paper, including undertaking background research, conducting all data collection for the cross-sectional sample, conducting all analyses, and preparing and revising manuscripts. Data collection for the prospective study was conducted by a fellow graduate student who Sarah assisted with setting up the online questionnaire.

Student signature: [Signatures]
Date: March 17, 2017

I, Andrew Page, certify that the student statements regarding their contribution to each of the works listed above are correct

Coordinating supervisor signature: [Signatures]
Date: 27 March 2017
Preamble to the Thesis

Consistent with the University of Western Australia’s guidelines for PhD submission, this thesis is presented as a series of publications and manuscripts. Chapters Two and Six have been published in peer-reviewed journals. Chapters One, Three to Five, Seven, and Eight have not been published. Presentation of this thesis as manuscripts may lead to some repetition and will require some linking sections to develop the overall argument. Figures and tables have been inserted into the text to facilitate reading.
A Note about Suicide Nomenclature

There is considerable debate about how best to classify the multi-dimensional range of suicide-related thoughts and behaviors (De Leo, Burgis, Bertolete, Kerkhof, & Bille-Brahe, 2006; Silverman, 2006; Silverman, Berman, Sandall, O’Carroll, & Joiner, 2007a). While a nomenclature has been proposed (e.g., Silverman, Berman, Sandall, O’Carroll, & Joiner, 2007b) this has not been adopted by all authors, and variations of this are often employed (e.g., Van Orden et al., 2010). Moreover, the inter-rater reliability for what constitutes some of these proposed definitions is low (Kattimani, Bharadwaj, Sarkar, & Mukerjee, 2015). As the field has yet to agree on an exact terminology, the following definitions are employed in the current thesis.

*Suicidal thoughts/Suicide ideation* refers to the cognitive contemplation of suicide.

*Suicide attempt* refers self-injurious behavior with some intent to die that does not result in death.

*Non-suicidal self-injury* refers to self-injurious behavior in the absence of the intent to die.

*Suicidal behavior* refers to self-injurious behavior with some intent to die that may be lethal (resulting in death) or non-lethal.

*Suicide risk* refers to the presence of suicidal thoughts and/or behaviors.

*Suicide risk factor* refers to any factor that has been positively associated with the presence of suicidal thoughts and/or behaviors.

It is acknowledged that the word ‘suicide’ has been used to describe suicidal behavior resulting in death (e.g., De Leo et al., 2006) and in the strictest sense, ‘suicide risk factor’ might then refer only to a ‘risk factor for death by suicide’, while other terms
such as ‘risk factor for suicide ideation’ and ‘risk factor for suicide attempt’ could also be employed (e.g., Kraemer et al., 1997). In contrast, the term ‘suicide risk’ is also frequently used across the literature in the more general sense in reference to the multi-dimensional range of suicidal thoughts and behaviors (e.g., Campos & Holden, 2015; Oglesby, Capron, Raines, & Schmidt, 2015; Silva, Chu, Monahan, & Joiner, 2015). In keeping with this literature, this latter more global definition was used in the current thesis. It is acknowledged, however, that the distinction between risk factors for ideation versus risk factors for behavior is a critical one (e.g., Klonsky & May, 2014; Klonsky, May, & Saffer, 2016) and is discussed further in relation to the studies comprising the present research.

It is also recognized that the use of the term, ‘suicidality’, has similarly been discouraged due to its lack of specificity (Silverman, 2006, 2007b). However, this term also continues to be employed throughout the suicide literature (e.g., Cheek, Nestor, & Liu, 2015; Jobes, 2012; Ribeiro et al., 2015) to refer to the wide spectrum of suicide-related thoughts, communications, and behaviors. It is thus also used in the current thesis when referencing existing literature that also employs this term.
Chapter One

The Interpersonal Theory of Suicide: Evidence Base and Gaps in the Literature
Introduction and Outline of Thesis Aims

Over 800,000 lives are lost to suicide across the world each year, and it is estimated that rates will remain stable through to 2030 (World Health Organization, 2013, 2014). In some countries such as the United States, suicide rates are even on the rise (Curtin, Warner, & Hedegaard, 2016) while visits to emergency departments for suicidal and self-injurious behavior have nearly doubled in recent decades (Larkin, Smith, & Beautrais, 2008; Ting, Sullivan, Boudreaux, Miller, & Camargo, 2012). In Australia, suicide represents the leading cause of death for individuals aged 15-44, claiming significantly more lives than road traffic accidents (Australian Bureau of Statistics, 2015; Bureau of Infrastructure, Transport and Regional Economics, 2015). Death by suicide leaves behind a wake of devastating consequences, while suicide ideation and attempts have adverse effects on the individual and their loved ones, can result in serious injury and disability, and create a significant financial burden on healthcare systems. Suicide is a pressing health problem across the globe (World Health Organization, 2014) and there is a clear and urgent need to better understand what causes an individual to contemplate disengaging from life, and what permits them to enact lethal self-destructive behavior.

In keeping with such calls, the latest version of the Diagnostic and Statistical Manual for Mental Disorders (DSM) has also shifted to a greater focus on suicide-related behaviors compared to earlier editions (e.g., American Psychiatric Association, 2000), now including procedures for suicide risk assessment, and identifying suicidal behavior and non-suicidal self-injury as areas for further research (American Psychiatric Association, 2013).

While attempts to identify risk factors proliferate, the accurate identification of those at highest risk remains challenging. Although a multitude of risk factors have been identified, it is well-documented that most people who possess these risk factors will not
go on to consider suicide, even less will make an attempt, and an even smaller amount will die by suicide. For example, most people who die by suicide have a diagnosable mental health problem (e.g., Nock et al., 2008), yet a large majority of those with mental health problems will never attempt suicide (Nordentoft et al., 2011). Similarly, while a history of multiple prior attempts is one of the most robust predictors of eventual death by suicide, approximately 50% die by suicide on their first attempt (Chesney, Goodwin, & Fazel, 2014; Suokas, Suominen, & Isometsa, 2001). Thus, there is a need for greater precision among the variables used to predict suicide.

The interpersonal theory of suicide (Joiner, 2005; Van Orden et al., 2010) was proposed to address the current shortfall in prediction, by shifting the focus from distal factors to more proximal risk factors. According to the theory, the pathway toward suicide is a universal one that is driven by three key proximal risk factors (Figure 1). The first two, perceived burdensomeness and thwarted belongingness, are thought to cause active suicide ideation when experienced together and in the context of hopelessness. **Perceived burdensomeness** is thought to comprise a sense that one is a liability on others coupled with a feeling of self-hatred, while **thwarted belongingness** refers to a lack of reciprocally caring relationships and a sense of loneliness. The third cornerstone of the theory, the **acquired capability** to enact lethal self-harm, comprises both fearlessness of death and pain tolerance required to overcome strong biological drives for self-preservation (Joiner, 2005; Van Orden et al., 2010).
The interpersonal theory has emerged as a leading model that has garnered substantial support since its initial proposal (e.g., Joiner et al., 2009; Spencer-Thomas & Jahn, 2012; Van Orden, Witte, Gordon, Bender, & Joiner, 2008), though there are some critical gaps in this research. This thesis sought to address these lacunae.

Focusing first on the model’s two putative causes of suicidal desire, it is necessary to test a core assumption of the theory that it is the ‘interpersonal’ nature of these factors that makes them particularly noxious. To date, research has failed to distinguish whether the adverse effects of burdensomeness and thwarted belongingness are due to their interpersonal nature or to failure more generally. An experimental test with high validity is required to clarify specifically it is about the interpersonal factors that drive a desire to give up. This test was conducted in Chapter Two.

After testing this core assumption, it was next important to address other predictions about the role of the interpersonal factors. The interpersonal theory posits that perceptions of burdensomeness are sufficient to confer risk even in the absence of actual
feedback that one is burdening others (Joiner, 2005). This proposal is as yet untested, and it is also unknown whether perceived burdensomeness and actual thwarted interpersonal needs have further interactive effects. Chapter Three thus sought to clarify the relative influence of perceived burdensomeness and actual thwarted interpersonal needs using an experimental paradigm.

Burdensomeness and thwarted belongingness are also thought to mutually amplify each other (Joiner, 2005) though their temporal reciprocal effects are difficult to separate in real-life settings (Ribeiro & Joiner, 2009). Chapter Four hence sought to disentangle these relationships experimentally.

Maintaining the focus on the theory’s two putative causes of suicidal desire, the thesis next moves from the laboratory to addressing a gap in the theory using a prospective design. It is important to consider the role of life-sustaining factors that may mitigate the adverse effects of risk factors (Harrison et al., 2014; Shneidman, 1996), though the interpersonal theory does not explicitly account for resilience. Chapter Five aimed to address this gap by testing the influence of zest for life, defined as a sense of connection to and enthusiasm for life, against the adverse effects of the interpersonal factors.

Turning next to the third key facet of the interpersonal theory, the acquired capability to enact lethal suicidal behavior, it was important to conduct the first test of the longitudinal associations between the acquired capability facets and indices of risk along the ideation-to-action pathway (Klonsky & May, 2015). To achieve this aim, it was also necessary to address shortcomings in existing measures of capability (Ribeiro et al., 2014; Smith, Wolford-Clevenger, Mandracchia, & Jahn, 2013) by developing a new measure that reliably and validly captures all facets of this key construct.
Finally, since it is important not to neglect factors that may circumvent the lethal trajectory from suicidal thoughts to lethal behavior, Chapter Seven aimed to investigate the interplay between zest for life and the acquired capability facets along the pathway from ideation to readiness for action. Prior to expanding on these identified aims for research, the interpersonal theory and its existing evidence are first overviewed.

**The Interpersonal Theory of Suicide: Overview and Evidence**

Multiple theories have been espoused in attempt to explain why people die by suicide. Suicide is often conceptualized here as an escape from circumstances that are perceived as intolerable, though theories vary in terms of which risk factors are thought to be most pernicious. Some theorists posit that a wish to escape is driven by aversive self-awareness following failure (Baumeister, 1990, 1991), while others emphasize the role of defeat and entrapment (O’Connor, 2011; Williams, 2001), hopelessness (Beck, 1986), and extreme psychological pain from thwarted psychological needs (Shneidman, 1993, 1996).

The interpersonal theory was postulated to amalgamate and expand existing theories, accounting for the interplay between intra-individual and interpersonal factors, while simultaneously explaining existing literature on suicide risk factors. Unlike some other models, the interpersonal theory makes precise and falsifiable predictions that are also clinically relevant regarding the proximal role of its three causal risk factors in driving lethal suicidal behavior. According to the theory, the failure and pain that causes thoughts of escape from life is interpersonal in nature; driven specifically by thwarted interpersonal needs for belongingness and effectiveness (Joiner, 2005; Van Orden, 2010).

The theory was also the first to propose that desire for death is necessary but insufficient to cause lethal suicidal behavior, challenging the assumption implicit in existing models that individuals who contemplate suicide differ from those who enact
lethal suicidal behavior in terms of the intensity of their suicidal desire. According to the interpersonal theory, suicidal desire (driven by perceived burdensomeness and thwarted belongingness) is insufficient to cause lethal suicidal behavior in the absence of the fearlessness of death and pain tolerance (acquired capability) required to beat down and over-ride evolutionarily ingrained survival instincts (Joiner, 2005).

Since this proposal, two additional theories inspired by the interpersonal theory have been postulated to explain the difference between those who act on suicidal thoughts versus those who do not. The integrated motivational-volitional model (O’Connor, 2011) integrates and expands on the interpersonal theory by identifying motivational moderators (such as thwarted belongingness, perceived burdensomeness, and a lack of positive future thinking and goals) that transform feelings of entrapment into suicidal thinking, and volitional moderators that transform ideation into behavior (such as acquired capability, impulsivity, planning and access to means). Similarly, the three-step theory (Klonsky & May, 2015; Klonsky, May, & Saffer, 2016) acknowledges the contribution of thwarted belongingness and perceived burdensomeness to suicide ideation, and expands Joiner’s (2005) notion of acquired capability to also include dispositional (e.g., genetic predispositions) and practical (e.g., access to and understanding of lethal means) elements of capacity for suicide that facilitate movement along the ideation-to-action pathway toward lethal behavior. The interpersonal theory is hence subsumed within the less parsimonious integrated motivational-volitional model (O’Connor, 2011; O’Connor & Nock, 2014) and its key facets are also acknowledged as important by the newly devised three-step theory (e.g., Klonsky & May, 2015). Perceived burdensomeness, thwarted belongingness and acquired capability are indeed recognized as key risk factors and their influence has been tested across a variety of studies.

**Perceived Burdensomeness, Thwarted Belongingness, and Suicidal Thoughts**
According to the interpersonal theory, it is the *perception* of burdensomeness that is deleterious, even if inaccurate, while belongingness refers to an *actual* shortage of reciprocally caring relationships (Joiner, 2005). Perceived burdensomeness and thwarted belongingness are dynamic constructs that are related but distinct (Van Orden, Cukrowicz, Witte, & Joiner, 2012; Van Orden et al., 2010). If burdensomeness is perceived but belongingness is satisfied, only passive suicide ideation will ensue, as “the will to live remains intact” (Joiner, 2005, p. 117). Similarly, if one maintains a sense of interpersonal effectiveness, this “can be life-saving” (Joiner, 2005, p. 100), even in the face of passive suicide ideation caused by thwarted belongingness. When both interpersonal needs are thwarted simultaneously, and are perceived as global and unchanging states, they act as “life-draining” forces (Joiner, 2005, p. 102) that instill an active desire for death.

The proposal that the two interpersonal factors are linked to suicide ideation has garnered a large amount of cross-sectional support across a range of diverse populations, such as clinical (Hawkins et al., 2014; Joiner et al., 2009), community (Christensen, Batterham, Soubelet, & Mackinnon, 2013), forensic (Cramer et al., 2012; Mandracchia & Smith, 2015), military (Monteith, Menefee, Pettit, Leopoulos, & Vincent, 2013), high school (Barzilay et al., 2015) and primary care (Nsamenang, Webb, Cukrowicz, & Hirsch, 2013) settings, as well as among undergraduate student samples from across the United States (e.g., Van Orden et al., 2008), China (e.g., Zhang, Lester, Zhao, & Zhou, 2013), Germany (Glaesmer, Spangenberg, Scherer, & Forkmann, 2014) and the United Kingdom (Dhingra, Boduszek, & Klonsky, 2016). In addition to the prolific quantitative literature supporting the link between the two interpersonal factors and thoughts of suicide, qualitative interviews with both male (Brenner, Gutierrez, Cornette, Betthauser, Bahraini & Staves, 2008) and female (Gutierrez et al., 2013) combat veterans showed that
suicide was spontaneously mentioned by several interviewees as a means of coping with feelings of burdensomeness and diminished belongingness. Further, therapists who were presented with case vignettes of individuals experiencing high levels of perceived burdensomeness and thwarted belongingness tended to rate such cases as being at higher risk of suicide compared to those experiencing lower levels of the interpersonal factors (Levi-Belz & Gamiel, 2015), indicating that thwarted interpersonal needs are important markers of clinician-rated risk. Themes of thwarted belongingness and perceived burdensomeness have also been documented in the final communications (Martin et al., 2013) and in notes left by those who died by suicide (Cox et al., 2013).

While most research on the interpersonal theory is cross-sectional, some prospective studies show that the interpersonal factors precede suicide ideation (Kleiman, Law & Anestis, 2013; Podlogar, Ziberna, & Postuvan, 2016; Puzia, Kraines, Liu, & Kleiman, 2014; Van Orden, Cukrowicz, et al., 2012) and precede decreased meaning in life (Van Orden, Bamonti, King, & Duberstein, 2012). Experimentally induced burdensomeness and thwarted belongingness were also recently found to increase thoughts of disengagement from such interpersonal adversity (Collins, Best, Stritzke, & Page, 2016; Collins, Stebbing, Stritzke, & Page, 2017). Though thoughts of disengaging from difficulty undoubtedly differ from thoughts of disengaging from life, suicide is often conceptualized as an escape from adversity (e.g., Baumeister, 1990; O’Connor, 2011; Shneidman, 1996; Williams, 2001), and thoughts of escaping interpersonal adversity and of escaping life may recruit similar psychological processes (cf. Joiner, 2005). Additionally, thoughts of disengaging from such experimentally induced interpersonal adversity were indeed significantly associated with frequency of suicide ideation (Collins et al., 2016, 2017).
While the interpersonal theory posits that both thwarted belongingness and perceived burdensomeness contribute to driving suicidal desire (Joiner, 2005), evidence is conflicting regarding the relative importance of the two factors. In a recent review of the literature on the interpersonal theory, Ma and colleagues (2016) concluded that perceived burdensomeness tends to emerge as a stronger predictor of risk compared to thwarted belongingness. Burdensomeness has also emerged as the stronger mediator of the relationships between various risk factors and suicide ideation, including post-traumatic stress (Poindexter et al., 2015), eating disorder symptoms (Forrest et al., 2016), childhood and emotional abuse (Puzia et al., 2014), and chronic interpersonal stress (Buitron et al., 2016). Similarly, experimental research shows that burdensomeness is a stronger driver of the desire to disengage compared to thwarted belongingness (Collins et al., 2016).

Though burdensomeness tends to emerge most frequently as the more pernicious interpersonal factor (Ma et al., 2016), this is not consistent across all studies. Some findings suggest that relative to burdensomeness, thwarted belongingness was more strongly linked to suicide ideation (O’Connor et al., 2016), suicide attempt status (Conner, Britton, Sworts, & Joiner, 2007; Simlot McFarland, & Lester, 2013) and to an active desire to die (Christensen et al., 2013; Cukrowicz, Jahn, Graham, Poindexter, & Williams, 2013, Donker, Batterham, Van Orden, & Christensen, 2014), and was also a more prevalent theme among notes left by those who died by suicide (Gunn, Lester, Haines, & Williams, 2012; Lester & Gunn, 2012). These latter findings suggest that thwarted belongingness may be a stronger predictor later at the behavioral stages of the pathway toward suicide, though the association between thwarted belongingness and suicidal behavior was not significant across all studies (Ma et al., 2016).

Hence, while the relative influence of the two interpersonal factors is unclear, both factors were associated with heightened risk across a multitude of studies using diverse
research methods, and of the two, burdensomeness tends to emerge most often as the more noxious interpersonal factor (Ma et al., 2016).

**Acquiring the Capability to Enact Lethal Suicidal Behavior**

Dying by suicide is a difficult feat that requires not only the desire for death, but also a significant amount of fearlessness of death and pain tolerance (acquired capability) to “beat back this pressing urge toward self-preservation” (Joiner, 2005, p. 24). Consistent with this thinking, males tend to report higher fearlessness of death (McLaren, 2011) and pain tolerance (Fillingim, King, Ribeiro-Dasilva, Rahim-Williams, & Riley, 2009) relative to females, and male deaths by suicide outnumber female deaths across most areas of the world (World Health Organization, 2014). While fearlessness enables the transition from suicide ideation to suicidal intent, pain tolerance is thought to facilitate medical lethality (Van Orden et al., 2010).

Acquired capability for suicide is thought to develop via opponent processes (Solomon & Corbit, 1974), whereby one becomes habituated to the fear and pain required to enact suicidal behavior through repeated exposure to painful and provocative events (Joiner, 2005). This can occur either indirectly, through experiences such as injection drug use or skydiving, or directly, via self-harm or mental preparation for suicide (Joiner, 2005; Van Orden et al., 2010). This is consistent with findings that, relative to controls, individuals who engage in self-harm report increased fearlessness of making a suicide attempt (Muehlenkamp & Gutierrez, 2007) and demonstrate a higher pain threshold and tolerance (e.g., Orbach et al., 1996; Willoughby, Heffer, & Hamza, 2015). Similarly, mental preparation for suicide is considered an important marker of risk (e.g., Joiner, Walker, Rudd, & Jobes, 1999) and greater planning for suicidal behavior is associated with more severe medical damage (Mann et al., 1996) and heightened likelihood of death (Beck & Lester, 1976; Joiner et al., 2003).
Capability for suicide is thought to be relatively static once acquired and is posited to be distinct from suicidal desire, causing pernicious effects only when experienced in combination with perceived burdensomeness and thwarted belongingness (Joiner, 2005). Some found support for the hypothesized moderating role of acquired capability (Anestis & Joiner, 2011; Smith, Cukrowicz, Poindexter, Hobson, & Cohen, 2010; Van Orden et al., 2008) while others have documented direct relationships between acquired capability and suicide risk (Bryan et al., 2012; Bryan, Morrow, Anestis, & Joiner, 2010; Kene & Hovey, 2014; Zhang et al., 2013). However, findings were not consistent across all studies, with many failing to find support for either moderating or direct effects (see Ma, Batterham, Calear, & Han, 2016 for a review). Evidence is considered preliminary regarding the predicted role of acquired capability and there is a need for further research on this novel construct (May & Klonsky, 2016).

**Key Gaps in the Research**

The interpersonal theory has garnered substantial support since its initial proposal, though there are some important gaps in the literature. The current thesis sought to fill these gaps by testing fundamental assumptions about the interpersonal factors, accounting for the role of life-oriented factors, and testing main predictions about the acquired capability for suicide.

**Untested Assumptions about the Interpersonal Factors**

At the center of the interpersonal theory is an untested assumption that it is the interpersonal nature of perceived burdensomeness and thwarted belongingness that makes these factors especially pernicious. However, existing research is limited by an inability to discern the mechanism of action by which these factors cause thoughts of escape. The interpersonal factors may instill a general sense of personal inadequacy and failure (Baumeister, 1990, 1991) and failure may drive suicide ideation irrespective of its
specific (interpersonal) causes. This would be consistent with the escape theory of suicide, where suicide is thought to be caused by a perception of failure (Baumeister, 1990) and with evidence linking suicide ideation to perceptions of falling short of a standard (Chatard & Selimbegovic, 2011; Cornette, Strauman, Abramson, & Busch, 2009). An experimental manipulation of thwarted interpersonal needs, such as the recently developed Interpersonal Persistence Task (Collins et al., 2016) is needed to clarify what specifically it is about burdensomeness and thwarted belongingness that drives a desire to give up.

After substantiating this fundamental interpersonal assumption of the theory, it was important to test other existing key predictions regarding the role of the interpersonal factors. The interpersonal theory posits that perceptions of burdensomeness are sufficient to confer risk even if they are mistaken (Joiner, 2005) though this proposal has never been tested, and both perceived (e.g., Van Orden, Cukrowicz et al., 2012) and actual (e.g., Inoue et al., 2007) burdensomeness are associated with heightened suicide risk. Additionally, according to the fluid vulnerability model of suicide (Bryan & Rudd, 2016, Rudd, 2006), risk is highest when trait-based and state-based risk factors interact, and the combination of perceptions of burdensomeness and actual state-based thwarted interpersonal needs may have further multiplicative effects. There is hence a need to clarify the relative impact of perceived burdensomeness and actual thwarted interpersonal needs.

The theory also posits that burdensomeness and thwarted belongingness may mutually amplify each other (Joiner, 2005) and some have found evidence for their multiplicative effects (e.g., Ma et al., 2016), though their temporal inter-relationships are unclear. While the respective influences of the interpersonal factors and are difficult to
untangle in real-life settings (Ribeiro & Joiner, 2009), it is possible to examine their reciprocal temporal effects using an experimental paradigm.

After testing existing predictions regarding the theory’s two putative proximal causes of suicidal desire, it was important to address a gap in the literature by testing new predictions about life-oriented factors that may mitigate the risk conferred by these interpersonal constructs.

**Accounting for Life-Oriented Factors**

In a recent review of research on the interpersonal theory, Ma and colleagues (2016) questioned whether there were additional crucial variables not accounted for by the model that may further improve risk estimates. It is important to consider both risk and resilience within theoretical models to accurately identify those at highest risk (Cheavens et al., 2015; Heisel & Flett, 2008), as resilience factors are discrete from an absence of risk and can neutralize the adverse effects of risk factors (Johnson et al., 2011). However, most theoretical models do not account for the role of protective factors, in line with a general trend in suicidology to focus on risk at the expense of a relative paucity of study on resilience (O’Connor & Nock, 2014). Moreover, many existing concepts of suicide resilience are not theoretically driven (Johnson et al., 2011). It is thus important to consider current concepts of resilience in suicidology and how they might be anchored within the postulates of the interpersonal theory.

Some factors commonly associated with diminished suicide risk include specific elements of a sense of connection to life such as reasons for living, purpose in life, meaning in life, and life satisfaction (Heisel & Flett, 2004; Kleiman & Beaver, 2013; Linehan, Goodstein, Nielsen, & Chiles, 1983). Further highlighting the importance of attachment to life, a diminished desire to live was found to denote heightened suicide risk beyond the desire for death alone (Brown, Steer, Henriches, & Beck, 2005; Kovacs &
Beck, 1977; O'Connor, Jobes, Comtois, et al., 2012; Wetzel, 1975). Importantly, the prospective emergence of suicidal behavior was more strongly associated with a depleted desire to live than a heightened desire for death (Bryan & Rudd, 2016).

In addition to engagement with life, a positive future life outlook also appears important in the reduction of risk. Future optimism is inversely associated with risk (Osman et al., 1998; Rasmussen & Wingate, 2011), while deficits in positive future thinking can undermine resilience (e.g., Hunter & O’Connor, 2003). With regard to the postulates of the interpersonal theory, dispositional optimism (e.g., Davidson & Wingate, 2013) and hope (e.g., Anestis, Moberg, & Arnau, 2014) were negatively associated with perceived burdensomeness and thwarted belongingness.

Literature on specific life-oriented factors hence suggests that a general sense of connection to and enthusiasm for future life is critical in the reduction of risk. Such a ‘zest for life’ may underlie many of the specific life-oriented factors examined and may create a protective barrier between the key postulates of the interpersonal theory and heightened risk.

While the interpersonal theory does not explicitly account for life-sustaining forces, the theory’s key putative causal factors are described in relation to how they impact one’s connection to life. Perceived burdensomeness and thwarted belongingness are thought to exert ‘‘life-draining’’ effects (Joiner, 2005, p. 102) and even when the will to live has been depleted by these factors, strong survival instincts must later be beaten down and overcome by fearlessness of death and pain tolerance (Joiner, 2005). While zest for life differs from evolutionarily ingrained survival drives, it could similarly stand in the way between the putative causal factors of the interpersonal theory and heightened risk; however, this has yet to be tested empirically. Hence, it was important to test the relationship between the interpersonal factors, zest for life, and suicide ideation. Prior to
examining the interplay between zest for life and the acquired capability facets along the ideation-to-action pathway (Klonsky & May, 2015), it was necessary to test the interpersonal theory’s main predictions regarding the influence of acquired capability.

**Testing the Role of Acquired Capability**

Relative to the literature on the interpersonal factors, there has been considerably less empirical scrutiny of the most novel component of the interpersonal theory – the acquired capability to enact suicidal behavior. Studies that have tested the hypothesized role of acquired capability in transforming suicidal desire into suicidal behavior have yielded mixed results (Ma et al., 2016). Moreover, there have been no longitudinal tests of the associations between the theoretically-derived facets of acquired capability and suicide risk, which are required to determine whether capability is an antecedent or a consequence of risk.

Existing measures of acquired capability are accompanied by psychometric and conceptual limitations (Ribeiro et al., 2014; Smith et al., 2013) and may not adequately capture this critical construct (Ma et al., 2016). Difficulties measuring all facets of the acquired capability for suicide may be clouding the complex relationship between capability and suicide risk. Prior to conducting prospective tests of the relationships between the acquired capability facets and indices of risk along the ideation-to-action pathway, there is first a need to develop a new multi-facet measure of acquired capability that reliably and validly captures all features of this key construct.

Since it is important not to also neglect factors that may circumvent the progression of risk from suicide ideation to lethal readiness for suicide, the achievement of the above aims would facilitate a final test of the inter-relationships between zest for life and the acquired capability facets in the pathway from ideation to readiness for action.
In sum, the interpersonal theory is a leading theoretical model that has garnered substantial evidence, yet there are some important gaps in the literature that this thesis will address. Focusing first on theory’s two putative causes of suicidal desire, it was necessary to first test a fundamental assumption that it is the specific interpersonal nature of perceived burdensomeness and thwarted belongingness that makes these factors especially pernicious.
Chapter Two

An Experimental Test of the “Interpersonal” in the Interpersonal Theory of Suicide
Abstract

The interpersonal theory of suicide posits that failed interpersonal needs for efficacy and belongingness cause suicide ideation (Joiner, 2005). To distinguish whether their mechanism of action is interpersonal or via failure per se, an experimental manipulation of high and low burdensomeness and thwarted belongingness (Collins et al., 2016) was modified to also manipulate high and low levels of intrapersonal failure. Participants ($n = 63$) were randomly allocated to complete the computerized task in collaborative (i.e., interpersonal; high or low failure) or competitive (i.e., intrapersonal; high or low failure) conditions. Participants in the interpersonal high failure condition expressed the greatest desire to disengage from this induced adversity, indicating that the interpersonal nature of perceived burdensomeness and thwarted belongingness makes these factors particularly pernicious, supporting the emphasis of the interpersonal theory of suicide.

*Keywords*: burdensomeness, thwarted belongingness, suicide, interpersonal theory of suicide, zest for life
An Experimental Test of the “Interpersonal” in the Interpersonal Theory of Suicide

The interpersonal theory of suicide (Joiner, 2005; Van Orden et al., 2010) identifies two fundamental interpersonal needs that if unmet are thought to drive active suicidal desire. The first is the need to belong and have mutually caring relationships. The second is the need to meaningfully and effectively contribute within one’s social network. When both needs are perceived as unfulfilled they are experienced as thwarted belongingness and perceived burdensomeness, respectively. Hence, “the simultaneous presence of thwarted belongingness and perceived burdensomeness, when perceived as stable and unchanging (i.e., hopelessness regarding these states), is a proximal and sufficient cause of active suicidal desire” (Van Orden et al., 2010; p. 581). Thus, the present focus is upon a defining feature of these two key factors posited by the theory in that they are interpersonal in nature. While there is growing empirical support for several of the theory’s predictions (Ma, Batterham, Calear, & Han, 2016), the fundamental underlying assumption that it is the interpersonal nature of feeling disconnected and a liability on others that causes the desire to escape life via suicide, rather than a general sense of inadequacy and failure (Baumeister, 1991), has not been examined or tested. The aim of the present study was to disambiguate whether desire to disengage was due to the interpersonal or the intrapersonal nature of failure and in so doing, test the central tenet of the theory.

In an experimental test of the interpersonal theory (Collins et al., 2016), perceived burdensomeness and thwarted belongingness were experimentally manipulated using an interactive computer team task to measure their relative influence on the desire to escape from such an interpersonally adverse situation. Here, both thwarted belongingness and perceived burdensomeness caused a heightened desire to escape.
This experimental evidence showing that the interpersonal factors drive a heightened desire to escape (Collins et al., 2016) is in line with cross-sectional (e.g., Christensen et al., 2013), and longitudinal (e.g., Van Orden, Cukrowicz, Witte, & Joiner, 2012) research indicating that burdensomeness and thwarted belongingness are associated with thoughts of escape from life – suicide ideation. Existing research on the theory is limited to date however by an inability to distinguish whether it is the interpersonal nature of burdensomeness and thwarted belongingness that causes thoughts of escape. The interpersonal factors may instill a general sense of inadequacy and failure (e.g., Baumeister, 1991) and failure may drive suicide ideation irrespective of its specific (interpersonal) causes. This is consistent with the escape theory of suicide, where suicide is posited to result from aversive self-awareness following failure to meet a salient standard (Baumeister, 1990), and with evidence that self-discrepancy (falling short of a standard) is significantly associated with suicide ideation (Chatard & Selimbegovic, 2011; Cornette, Strauman, Abramson, & Busch, 2009). An experimental test with high internal validity, such as the Persistence Task (Collins et al., 2016), would allow the careful separation of interpersonal from intrapersonal failure, clarifying if it is specifically the interpersonal nature of the variables that drives a desire to give up.

**Research Rationale and Aims**

We thus sought to test the mechanisms via which the interpersonal factors caused disengagement. Here, the original persistence task, which experimentally induces high and low levels of interpersonal failure (burdensomeness and thwarted belongingness), was modified to include a comparable intrapersonal manipulation of high and low levels of individual failure. Participants were then randomly allocated to either high or low levels of failure in either the interpersonal or intrapersonal versions. By comparing those who experienced high levels of interpersonal failure with those who experienced high
levels of intra-individual failure, it was possible to distil the interpersonal from a more general sense of failure and inadequacy, providing the first test of how the interpersonal factors exert their effects.

Should the high interpersonal and high intrapersonal failure conditions have equivalent adverse effects on disengagement, this would support the escape theory of suicide’s proposal that desire to escape results from a general sense of inadequacy (Baumeister, 1990). Conversely, should interpersonal failure emerge as especially pernicious, this would support the more specific emphasis of the interpersonal theory.

Method

Participants and Procedures

Sixty-three undergraduate students (34 females and 29 males) ranging in age from 17-46 years ($M = 18.90$ years, $SD = 4.28$) whose scores fell within the average range (one standard deviation above and below the mean) on measures of thwarted belongingness, perceived burdensomeness, and zest for life participated for course credit. As prior research using the task (Collins et al., 2016) employed a participant sample who fell at the extremes of zest for life scores, the current research examined the effect of the different manipulations on a sample falling within the normal ranges on belongingness, burdensomeness, and zest for life. Participants were informed that they were taking part in a study about persistence. Self-reported ethnicity consisted of Caucasian/Australian (61.9%), Asian (19.0%), European (3.2%), African (1.6%) and Other (14.3%) ethnicities. All participants were debriefed and provided with details of campus and community mental health resources following the study. Procedures were approved by the institution’s Human Research Ethics Office.

Persistence Task
In the original version of the Interpersonal Persistence Task (Collins et al., 2016), participants were informed that they were playing online with two fellow participants in separate testing rooms, and that they would each work to accumulate points toward their team score with the aim of beating a target score. Participants were told that points would be won or lost based on both speed and accuracy, by correctly identifying whether two characters were identical or different. The doors of the testing rooms were closed during the task, to preclude conversation between participants.

After every five responses, a summary table was displayed with each player’s scores (points won and lost), the team total, and the target score. All participant scores were unreflective of actual performance and were instead manipulated so that those in the high burdensomeness/thwarted belongingness (B-TB) group received feedback that they were performing worse than their co-players, while those in the low B-TB group consistently received feedback that they were performing similarly to co-players (and their team approximated the target score). Hence, while those in the low B-TB condition received feedback that they performed similarly to their team mates and their team was comparable to the target score, those in the high B-TB condition were given feedback that their performance was less than the target by virtue of their performance being lower than that of their team members.

In addition to receiving numerical feedback about their relative contribution to the team, participants were also invited to exchange written feedback with their co-players on three occasions, after every 15 figure discrimination trials, in an “online chat.” After sending their text messages, participants received teammate feedback. Co-player feedback was also entirely determined such that all high B-TB participants received messages that became increasingly critical and impatient, while low B-TB participants received feedback that encouraged them to maintain their positive contribution. Spelling
and grammatical errors were included in both conditions to increase plausibility that comments were written by fellow students.

Following the reception of each set of co-player feedback, participants rated their current level of belongingness to the team (‘‘The other players make me feel like I am part of the team’’) perceived burdensomeness relative to the team (‘‘I think I am a burden on my other team members’’), and desire to disengage (‘‘If I had the option, I would rather drop out of the game’’) on a scale from 0 (‘not at all true for me’) to 6 (‘very true for me’). One-item measures were used to facilitate information-gathering over the course of the brief task.

To account for the potential influence of interest, as defined by whether participants found the task interesting, and effort, as defined by whether participants tried to do well in the experiment, two items were administered (‘‘I found the task interesting’’ and ‘‘I made an effort to do well on the task’’) on a scale from 0 (‘not at all true for me’) to 6 (‘very true for me’). To determine whether participants experienced suspicion that the task may have been fixed, participants were invited to comment about the experiment (‘‘Do you have any comments about the experiment?’’) and their co-players (‘‘Do you have any comments about your teammates?’’) prior to debriefing.

A brief version of the computerized task was used in the current study lasting approximately ten minutes in duration. Participants were randomly allocated to one of four experimental groups. Two groups (high and low failure: interpersonal condition) played the Interpersonal Persistence task as outlined above. Two other groups (high and low failure: intrapersonal condition) played a nearly identical task with one modification. Here, participants were informed that they would be playing a competitive task, and would be competing against two other players with the goal of beating an individual target score. The task and all other procedures were identical to those of the original task.
outlined above, such that those in the high failure condition (like those in the high B-TB condition) consistently performed worse than their co-players and received critical feedback, while those in the low failure condition (like those in the low B-TB condition) consistently performed slightly better than their co-players, and received encouraging comments from co-players.

Measures

Participants completed questionnaires about perceived burdensomeness, thwarted belongingness, and zest for life at screening. Questionnaires about suicide risk and general psychological distress were administered following the task prior to debriefing.

**Interpersonal Needs Questionnaire (INQ; Van Orden et al., 2008).** The INQ was administered to assess perceived burdensomeness (six items; e.g., ‘‘The people in my life would be better off if I were gone’’) and thwarted belongingness (nine items; e.g., ‘‘I feel disconnected from other people’’). Items are measured on a 6-point scale, where high scores denote heightened perceived burdensomeness and thwarted belongingness. The INQ has been used in non-clinical settings and demonstrates construct validity and internal consistency (Van Orden et al., 2012; Van Orden et al., 2008). Total scale scores ranged from 15 to 72 and the internal consistency in the current sample was excellent (PB subscale α = .88; TB subscale α = .88; Total INQ α = .91).

**Zest for Life Scale (ZLS; George et al., 2017).** The ZLS is a 12-item measure of general engagement with and enthusiasm for life (e.g., ‘‘I am embracing life’’). Items are measured on a scale from 0 (‘not at all’) to 8 (‘very strongly’). The scale includes six reverse-scored items (e.g., ‘‘Life seems to hold less for me than it used to’’), such that higher scores denote heightened zest. The ZLS is suitable for use in non-clinical samples and demonstrates good internal consistency and construct validity (George et al., 2017). A 7-item version of the scale was administered during the initial screening. Both 7- and
12-item scales were strongly correlated \((r = .93, p < .01)\) and demonstrated excellent internal consistency \((\alpha = .96 \text{ and } .97, \text{ respectively})\).

**Suicide risk.** Two items from the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007) were administered to measure frequency of suicide ideation in the past year (‘How many times have you thought about suicide?’), on a 6-point scale (never’ to ‘almost every day’), and lifetime suicide attempts (‘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?’) on a 5-point scale (‘never’ to ‘five or more times’). The SITBI is appropriate for administration in self-report format (Latimer, Meade, & Tennant, 2013) and has demonstrated inter-rater reliability, test-retest reliability and construct validity with other measures of suicide risk (Nock et al., 2007).

As the SITBI items refer to past behavior, one reverse-scored item was also administered to measure imminent suicidal intent (‘I have no intention of killing myself in the near future’) on a scale from 0 (not at all) to 8 (very strongly). This item is appropriate for use in non-clinical samples and correlates significantly with past suicidal behavior (George, Page, Hooke, & Stritzke, 2016; see also Chapter Six).

**General psychological distress.** The Kessler Psychological Distress Scale (K10; Kessler et al., 2003) comprises ten items measuring emotional states occurring in the past four weeks on a scale from 1 (‘none of the time’) to 5 (‘all of the time’). High scores denote heightened general psychological distress and increased probability of experiencing a mental health problem (Andrews & Slade, 2001). Total scale scores ranged from 22 to 50 and internal consistency in the current sample was excellent \((\alpha = .88)\).

**Data Analytic Strategy**
Data were screened for outliers and participant feedback was examined independently by two researchers to evaluate whether participants expressed suspicion that the task may have been rigged. To determine the effect of the manipulation on desire to disengage, a 2 (intrapersonal/interpersonal condition) × 2 (high/low failure) × 3 (blocks of trials) mixed-design ANOVA was run.

**Results**

**Data Screening and Manipulation Checks**

One case was identified who exceeded the critical value ($z = 3.29$) on the reaction-time variable. As this participant responded within the normal range on all other measures, they were assigned a score of three standard deviations above the mean (Field, 2009). All task measures were normally distributed (skew < ±2; Field, 2009). Mean task burdensomeness and belongingness ratings were significantly correlated ($r = .65, p < .01$).

Twelve participants (19.0% of the sample) were identified who expressed suspicion that the task was fixed. While these participants did not differ from non-suspicious participants in mean scores of task related measures ($ps > .05$), they were removed from subsequent analyses.

**Sample Characteristics**

Frequency of self-reported suicide ideation was as follows: 43.1% thought about suicide at least once in the past year, 5.9% thought about suicide on at least a monthly basis, and 2.0% thought about suicide at least weekly. More than a tenth of the sample (11.8%) reported at least one lifetime suicide attempt, with 3.9% reporting multiple attempts. These findings are consistent with others showing heightened rates of suicide ideation (Johnson et al., 2010) and lifetime suicide attempts (e.g., Bauer, Chestin, &
Participants did not significantly differ across the four experimental groups in levels of suicide ideation, $F(3, 47) = 0.79, p = .51, \eta^2 = .048, 90\% \text{ CI} (.00, .05)$, suicide attempts, $F(3, 47) = 0.52, p = .67, \eta^2 = .032, 90\% \text{ CI} (.00, .33)$, baseline burdensomeness, $F(3, 47) = 0.33, p = .80, \eta^2 = .021, 90\% \text{ CI} (.00, .06)$, baseline belongingness, $F(3, 47) = 0.84, p = .48, \eta^2 = .051, 90\% \text{ CI} (.00, .13)$, or baseline zest for life $F(3, 47) = 0.34, p = .80, \eta^2 = .029, 90\% \text{ CI} (.00, .08)$. Participants also did not significantly differ across groups in reported levels of interest in the task, $F(3, 47) = 1.86, p = .15, \eta^2 = .106, 90\% \text{ CI} (.00, .21)$ (Intrapersonal high failure condition: $M = 4.23, SD = 1.17$; Intrapersonal low failure condition: $M = 4.69, SD = 0.95$; Interpersonal high failure condition: $M = 3.67, SD = 1.50$; Interpersonal low failure condition: $M = 3.90, SD = 0.99$), or effort exercised while playing, $F(3, 47) = 1.52, p = .22, \eta^2 = .088, 90\% \text{ CI} (.00, .19)$ (Intrapersonal high failure condition: $M = 5.62, SD = 0.51$; Intrapersonal low failure condition: $M = 5.38, SD = 0.48$; Interpersonal high failure condition: $M = 5.13, SD = 0.83$; Interpersonal low failure condition: $M = 5.70, SD = 0.48$).

**Experimental Manipulation**

An ANOVA was run to determine the effect of condition (intrapersonal/interpersonal) by failure rate (high/low) on desire to disengage. Participants in the high failure conditions expressed a significantly greater desire to disengage relative to those in the low failure conditions, $F(1, 47) = 32.16, p < .001, \eta^2_p = .41, 90\% \text{ CI} (.22, .54)$, indicating that failure, whether interpersonal or intrapersonal, causes a wish to give up. The main effect of failure was qualified by a significant Time x Failure interaction, $F(2, 94) = 4.65, p = .012, \eta^2_p = .09, 90\% \text{ CI} (.01, .18)$. Follow-up contrasts revealed a significant linear trend across time in the high failure conditions, $F(1,
26) = 8.20, p = .004, $\eta^2_p = .24$, 90% CI (.04, .43), but not in the low failure conditions, $F(1, 21) = 0.53, p = .48, \eta^2_p = .03$, 90% CI (.00, .20), indicating that those in the high failure groups experienced an increasing desire to disengage over the course of the experiment while desire to disengage remained relatively stable in the low failure groups.

A significant main effect of condition, $F(1, 47) = 5.78, p = .020, \eta^2_p = .11$, 90% CI (.01, .25) and a significant Condition x Failure interaction, $F(1, 47) = 8.88, p = .005, \eta^2_p = .16$, 90% CI (.03, .31) were also observed. Follow-up tests revealed a significant main effect of condition among high failure, $F(1, 26) = 10.95, p = .003, \eta^2_p = .30$, 90% CI (.07, .48), but not low failure groups, $F(1, 21) = 0.37, p = .55, \eta^2_p = .02$, 90% CI (.00, .18). As shown in Figure 2, it was the interpersonal/high failure condition that caused the greatest desire to disengage of the four experimental conditions.\(^1\)

\[\text{Figure 2. Mean desire to disengage ratings across the three blocks of task trials; error bars represent standard error.}\]

\(^1\) Main findings remained significant when effort and general psychological distress were entered as covariates in the ANOVA. The effects of effort and psychological distress were not significant ($p$s > .05).
Discussion

At the core of the interpersonal theory lies the assumption that it is the interpersonal nature of perceived burdensomeness and thwarted belongingness that drives risk for suicide. To date, empirical support for the theory (e.g., Ribeiro et al., 2013) has failed to distinguish whether the interpersonal factors drive disengagement because they instill a general sense of inadequacy and failure, or whether it is more specifically failed interpersonal needs that are particularly pernicious. We thus sought to disentangle this confound limiting existing research by clarifying the causal mechanism via which the interpersonal variables caused a desire to disengage.

Findings showed that participants allocated to the high failure manipulations (interpersonal or intrapersonal) expressed a heightened desire to disengage from the task compared to those in the low fail conditions, indicating that failure, regardless of whether one is acting individually or on a team, drives a desire to give up. Large effect sizes highlight that desire to disengage was stimulated to a significant degree by both failure manipulations, however it was the interpersonal high failure manipulation that was especially pernicious, with those allocated to this condition expressing a significantly greater desire to disengage relative to the individual high fail group.

Together, findings show that while any form of failure is aversive, this is particularly so when failure is framed interpersonally. The persistence task permitted the extraction of the interpersonal nature of failure to provide the first causal evidence that failing others amplifies a desire to disengage over and above that caused by intrapersonal failure. While not inconsistent with the escape theory of suicide, where ideation is thought to ensue from aversive self-awareness following failure (Baumeister, 1990), results support the interpersonal theory’s more specific proposal that even short-lived
failed interpersonal efficacy and belongingness are particularly powerful adverse states that cause a wish to disengage (Joiner, 2005).

Limitations

The present research should be considered in the context of its limitations. Findings may not generalize to those who experience extreme levels of zest for life, perceived burdensomeness, or thwarted belongingness. The use of explicit questions about burdensomeness, belongingness, and desire to disengage may also have fostered demand characteristics. However, the large effects observed between conditions at the first time interval partly allay these concerns. To minimize demand effects, all participants expressing disbelief about the task were removed from the analyses, though the open-ended suspicion questions may have lacked sensitivity in identifying all suspicious participants.

Finally, it is acknowledged that desire to disengage from experimentally induced adversity differs from the “ultimate disengagement – a disengagement from life itself” (Scheier & Carver, 1992, p. 251). Recent evidence suggests though that desire to disengage from the Interpersonal Persistence Task is significantly associated with multiple indices of suicide risk (Collins et al., 2016, 2017), consistent with earlier speculation that the desire to disengage from interpersonal adversity and from life itself may recruit similar psychological processes (cf. Joiner, 2005).

Conclusion

The current research tested a previously unexamined assumption of the interpersonal theory that it is the interpersonal nature of perceived burdensomeness and thwarted belongingness that drives disengagement. Though similar deficits in persistence were also observed when participants failed at an equivalent competitive task, deficits
were significantly worse when failure was framed interpersonally, indicating that there is something especially pernicious about thwarted interpersonal needs.

Taken together, our findings support the interpersonal emphasis of the interpersonal theory of suicide. Perceived burdensomeness and thwarted belongingness drive heightened thoughts of escape not just because they involve personal inadequacy and failure to meet a standard, but because their interpersonal nature confers additional risk. Results also suggest that interventions targeting the reduction of the interpersonal factors will result in a decreased desire to disengage from difficult circumstances. This appears to have particularly vital implications for those who are contemplating disengagement from life.
Foreword to Chapter Three

Findings from Chapter Two support the core ‘interpersonal’ emphasis of the interpersonal theory of suicide. Results clarify the robust non-experimental evidence linking thwarted interpersonal needs with thoughts of disengaging from life (e.g., Ma et al., 2016) by confirming that the noxious effects conferred by burdensomeness and thwarted belongingness are indeed due to their specific interpersonal nature. After substantiating this fundamental assumption, it was necessary to test additional key predictions of the theory regarding the role of the interpersonal factors.

The interpersonal theory posits that perceptions of burdensomeness are sufficient to confer risk even in the absence of feedback that one is burdening others (Joiner, 2005). As perceived burdensomeness and actual thwarted interpersonal needs have never been tested concurrently, it is unknown whether burdensomeness perceptions are indeed sufficient to confer risk, and whether burdensomeness perceptions interact with actual thwarted interpersonal states. Using the same novel experimental paradigm introduced in Chapter Two to manipulate brief thwarted interpersonal states, Chapter Three will test the relative effects of perceived burdensomeness and actual thwarted interpersonal needs.
Chapter Three

Perceptions of Burdensomeness Color Interpersonal Interactions and Confer Risk for Disengagement Irrespective of Actual Burdensomeness and Thwarted Belongingness
Abstract

The interpersonal theory of suicide posits that perceived burdensomeness and thwarted belongingness are key proximal causes of suicidal desire (Joiner, 2005), though it is unknown whether perceptions of burdensomeness are sufficient to confer risk, and whether perceived burdensomeness interacts with actual thwarted interpersonal needs. This was tested using an experimental paradigm, the Interpersonal Persistence Task (Collins et al., 2016). Healthy adults ($n = 100$) who were previously screened for high and low levels of perceived burdensomeness were randomly allocated to either high or low levels of actual experimentally induced burdensomeness and thwarted belongingness. Both perceived burdensomeness and actual thwarted interpersonal needs had significant adverse effects on the desire to disengage from such interpersonal adversity, though they did not have further multiplicative effects. High perceived burdensomeness participants were significantly more likely to report state burdensomeness and a wish to disengage from interpersonal adversity, even in the absence of feedback that they were burdening others. Follow-up tests also revealed that the effects of experimentally induced thwarted belongingness on the desire to escape adversity were fully mediated by burdensomeness. Findings support the interpersonal theory’s proposal that even mistaken perceptions of burdensomeness have adverse effects, and indicate that the reduction of burdensomeness perceptions will result in an enhanced capacity to realistically appraise interpersonal events and to persist through difficulty.

Keywords: perceived burdensomeness, interpersonal theory of suicide, suicide, Interpersonal Persistence Task
The interpersonal theory of suicide posits that a lack of mutually caring relationships (thwarted belongingness) and a perception that one is a liability on others (perceived burdensomeness) are key proximal drivers of suicidal thinking (Joiner, 2005). Numerous findings including some prospective studies (Kleiman, Law, & Anestis, 2013; Puzia, Kraines, Liu, & Kleiman, 2014; Van Orden et al., 2012) support the link between thwarted interpersonal needs and suicide ideation, and a recent review indicates that burdensomeness may be a more robust predictor than thwarted belongingness (Ma et al., 2016). Both perceived (e.g., Van Orden, Cukrowicz, Witte, & Joiner, 2012) and actual (e.g., Inoue et al., 2007) burdensomeness were associated with risk, though it is the mere perception of burdensomeness that is thought to be pernicious (Joiner, 2005). The main aim of the present study was to investigate the impact of individual differences in perceived burdensomeness in the context of actual, experimentally induced thwarted interpersonal needs. Specifically, we sought to uncover whether burdensomeness perceptions were sufficient to confer risk, and whether perceived and actual burdensomeness have further interactive effects. The experimental manipulation of burdensomeness and thwarted belongingness also facilitated a second aim of probing the relationships between the interpersonal factors and their respective effects.

**The Interpersonal Theory of Suicide and the Role of Perceived Burdensomeness**

The perception that one is a burden is thought to be sufficient to give rise to suicidal desire, irrespective of whether one is actually a liability on others (Joiner, 2005). Most research on the interpersonal theory has examined perceived burdensomeness, rather than actual burdensomeness (see Ma et al., 2016 for a review), but some studies reported that actual burdensomeness such as unemployment (e.g., Inoue et al., 2007),
physical illness (Bastia & Kar, 2009; Harris & Barraclough, 1997), and incarceration (e.g., Kariminia et al., 2007) was also associated with heightened risk of suicide. In addition, brief experimentally induced burdensomeness was found to cause a heightened wish to disengage from such interpersonal adversity (e.g., Collins et al., 2016). While both perceived burdensomeness and actual thwarted interpersonal needs have emerged as pernicious suicide risk factors, their effects have never been examined concurrently.

The fluid vulnerability model of suicide posits risk can be elevated by the dynamic interaction of both trait- and state-based factors (e.g., Bryan & Rudd, 2016; Rudd, 2006). Accordingly, risk would be highest when perceptions of burdensomeness that are habitual or trait-based are coupled with the actual, state-based experience of thwarted interpersonal needs. However, if the perception of burdensomeness is sufficient to confer risk (Joiner, 2005), habitual perceptions of burdensomeness would drive risk in all interpersonal situations, irrespective of whether one receives feedback that one is actually a liability. The latter finding would support the interpersonal theory’s proposal that perceptions of burdensomeness are noxious even when mistaken.

In addition to better understanding the impact of perceived burdensomeness and actual thwarted interpersonal needs, it is important to probe the relationships between burdensomeness and thwarted belongingness. The interpersonal factors are deemed to be related but distinct in that both involve thwarted interpersonal needs and may influence each other, yet they do not necessarily coexist (Joiner, 2005; Van Orden et al., 2010). While both interpersonal factors are thought to drive risk, perceived burdensomeness tends to emerge as the more pernicious predictor (Ma et al., 2016). One possibility may be that thwarted belongingness exerts its adverse effects indirectly via burdensomeness. While not anticipated by the interpersonal theory (Joiner, 2005), a shortage of
reciprocally caring relationships could drive thoughts of disengagement because it instills a sense that one’s presence is also a burden on others, though this has never been tested.

To test the influence of perceived burdensomeness in the context of actual frustrated interpersonal needs, an experimental paradigm is needed to safely thwart interpersonal needs. One such paradigm is the Interpersonal Persistence Task (Collins et al., 2016), where participants play a computer team game and receive experimentally manipulated feedback about their relative belongingness and contribution. In the high burdensomeness/thwarted belongingness (B-TB) condition, participants receive feedback that they are performing worse than their teammates and that they do not belong, while participants in the low B-TB condition receive feedback that they are performing similarly to their teammates and belong to the team. Those in the high B-TB condition reported a significantly greater desire to disengage from such interpersonal adversity relative to those in the low B-TB condition (Collins et al., 2016).

While a desire to disengage from such interpersonal difficulty differs from a more extreme desire to disengage from life, they are conceptually similar in that both involve a wish to escape adversity (Baumeister, 1991) and may recruit similar psychological processes (cf. Joiner, 2005). This was consistent with findings that desire to disengage from experimentally induced thwarted interpersonal needs is significantly associated with suicidal thinking (Collins et al., 2016, 2017).

The Present Study

To achieve the main aims of testing whether perceived burdensomeness was sufficient to confer risk even in the absence of actual thwarted interpersonal needs, and whether perceived burdensomeness and actual thwarted interpersonal states have further interactive effects, participants were first screened for high or low perceived burdensomeness. Participants from each group were then randomly assigned to either
high or low levels of the combination of actual burdensomeness and thwarted belongingness that were experimentally manipulated using the Interpersonal Persistence Task (Collins et al., 2016).

It was anticipated that both actual experimentally induced thwarted interpersonal needs and existing perceptions of burdensomeness would each confer risk for disengagement. Consistent with the interpersonal theory’s proposal that it is the perception of burdensomeness that is pernicious (Joiner, 2005), it was hypothesized that those high in existing burdensomeness perceptions would report a heightened desire to disengage irrespective of whether they received any burdensomeness feedback. Should this be the case, further interactive effects between perceived burdensomeness and experimentally induced thwarted interpersonal states may not be anticipated, as burdensomeness perceptions would confer risk regardless of actual interpersonal feedback. Should the fluid vulnerability model be supported (Bryan & Rudd, 2016), a significant interaction would also be anticipated between trait-level perceived burdensomeness and actual thwarted interpersonal states.

Prior to testing these main hypotheses, it was important to verify that thwarted interpersonal needs were successfully experimentally induced, which would be consistent with prior research using the Interpersonal Persistence Task (e.g., Collins et al., 2016). It was also hypothesized that those high in perceived burdensomeness would be prone to perceiving themselves as a burden during the interpersonal team task, irrespective of actual feedback received. As burdensomeness and thwarted belongingness are thought to be discrete (Joiner, 2005), it was anticipated that the hypothesized sensitivity to burdensomeness states conferred by existing perceived burdensomeness would not generalize to state thwarted belongingness. Such a finding would support the discriminant validity of the experimentally induced constructs.
Next, the relative effects of actual experimentally induced burdensomeness and thwarted belongingness on desire to disengage were examined. Consistent with existing literature indicating that burdensomeness may be the more pernicious interpersonal factor (e.g., Ma et al., 2016), it was hypothesized that burdensomeness would emerge as the stronger predictor of disengagement, and that the contribution of thwarted belongingness would not be evident with the simultaneous consideration of both interpersonal factors. The latter would suggest that burdensomeness may account for the association between belongingness and desire to disengage. We thus sought to test whether burdensomeness mediates the effects of thwarted belongingness. Such a finding would further attest to the key role of burdensomeness.

Method

Participants and Procedures

Undergraduate students ($n = 1,071$) were screened for perceived burdensomeness using the burdensomeness subscale of the Interpersonal Needs Questionnaire (Van Orden, Witte, Gordon, Bender, & Joiner, 2008). Individuals reporting high levels of perceived burdensomeness (top 10% of scores; $n = 50$) and those reporting an absence of burdensomeness (scores of 0; $n = 50$) were recruited. The sample comprised 37 males and 63 females, ranging in age from 17-46 years ($M = 19.27, SD = 4.90$). Participants self-identified as being of Caucasian/Australian (58%), Asian (24%), European (6%), African (3%), Aboriginal Australian (1%) and Other (8%) ethnicities.

Interpersonal Persistence Task (Collins et al., 2016)

A brief version of the Interpersonal Persistence Task was used, lasting approximately ten minutes in duration, to manipulate burdensomeness and thwarted belongingness. Participants were informed that they were taking part in a study about persistence, and the task was introduced as an online team game that participants played
with two co-players – one who was visible in an adjacent room and another who was seated in a nearby laboratory. Co-players were either other participants who played the task concurrently, or a researcher acting as a confederate. Participants were informed that their aim was to earn points toward their team total with the goal of beating a target score, by identifying whether two characters were identical. Points were reportedly gained and lost based on speed and accuracy. The doors of the individual testing rooms were then closed for the duration of the task.

The task involved three phases of 15 figure discrimination trials for a total of 45 trials. After every five trials, participants received feedback about their relative contribution via a summary table that depicted each player’s scores (points lost and won), the team total, and the target score. All scores were unreflective of performance and were manipulated according to an odds ratio, such that participants allocated to the high burdensomeness – thwarted belongingness (B-TB) condition received feedback that they were performing worse than their co-players, and that their team was failing to beat the target score, while those in the low B-TB condition received feedback that they were performing similarly to co-players, and that their team was beating the target score.

Participants also received feedback about belongingness via the exchange of written feedback with their co-players at three points during the task, after every three blocks of five trials. Written feedback was also experimentally manipulated, such that those in the high B-TB condition received co-player feedback that grew increasingly critical, while those in the low B-TB condition received feedback that encouraged continuation. Fictitious co-player feedback was devised to include spelling and grammatical errors to increase credibility that comments were written by fellow participants.
Following the receipt of each of the three rounds of co-player feedback, participants answered questions about belongingness (‘‘The other players make me feel like I am part of the team’’), burdensomeness (‘‘I think I am a burden to my other team members’’), and desire to disengage (‘‘If I had the option, I would rather drop out of the game’’). After the task, interest (‘‘I found the task interesting’’) and effort (‘‘I made an effort to do well on the task’’) items were administered. All task items were administered on a scale from 0 (‘not at all true for me’) to 6 (‘very true for me’).

To gauge whether participants experienced suspicion that the task may have been fixed, open-ended questions about the task (‘‘Do you have any comments about the experiment?’’) and co-players (‘‘Do you have any comments about your teammates?’’) were administered prior to debriefing.

**Measures**

After completing the task, participants completed questionnaires about perceived burdensomeness, thwarted belongingness, and suicide risk.

**Interpersonal Needs Questionnaire (INQ; Van Orden et al., 2008).** The INQ comprises six items measuring perceived burdensomeness (e.g., ‘‘The people in my life would be better off if I were gone’’) and nine items about thwarted belongingness (e.g., ‘‘I feel disconnected from other people’’) on a scale from 1 (‘not at all true for me’) to 7 (‘very true for me’). The INQ is appropriate for use in non-clinical settings and demonstrates internal consistency and construct validity (Van Orden et al., 2012; Van Orden et al., 2008). The scale was administered at screening to recruit two groups high or low in perceived burdensomeness, and then again at the time of testing to check that participants classified as ‘high’ or ‘low’ still met the criteria of their respective group allocation. Total scale scores ranged from 15 to 81 at screening and from 15 to 88 at testing. Internal consistency was excellent at screening (PB subscale $\alpha = .94$; TB
subscale $\alpha = .90$; Total INQ $\alpha = .95$) and testing (PB subscale $\alpha = .94$; TB subscale $\alpha = .92$; Total INQ $\alpha = .95$).

**Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007).** One item from the SITBI was administered to measure frequency of suicide ideation in the past year (‘*How many times have you thought about suicide*’) on a six-point scale from ‘never’ to ‘almost every day.’ The SITBI is suitable for administration via self-report (Latimer, Meade, & Tennant, 2013) and demonstrates test-retest reliability and construct validity (Nock et al., 2007).

**Data Analytic Strategy**

The reliability of the perceived burdensomeness screening was first verified, and only those who remained in their respective screening groups at the time of testing (high/low perceived burdensomeness participants remained above/below the median) were included. Participant feedback about the task and co-players was inspected independently by two researchers to determine whether participants expressed suspicion that the task was rigged. Potential significant differences across experimental conditions in task interest and effort were tested and controlled for as covariates in subsequent analyses.

To first verify that burdensomeness and thwarted belongingness were successfully experimentally manipulated, while simultaneously testing the influence of trait-level perceived burdensomeness on these thwarted interpersonal states, two 2(Group) x 2(Condition) x 3(Time) mixed-design analyses of covariance (ANCOVAs) were run, with perceived burdensomeness group (high and low perceived burdensomeness) and condition (high and low actual B-TB) as the between group factors, and time (trial blocks 1-3) as the within-participant factor. To next test the key question regarding the relative influence of perceived burdensomeness and actual thwarted interpersonal needs on the
desire to disengage, a third 2 (high/low perceived burdensomeness) x 2 (high/low B-TB) x 3 (blocks of trails) mixed-design ANCOVA was run.

A hierarchical multiple regression was next run to clarify the relative effects of experimentally induced burdensomeness and thwarted belongingness on desire to disengage. Finally, a mediation model tested whether burdensomeness explained the association between thwarted belongingness and disengagement.

Results

Screening and Manipulation Checks

Perceived burdensomeness scores at screening were significantly strongly correlated with scores at testing ($r = .82, p < .001$). Twelve participants did not remain in their respective perceived burdensomeness groups from screening to testing and were removed from all subsequent analyses.

Fourteen participants expressed suspicion that their co-players or the task may have been computer controlled (Low B-TB/Low Perceived burdensomeness: $n = 1$; Low B-TB/High Perceived burdensomeness: $n = 3$; High B-TB/Low Perceived burdensomeness: $n = 6$; High B-TB/High Perceived burdensomeness: $n = 4$). As suspicious participants reported a significantly greater desire to disengage from the experiment compared to their non-suspicious counterparts, ($M_{suspicious} = 3.02, SD = 1.90$ vs. $M = 1.58, SD = 1.72$), $t(86) = -2.83, p = .006, d = 0.79$, suspicious participants were removed from subsequent analyses.

Participant Characteristics

Seventy-four participants remained in the study (Low B-TB/Low Perceived burdensomeness: $n = 23$; Low B-TB/High Perceived burdensomeness: $n = 18$; High B-TB/Low Perceived burdensomeness: $n = 15$; High B-TB/High Perceived burdensomeness: $n = 18$). Participants in the high perceived burdensomeness group
reported significantly greater levels of perceived burdensomeness \( (M = 3.62, SD = 1.01) \) than those in the low perceived burdensomeness group \( (M = 1.13, SD = 0.22) \), \( t(34.43) = -13.91, p < .001, d = -3.41 \). Those high in perceived burdensomeness also reported greater levels of thwarted belongingness \( (M = 4.10, SD = 0.91) \) than those low in perceived burdensomeness \( (M =1.86, SD = 0.63) \), \( t(55.12) = -11.99, p < .001, d = -2.86 \).

Consistent with the interpersonal theory of suicide’s proposal that perceived burdensomeness confers risk for suicidal thinking (Van Orden et al, 2010), the high perceived burdensomeness group reported high rates of suicide ideation, with 84.8% reporting that they thought about suicide at least once in the past year, 51.5% reporting monthly suicidal thoughts, and 6% reporting weekly suicidal thoughts. In contrast, among the low perceived burdensomeness group, 36.6% reported thinking about suicide at least once in the past year, with 4.8% reporting monthly suicidal thoughts, and 2.4% reporting weekly suicidal thoughts. These differences in frequency of suicide ideation between high and low perceived burdensomeness participants were significant, \( t(49.24) = -5.47, p < .001, d = 1.25 \).

Participants did not significantly differ across experimental conditions in self-reported level of effort exerted [high B-TB: \( M =5.42, SD = 0.69 \), low B-TB: \( M = 5.58, SD = 1.00 \), \( t(72) = 0.81, p = .42, d = 0.19 \)]. However, there were significant differences in interest in the task between high \( (M =3.25, SD = 1.56) \) and low \( (M =4.61, SD = 1.41) \) B-TB conditions, \( t(72) = 3.94, p < .001, d = 0.91 \). The influence of interest was thus controlled for in subsequent analyses.

**Experimental Manipulation of Actual Burdensomeness and Thwarted Belongingness and Influence of Existing Burdensomeness Perceptions**

To verify that burdensomeness was successfully manipulated during the task, while considering the influence of existing burdensomeness perceptions and controlling
for interest as a covariate, a 2 (high/low B-TB) x 2 (high/low perceived burdensomeness) x 3 (blocks of trials) ANCOVA was run with interest as the covariate. As shown in Figure 1a, there was a main effect of condition such that those in the high B-TB condition reported significantly higher levels of state burdensomeness relative to those in the low B-TB condition, $F(1, 69) = 126.17, p < .001, \eta^2_p = .65, 90\% \text{ CI } (0.53, 0.72)$, indicating that actual burdensomeness was successfully manipulated.

Those high in perceived burdensomeness also reported significantly greater perceptions of task burdensomeness relative to those low in perceived burdensomeness regardless of condition, $F(1, 69) = 6.67, p = .012, \eta^2_p = .09, 90\% \text{ CI } (.01, .20)$, indicating that perceived burdensomeness colors interpersonal interactions irrespective of actual burdensomeness. No other main or interaction effects were significant.

*Figure 1a.* Mean burdensomeness ratings across three blocks of task trials; error bars represent standard error.

*Note.* PB = Perceived burdensomeness

To confirm that thwarted belongingness was successfully manipulated, while considering the influence of existing burdensomeness perceptions and controlling for
interest, a second 2 x 2 x 3 mixed-design ANCOVA was run. As shown in Figure 1b, there was a main effect of condition where participants in the high B-TB condition reported significantly lower levels of belongingness compared to those in the low B-TB condition, $F(1, 69) = 93.19, p < .001, \eta_p^2 = .58, 90\% CI (.44, .66)$, indicating that state belongingness was also successfully manipulated. There was also a significant main effect of time, $F(1.55, 108.41) = 7.36, p = .002, \eta_p^2 = .10, 90\% CI (.02, .18)$, which was qualified by a significant Time x Condition interaction, $F(1.55, 108.41) = 6.93, p = .003, \eta_p^2 = .09, 90\% CI (.02, .18)$. Follow-up analyses for each condition separately showed that there was a significant effect of time in the high B-TB condition, $F(1.44, 49.03) = 7.97, p = .003, \eta_p^2 = .19, 90\% CI (.04, .33)$, but not in the low B-TB condition, $F(1.66, 59.73) = 1.88, p = .17, \eta_p^2 = .05, 90\% CI (.00, .15)$. That is, those in the high B-TB condition reported a reduction in belongingness after the first block of trials that remained low after the second block of trials, as evidenced by significant linear, $F(1, 34) = 6.11, p = .019, \eta_p^2 = .15, 90\% CI (.01, .33)$ and quadratic, $F(1, 34) = 10.61, p = .003, \eta_p^2 = .24, 90\% CI (.06, .41)$ trends. In contrast, those in the low B-TB condition reported stable high belongingness throughout the task.

Those high in perceived burdensomeness did not report significantly different levels of task thwarted belongingness relative to those low in perceived burdensomeness, $F(1, 69) = 2.17, p = .15, \eta_p^2 = .03, 90\% CI (.00, .12)$. No other main or interaction effects were significant.
Figure 1b. Mean belongingness ratings across three blocks of task trials; error bars represent standard error.

Note. PB = Perceived burdensomeness

Findings hence confirm that the manipulation of actual burdensomeness and thwarted belongingness was successful. Relative to those low in perceived burdensomeness, individuals with high perceived burdensomeness reported significantly greater burdensomeness throughout the interpersonal task, irrespective of experimental condition. Conversely, perceived burdensomeness did not influence the experience of task thwarted belongingness.

Testing the Influence of Perceived Burdensomeness and Actual Experimentally Induced Thwarted Interpersonal Needs on Disengagement

A final 2 x 2 x 3 ANCOVA was run to test the effects of perceived burdensomeness and actual thwarted interpersonal needs on desire to disengage, while controlling for interest. A significant main effect of interest was observed, $F(1, 69) = 9.28, p = .003, \eta^2_p = .12, 90\% \ CI (.025, .24)$, and interest was negatively associated with desire to disengage ($r = -.49, p < .001$).
Figure 1c shows that participants allocated to the high B-TB condition reported a significantly greater desire to disengage from the task relative to those in the low B-TB condition, \( F(1, 69) = 10.18, p = .002, \eta_p^2 = .13, 90\% \text{ CI } (.03, .25) \). There was also a significant main effect of time, \( F(1.96, 135.14) = 4.09, p = .020, \eta_p^2 = .056, 90\% \text{ CI } (.005, .12) \), that was qualified by a significant Time x Condition interaction, \( F(1.96, 135.14) = 8.27, p = .005, \eta_p^2 = .11, 90\% \text{ CI } (.03, .19) \). In the high B-TB condition, greater desire to disengage increased over time, as evidenced by a significant linear trend, \( F(1, 34) = 28.32, p < .001, \eta_p^2 = .45, 90\% \text{ CI } (.24, .59) \) while those in the low B-TB condition reported a lower desire to disengage that remained relatively stable, \( F(1, 36) = .008, p = .93, \eta_p^2 = .000, 90\% \text{ CI } (.000, .009) \).

Consistent with the above pattern of findings for state-based burdensomeness, there was a main effect of group, where individuals with high perceived burdensomeness reported a significantly greater desire to disengage relative to those low in perceived burdensomeness regardless of condition, \( F(1, 69) = 4.01, p = .049, \eta_p^2 = .06, 90\% \text{ CI } (.001, .16) \), while the Group x Condition interaction was not significant, \( F(1, 69) = .014, p = .91, \eta_p^2 = .000, 90\% \text{ CI } (.000, .008) \). No other main or interaction effects were significant.
Figure 1c. Mean desire to disengage ratings across three blocks of task trials; error bars represent standard error.

*Note.* PB = Perceived burdensomeness

Untangling the Relative Influence of Experimentally Induced Burdensomeness and Thwarted Belongingness on Disengagement

A hierarchical multiple regression was run to test the relative influence of burdensomeness and thwarted belongingness on desire to disengage (Table 1). Belongingness ratings were reverse-coded such that high scores represent higher levels of thwarted belongingness. To control for the influence of interest and effort, these variables were added at step one. Mean task thwarted belongingness was added at step two, and mean task burdensomeness was added at step three. At step one, the model was significant, \(F(2,71) = 15.04, p < .001\), and both interest and effort significantly predicted desire to disengage. At step two, the addition of thwarted belongingness explained an additional 13% of the variance in desire to disengage, \(F_{\text{change}}(1,70) = 15.53, p < .001\). At

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2 Recent research indicates that participants who play the Persistence Task express a strong desire to belong to their team, and the large effect of the experimental belongingness manipulation shows that this powerful need to belong to the team can be thwarted (Collins et al., 2017).
step three, the addition of burdensomeness explained an additional 7% of the variance,
\[ F_{\text{change}}(1,69) = 9.47, \ p = .003 \] When burdensomeness was accounted for in the model, belongingness was no longer a significant predictor of the desire to disengage.

Table 1

Hierarchical Regression: Burdensomeness and Thwarted Belongingness predict Desire to Disengage after Controlling for Interest and Effort

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<th>( b )</th>
<th>( SE \ b )</th>
<th>( \beta )</th>
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<td>.20</td>
<td>-.24*</td>
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<td>.11</td>
<td>-.46***</td>
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<td>.13***</td>
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<td>.10</td>
<td>.38***</td>
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<td>.11</td>
<td>.42**</td>
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</table>

Note. ^p=.056, * \( p < .05 \), ** \( p < .01 \), *** \( p < .001 \)

To test whether burdensomeness mediated the association between thwarted belongingness and desire to disengage, SPSS and PROCESS (version 2.16; Hayes, 2016) were used. Five thousand bias-corrected bootstrapping samples were employed, to estimate indirect effects while controlling for Type-1 error (Jose, 2013). Burdensomeness significantly mediated the association between thwarted belongingness and desire to disengage (see Figure 2), as evidenced by a significant indirect effect (indirect effect = .36, 95% CI: .09, .62). Consistent with findings from the regression, the total effect of
thwarted belongingness on disengagement was significant (total effect = .54, 95% CI: .34, .75, \( p < .001 \)), however this association became non-significant once the influence of burdensomeness was accounted for (direct effect = .18, 95% CI: -.13, .49, \( p = .25 \)).

![Diagram](image)

**Figure 2.** Burdensomeness mediates the association between thwarted belongingness and desire to disengage.

*Note.* **\( p < .01 \), *** \( p < .001 \)

**Discussion**

Consistent with the interpersonal theory’s proposal that it is the perception of burdensomeness that is important (Joiner, 2005), burdensomeness perceptions were sufficient to confer risk for disengagement from an interpersonal team task, irrespective of actual burdensomeness. The confluence of experimentally induced burdensomeness and thwarted belongingness also drove a heightened desire to disengage, consistent with existing research (e.g., Collins et al., 2016), though the combination of perceived burdensomeness and actual thwarted interpersonal needs did not have further interactive effects. Individuals high in perceived burdensomeness reported significantly greater
levels of task burdensomeness and a wish to disengage not only when they received feedback that they were letting down their teammates (high B-TB condition), but also in the absence of any actual burdensomeness feedback (low B-TB condition). This indicates that those high in perceived burdensomeness are prone to sensing that they are a liability even in the face of information indicating the opposite. Results confirm the interpersonal theory’s proposal that it is the perception of burdensomeness that is deleterious, even when such perceptions are mistaken (Joiner, 2005).

Findings did not support the hypothesis based on fluid vulnerability theory that risk is highest when trait-based risk factors such as habitual perceptions of burdensomeness interact with state-based factors such as thwarted interpersonal needs (Bryan & Rudd, 2016). However, as the experimental manipulation safely induced a low level of thwarted interpersonal states, this may have also been insufficiently potent to fuel a further interaction among those who were already high in perceived burdensomeness.

As hypothesized, high perceived burdensomeness participants did not significantly differ relative to those low in perceived burdensomeness in self-reported task thwarted belongingness. That those high in perceived burdensomeness were prone to perceiving themselves as a burden, but not to experiencing diminished belongingness supports the discriminant validity of the two interpersonal constructs induced via the experimental manipulation.

Together, findings indicate that both the perception that one is a burden, and the actual experience of burdensomeness and thwarted belongingness confer risk for disengagement. That the observed effects were significant using a healthy adult sample and a brief manipulation of thwarted interpersonal states where participants had never even met their co-players highlights the perniciousness of both elevated burdensomeness perceptions and even the momentary experience of actual thwarted interpersonal needs.
Findings from the multiple regression and mediation analyses further support the current focus on the key role of burdensomeness. The effects of experimentally induced thwarted belongingness on desire to disengage were fully mediated by burdensomeness, suggesting that thwarted belongingness influences disengagement only indirectly via burdensomeness. This is consistent with literature indicating that burdensomeness is the more pernicious interpersonal predictor (Ma et al., 2016).

The present findings should be interpreted in the context of some limitations. All participants expressing suspicion about the task were removed from the analyses to minimize demand characteristics, though the open-ended suspicion questions may have been insufficiently sensitive to detect all suspicious participants.

Findings from the mediation model suggest that thwarted belongingness influences disengagement via burdensomeness. As this analysis was cross-sectional, and mediation requires temporal precedence across variables (e.g., MacKinnon, Fairchild, & Fritz, 2007), future research should endeavor to replicate this finding longitudinally. Since the interpersonal factors may also mutually amplify each other (Joiner, 2005), it would be valuable to also test their reciprocal effects.

Finally, it is unclear whether perceptions of thwarted belongingness would have similar adverse effects. While thwarted belongingness was initially conceptualized as an actual shortage of mutually caring relationships (Joiner, 2005), it was later speculated that the perception of thwarted belongingness may also be important (Ribeiro, Bodell, Hames, Hagan, & Joiner, 2013), and future study might test whether the current findings also generalize to individuals high and low in perceptions of thwarted belongingness.

In sum, supporting the interpersonal theory’s proposal that burdensomeness perceptions are pernicious even when they are mistaken (Joiner, 2005) results indicate that those possessing existing perceptions of burdensomeness are predisposed to
perceiving themselves as a liability in interpersonal settings, even in the face of contradictory positive feedback about their contribution. These individuals will consequently increasingly want to escape such interactions, and in extreme circumstances of interpersonal hardship, may even contemplate disengagement from life. Findings highlight the importance of evaluating not only the presence of burdensomeness perceptions, but also considering their chronicity. Importantly, results indicate that clinical interventions targeting the reduction of perceived burdensomeness (e.g., Hill, 2015) will result in an enhanced capacity to realistically appraise interpersonal interactions and to persist through adversity.
Foreword to Chapter Four

Findings from Chapter Three support another key prediction of the interpersonal theory that perceptions of burdensomeness are sufficient to confer risk even when they are mistaken (Joiner, 2005). Actual thwarted interpersonal needs also emerged as important, with burdensomeness playing an especially potent role and fully mediating the adverse effects of thwarted belongingness. Findings highlight the key role of burdensomeness and suggest that thwarted belongingness acts via burdensomeness to influence disengagement. As these findings were cross-sectional though, the temporal relationships between the interpersonal factors are unclear. Put otherwise, it is unknown whether thwarted belongingness precedes increased burdensomeness to amplify its adverse effects.

The interpersonal theory acknowledges that the interpersonal factors may indeed mutually influence each other (Joiner, 2005) though their temporal respective effects are difficult to tease out in real-life settings. Using the same novel paradigm introduced in Chapters Two and Three, it was possible to combine experimental control with prospective analyses to unravel the temporal reciprocal effects of the interpersonal factors and to probe their respective effects on the desire to disengage.
Chapter Four

Untangling the Temporal Inter-Relationships Between Burdensomeness and Thwarted Belongingness and Examining their Respective Associations with the Desire to Disengage from Interpersonal Adversity
Abstract

The interpersonal theory of suicide posits that perceived burdensomeness and thwarted belongingness drive suicide ideation, yet the relative influence of the two factors is unclear. Using a healthy adult sample (n = 104), burdensomeness and thwarted belongingness were experimentally induced, and their temporal reciprocal effects were examined. The associations between the interpersonal factors and desire to disengage from this interpersonal adversity were also tested. Findings suggest that thwarted belongingness and perceived burdensomeness initially positively intensify each other. Only burdensomeness was significantly associated with desire to disengage, indicating that thwarted belongingness influences disengagement via its amplifying effect on burdensomeness. Interventions that target the reduction of burdensomeness should result in both the alleviation of thwarted belongingness and an increased capacity to persist through adversity.

Keywords: burdensomeness, thwarted belongingness, suicide, interpersonal theory of suicide, disengagement, persistence task
Untangling the Temporal Inter-Relationships Between Burdensomeness and Thwarted Belongingness and Examining their Respective Associations with the Desire to Disengage from Interpersonal Adversity

The interpersonal theory of suicide posits that thoughts of disengaging from life are driven by a paucity of mutually caring relationships and the perception that one is a burden on others. While perceived burdensomeness and thwarted belongingness are thought to be distinct (Van Orden et al., 2010), they are often highly correlated (e.g., Anestis, Bagge, Tull, & Joiner, 2011), are difficult to disentangle (Ribeiro & Joiner, 2009) and may mutually influence each other (Joiner, 2005). To date, the temporal reciprocal effects of the interpersonal factors have not been tested, yet better understanding the pathways through which risk factors exert their effects is thought to be one of the most critical avenues for suicide research (Nock, 2012). We thus sought to explore the reciprocal effects over time of experimentally manipulated perceived burdensomeness and thwarted belongingness, and to simultaneously test their respective associations with desire to disengage from this experimentally induced experience of interpersonal adversity.

**Perceived burdensomeness, Thwarted Belongingness, and Suicidal Thinking**

Perceived burdensomeness comprises a sense that one is a liability on others coupled with feelings of self-hatred, while thwarted belongingness refers to a lack of reciprocal care and perceived loneliness. According to the interpersonal theory, these factors drive active suicidal desire when they are experienced together, and are perceived as stable and unchanging (Joiner, 2005; Van Orden et al., 2010). Both thwarted belongingness and perceived burdensomeness were associated with suicide risk in numerous cross-sectional studies (e.g., Christensen, Batterham, Soubelet, & Mackinnon, 2013; Cramer et al., 2012; Lamis & Malone, 2011). Prospective research also showed
that perceived burdensomeness and thwarted belongingness precede suicidal thinking (e.g., Kleiman, Law, & Anestis, 2013), and experimental evidence indicated that induced perceived burdensomeness and thwarted belongingness cause a subsequent heightened desire to disengage from such adversity (Collins et al., 2016, 2017). While desire to disengage from an experiment undoubtedly differs from “the ultimate disengagement – a disengagement from life itself” (Scheier & Carver, 1992, p. 251), they are conceptually similar in that both involve a wish to escape adversity (Baumeister, 1991) and may recruit similar psychological processes (cf. Joiner, 2005). This is consistent with evidence that the interpersonal factors are linked to increased behavioral disengagement (Khazem, Law, Green, & Anestis, 2015), and with findings that desire to disengage from experimentally induced burdensomeness and thwarted belongingness is significantly associated with suicidal thinking (e.g., Collins et al., 2016).

While both interpersonal factors are thought to contribute equally to risk (Van Orden et al., 2010), some evidence suggested that thwarted belongingness was more strongly associated with active suicide ideation (e.g., Christensen et al., 2013), suicide attempt status (e.g., Conner, Britton, Sworts, & Joiner, 2007), and featured more prominently in suicide notes (e.g., Gunn, Lester, Haines, & Williams, 2012) relative to burdensomeness. Conversely, in a recent systematic review of the evidence in support of the predictions of the interpersonal theory, Ma and colleagues (2016) concluded that the association between burdensomeness and suicide ideation was more robust than the association between thwarted belongingness and suicide ideation. Hence, evidence regarding the hypothesized joint causal role of burdensomeness and belongingness in suicide risk remains equivocal. One way to further clarify their joint, individual, or indeed reciprocal contribution to a desire to escape from these interpersonally adverse states is to
observe their respective effects as they unfold over time in a controlled experimental setting.

The Present Study

We thus aimed to answer two simultaneous questions. First, we sought to disentangle the temporal interrelationships between burdensomeness and thwarted belongingness. Experimental evidence showed that burdensomeness and thwarted belongingness states can be manipulated compared to a matched control condition using the Interpersonal Persistence Task (e.g., Collins et al., 2016). Here, participants are led to believe that they are playing a computer game with two co-players, with the goal of accumulating points for their team. Performance is experimentally manipulated such that participants consistently receive feedback that they are performing worse than their co-players increasing their sense of burdensomeness on the team, and on-screen text messages from their co-players that imply they are not part of the team increasing their sense of thwarted belongingness. Conversely, participants in the matched control condition play an identical version of the task but received feedback that they were performing similarly to their co-players, and on-screen text messages from their co-players implied that they were regarded a part of the team. Using a brief version of the heightened burdensomeness and thwarted belongingness manipulation of this paradigm, we assessed induced heightened thwarted interpersonal needs across three time points, and tested their reciprocal effects over time.

In addition, we tested the interpersonal theory’s proposal that thwarted belongingness and burdensomeness drive a desire to disengage by examining their respective associations with desire to disengage from the experiment, measured at three time points.
It was hypothesized that the two interpersonal variables would be significantly associated with each other across time. Findings from Chapter Three indicate that thwarted belongingness exerts its adverse effects via burdensomeness, though these temporal associations are unknown, and burdensomeness may similarly influence thwarted belongingness, consistent with Joiner’s (2005) speculation that “feeling disconnected could affect feelings of effectiveness, and vice-versa” (p. 138).

We also anticipated that perceived burdensomeness would be more strongly associated with desire to disengage compared to thwarted belongingness. Though this would be inconsistent with the interpersonal theory’s theoretical assumption that both interpersonal factors are similarly pernicious (e.g., Joiner, 2005), it would be consistent with the empirical evidence from a preponderance of findings from non-experimental studies that burdensomeness is the more pernicious of the two interpersonal predictors (Ma et al., 2016).

**Method**

**Participants and Procedures**

One hundred and four undergraduate students (32 males, 71 females) participated in the research for course credit. To ensure that the analyses had sufficient power, the current sample was drawn from two smaller unpublished studies, one of which comprises participants from Chapter Three of this thesis. All participants completed the same brief version of the Interpersonal Persistence Task, and all were allocated to the high burdensomeness/thwarted belongingness condition. Participants did not significantly differ across the sub-samples on any of the task measures of burdensomeness, belongingness, desire to disengage, interest, or effort (all $p > .05$). Age ranged from 17 to 46 years ($M = 19.40$, $SD = 4.95$). Self-reported ethnicity comprised Caucasian/Australian (51%), Asian (13.4%), European (7.7%), African (2.9%) and Other
(13.4%) ethnicities. Participants played the Interpersonal Persistence Task and then responded to questionnaires about demographics, psychological distress, and suicide risk. Questionnaires were set up with forced choice option to eliminate missing data (e.g., Johnson, 2010), however questionnaire data was lost for one participant due to an initial recording error. Participants were fully debriefed and provided with information about campus and community mental health services. All procedures were approved by the institution’s Human Research and Ethics Office.

**Interpersonal Persistence Task (Collins et al., 2016, 2017)**

Participants were informed that they would be playing an online team task with two fellow participants; one of whom was visible in an adjacent testing room, and another was said to be seated in a nearby laboratory. Participants were informed that they were to accumulate points for their team with the goal of beating a target score, by identifying whether two figures that flashed on the screen were identical. Points were ostensibly accrued or lost based on speed and accuracy. However, participant performance and co-player feedback were instead computer controlled to experimentally manipulate burdensomeness and belongingness.

A brief version of the task was used lasting approximately ten minutes in duration that involved three phases of 15 figure discrimination trials for a total of 45 trials. Within each phase, there were three blocks of five trials. After each block of five trials, participants received feedback about their relative contribution. Here, a scoreboard was displayed showing each participant’s score (points won and lost), the team total, and the target score. Participants in the high burdensomeness/thwarted belongingness condition consistently received numerical feedback that they were performing worse than their co-players, whereas participants in the low burdensomeness/thwarted belongingness control condition received numerical feedback that they were performing similarly or better to
their co-players. Participants were also invited to exchange written feedback with their co-players at three points over the course of the game, after each three blocks of five trials immediately after receiving the latest scoreboard update (roughly every 3.5 minutes). After sending their own feedback, participants could view their co-player’s feedback responses. Co-player feedback was also experimentally manipulated. In the high burdensomeness/thwarted belongingness condition, the comments grew increasingly frustrated with the participant’s role in the team as the game progressed. In the low burdensomeness/thwarted belongingness condition, participants received feedback that encouraged positive performance.

At the same three time points, following the receipt of co-player feedback, three items were administered to assess burdensomeness (‘‘I think I am a burden on my other team members’’), thwarted belongingness (reverse-coded; ‘‘The other players make me feel like I am part of the team’’) and desire to disengage (‘‘If I had the option, I would rather drop out of the game’’) on a scale from 0 (‘not at all true for me’) to 6 (‘very true for me’).

To determine whether participants experienced suspicion that the task may have been pre-determined, they were invited to provide written comment about the experiment (‘‘Do you have any comments about the experiment?’’) and their co-players (‘‘Do you have any comments about your teammates?’’) prior to debriefing.

**Measures**

**General psychological distress.** The 10-item Kessler Psychological Distress Scale (K10; Kessler et al., 2003) measures emotional states in the past four weeks on a scale from 1 (‘none of the time’) to 5 (‘all of the time’). Normative bands in the Australian population are: low (10-15), moderate (16-21), high (22-29), and very high
(30-50) distress (Cvetkovski, Reavley, & Jorm, 2012). Total scale scores ranged from 10 to 44 and internal consistency reliability was excellent ($\alpha = .94$).

**Suicide ideation and attempts.** Two items were adapted from the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007) to measure frequency of suicide ideation ("How many times in the past year have you thought about suicide?") on a 6-point ('never' to 'almost every day') scale, and number of lifetime attempts ("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?") on a 5-point ('never' to 'five or more times') scale. The SITBI is appropriate for administration via self-report (Latimer, Meade, & Tennant, 2013), is associated with other indices of suicide risk, and demonstrates good inter-rater and test-retest reliability (Nock et al., 2007).

**Results**

**Screening**

Task measures were normally distributed (skew $< \pm 2$; Field, 2009) and were screened for multivariate outliers, with no cases exceeding the critical value ($z = 3.29, p < .001$). Experiment feedback was examined and 24 participants were identified who expressed suspicion that the task may have been fixed. These participants did not significantly differ from non-suspicious participants on any of the task measures of thwarted belongingness, burdensomeness, and desire to disengage ($ps > .05$), consistent with some earlier findings using the task indicating that results did not significantly differ whether suspicious participants were included (Collins et al., 2016). Suspicious participants were thus left in the dataset to allow a larger sample size to ensure sufficient power.
Sample Characteristics

Mean levels of general psychological distress fell in the high distress band ($M = 23.64, SD = 8.83$). Over half of the sample (52.8%) reported thinking about suicide at least once in the past year, with 16.3% reporting thinking about suicide at least monthly, and 3.9% endorsing weekly suicidal thoughts. More than one in ten (12.5%) reported having made at least one lifetime suicide attempt, with 3.8% reporting multiple prior attempts.

Descriptives and Bivariate Associations.

Descriptive statistics and inter-item correlations between burdensomeness, thwarted belongingness, and desire to disengage for each time point are displayed in Table 1. Paired-samples t-tests were employed to examine change in variables across time points. Burdensomeness ratings were significantly inter-correlated and did not significantly differ in magnitude from Time 1 to Time 2, $t(103) = -.88, p = .38$, or from Time 2 to Time 3, $t(103) = -.43, p = .67$. Thwarted belongingness ratings were also significantly correlated, and increased significantly in magnitude from Time 1 to Time 2, $t(103) = -7.20, p < .001$, while remaining similar from Time 2 to Time 3, $t(103) = 1.51, p = .13$. Desire to disengage ratings were also significantly correlated, and increased significantly from Time 1 to Time 2, $t(103) = -5.88, p < .001$, and from Time 2 to Time 3, $t(103) = -2.96, p = .004$. 
Table 1

*Means, Standard Deviations and Inter-correlations between Task Measures*

<table>
<thead>
<tr>
<th>Variable</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
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<th>7.</th>
<th>8.</th>
<th>9.</th>
<th>M</th>
<th>SD</th>
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<tbody>
<tr>
<td>1. T1 - PB</td>
<td>-</td>
<td>.51*</td>
<td>.47*</td>
<td>-.09</td>
<td>.17</td>
<td>.07</td>
<td>.39*</td>
<td>.40*</td>
<td>.41*</td>
<td>3.65</td>
<td>1.58</td>
</tr>
<tr>
<td>2. T2 - PB</td>
<td>-</td>
<td>.75*</td>
<td>.12</td>
<td>.25*</td>
<td>.12</td>
<td>.29*</td>
<td>.36*</td>
<td>.40*</td>
<td>3.81</td>
<td>1.95</td>
<td></td>
</tr>
<tr>
<td>3. T3 - PB</td>
<td>-</td>
<td>.01</td>
<td>.21*</td>
<td>.07</td>
<td>.26*</td>
<td>.29*</td>
<td>.34*</td>
<td>3.87</td>
<td>1.88</td>
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<tr>
<td>4. T1 - TB</td>
<td>-</td>
<td>.50*</td>
<td>.53*</td>
<td>-.06</td>
<td>-.06</td>
<td>-.08</td>
<td>2.89</td>
<td>1.35</td>
<td></td>
<td></td>
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<tr>
<td>5. T2 - TB</td>
<td>-</td>
<td>.82*</td>
<td>.03</td>
<td>.08</td>
<td>.06</td>
<td>3.87</td>
<td>1.39</td>
<td></td>
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<tr>
<td>6. T3 - TB</td>
<td>-</td>
<td>-.04</td>
<td>-.06</td>
<td>-.05</td>
<td>3.74</td>
<td>1.45</td>
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<tr>
<td>7. T1 - Disengage</td>
<td>-</td>
<td>.77*</td>
<td>.70*</td>
<td>1.88</td>
<td>1.73</td>
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<tr>
<td>8. T2 - Disengage</td>
<td>-</td>
<td>.89*</td>
<td>2.63</td>
<td>2.07</td>
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<tr>
<td>9. T3 - Disengage</td>
<td>-</td>
<td>2.91</td>
<td>2.01</td>
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Note. T1 = Time 1; T2 = Time 2; T3 = Time 3; PB = Perceived burdensomeness; TB = Thwarted belongingness; Disengage = Desire to disengage

*p < .01

Manipulation Check

To verify that the interpersonal factors were successfully induced, participants in the high burdensomeness/thwarted belongingness manipulation in the current sample were compared to matched controls who were allocated to the low burdensomeness/thwarted belongingness condition from unpublished research (n = 97). Compared to the matched controls, participants in the high burdensomeness/thwarted belongingness manipulation expressed significantly greater average levels of perceived burdensomeness (M = 0.62, SD = 0.95 vs. M = 3.78, SD = 1.54), F(1, 199) = 301.98, p < .001, $\eta^2 = .60$, 90% CI (.53, .66), and thwarted belongingness (M = 2.34, SD = 1.96 vs. M
= 3.50, SD = 1.21), $F(1, 199) = 26.06, p < .001, \eta^2 = .12, 90\% CI (.05, .19)$. This is consistent with existing research showing that the paradigm effectively manipulates heightened burdensomeness and thwarted belongingness (Collins et al., 2016).

**Testing Temporal Inter-relationships between Burdensomeness and Thwarted Belongingness and their Effects on Concurrent Desire to Disengage**

A cross-lagged path model was specified in AMOS 21.0 (Figure 1) comprising three observed variables: perceived burdensomeness, thwarted belongingness, and desire to disengage, measured at three time points (roughly every 3.5 minutes). Autoregressive (within-variable) paths were specified between each of the variables from Time 1 to 2, and from Time 2 to 3. These autoregressive paths are indicators of the temporal stability of the measures (Little & Card, 2013). Cross-lagged paths were specified across time between perceived burdensomeness and thwarted belongingness, whereby burdensomeness at Time 1 was specified to predict thwarted belongingness at Time 2, and burdensomeness at Time 2 was specified to predict thwarted belongingness at Time 3, and vice versa. The inclusion of cross-lagged pathways permits the study of reciprocal relationships and is useful in the absence of an a priori theoretical hypothesis of the strength and direction of these relationships (Selig & Little, 2012). Synchronous correlations were specified between perceived burdensomeness and thwarted belongingness at Time 1, and between their residual errors at Times 2 and 3. Finally, both interpersonal factors were specified to predict desire to disengage at each time point. While within-time direct effects are typically not included in cross-lagged path models (Little & Card, 2013), these were added to permit testing of the interpersonal theory’s prediction that heightened burdensomeness and thwarted belongingness proximally drive the desire to disengage (Joiner, 2005).
Figure 1. The reciprocal effects of perceived burdensomeness and thwarted belongingness and their associations with desire to disengage

*p = .069, **p < .01, ***p < .001

Four fit indices were examined to assess model fit: the chi square, RMSEA, CFI and TLI. A non-significant chi-square (Tabachnick & Fidell, 2013), RMSEA values below 0.05 (Hu & Bentler, 1999) and CFI and TLI values above .95 (Byrne, 2010) indicate good fit. The model demonstrated excellent fit, \( \chi^2(17) = 19.02, p = .33 \), RMSEA = .034 (90% CI = .000, .098), CFI = .996, TLI = .99.

Considering first the relationships within variables, the autoregressive coefficients for all variables were strong and significant, indicating that the three variables were relatively stable over the course of the experiment. Perceived burdensomeness at Time 1 significantly predicted thwarted belongingness at Time 2, and thwarted belongingness at Time 1 significantly predicted perceived burdensomeness at Time 2.

The cross-lagged effects between burdensomeness and thwarted belongingness were smaller than their respective autoregressive coefficients. These cross-lagged effects
were no longer significant across Times 2 and 3, while the autoregressive effects of burdensomeness and thwarted belongingness became stronger. Perceived burdensomeness and thwarted belongingness were not significantly associated at Time 1, and their residual covariances at Times 2 and 3 (not shown in the Figure) were also not significant ($p_s > .05$). The relationships between perceived burdensomeness and desire to disengage were greatest at Time 1, and diminished as the experiment progressed, falling outside of the conventional criteria for significance ($p = .069$) at Time 3. In contrast, thwarted belongingness was not significantly associated with desire to disengage at any time point.

**Discussion**

The present research sought to disentangle the reciprocal effects of two interpersonal factors thought to proximally drive suicidal desire (Joiner, 2005), and to test their respective associations with desire to disengage from this interpersonal adversity. Burdensomeness and thwarted belongingness mutually amplified each other initially, as evidenced by their significant cross-lagged effects from Times 1 and 2. This may explain why the interpersonal factors are often strongly associated (e.g., Anestis et al., 2011). While the effect sizes of these pathways were similar, the path from burdensomeness to thwarted belongingness was slightly larger, suggesting that burdensomeness may be a stronger temporal predictor of thwarted belongingness than the converse. Some posit that this suggests that burdensomeness is more likely a cause of thwarted belongingness (Martens & Haase, 2006). While not anticipated by the interpersonal theory, this indicates that reducing perceived burdensomeness would result in the simultaneous alleviation of thwarted belongingness. The cross-lagged effects between the two interpersonal factors diminished in strength across Times 2 and 3, suggesting that while
they may initially mutually amplify each other, they do not continue to do so over an extended period.

Only burdensomeness was significantly associated with desire to disengage, and this association was especially strong at the first time interval. This may indicate that even a brief induction of burdensomeness may be sufficient to instill a more lasting wish to escape such adversity. Alternatively, the diminishing association between burdensomeness and desire to disengage across time might point to the presence of an unknown moderator of these relationships.

In contrast, thwarted belongingness was not associated with desire to disengage at any time point. Taken together, findings suggest that thwarted belongingness may indirectly influence desire to disengage by amplifying burdensomeness. Although both factors are believed to be equally proximal drivers of suicidal desire (Joiner, 2005), our results indicate that burdensomeness is more proximal to desire to disengage. This is consistent with other research showing that perceived burdensomeness may be an especially strong predictor of thoughts of disengaging from life (e.g., Ma et al., 2016), suggesting that the interpersonal theory could be reformulated to account for the especially pernicious and proximal role of burdensomeness.

The present findings do not rule out the possibility however that thwarted belongingness may also be more acutely related to risk (e.g., Bryan, Clemans, & Hernandez, 2012). Compared to perceived burdensomeness, themes of thwarted belongingness appeared more frequently in suicide notes (e.g., Gunn, Lester, Haines, & Williams, 2012) and thwarted belongingness was more strongly associated with suicide attempt status (e.g., Conner et al., 2007). It is possible then that thwarted belongingness might re-emerge as an important predictor of risk later in the motivational-volitional pathway toward lethal suicidal behavior (cf. O’Connor & Nock, 2014).
Although some participants expressed suspicion that the task may have been rigged, they did not differ from non-suspicious participants on any of the study measures. This was consistent with earlier findings using the task (Collins et al., 2016) and with findings that experimentally induced social exclusion has deleterious effects even when participants are made aware that they are playing against computer-controlled players (Zadro, Williams, & Richardson, 2004).

Finally, the high rate of psychological distress, suicide ideation and lifetime suicide attempts reported by the healthy adult sample deserves mention. While a non-clinical sample was selected to safely examine the reciprocal effects of the interpersonal factors within a controlled setting, the high rates of risk factors echo findings from other university student samples (e.g., Center for Collegiate Mental Health, 2015) and raise further alarm that this population is an important target for prevention (Lamis, Drum, & Swanbrow Becker, 2015).

The findings should be considered in the context of several limitations. First, autoregressive and cross-lagged effects are specific to the time lag used (approximately 3.5 minutes) and different patterns of effects might have emerged had longer or shorter intervals been selected between measurements (Little & Card, 2013).

Second, perceived burdensomeness, thwarted belongingness, and desire to disengage were each measured using one-item measures. While this facilitated information-gathering during the brief paradigm, one-item measures may limit comprehensiveness (Sloan et al., 2002) and preclude testing of factorial invariance (Selig & Little, 2012).

Finally, thwarted belongingness in relation to family may be more important among university students compared to thwarted belongingness relative to peers (Wong, Tran, Koo, Chiu, & Mok, 2011), which might explain the limited influence of
belongingness. Future research examining the reciprocal effects of the two interpersonal factors should thus endeavor to replicate the current findings using multi-item measures, different time lags between measurements, and other types of diminished belongingness.

In sum, the current research makes an important first attempt at untangling the reciprocal inter-relationships between two factors thought to be key drivers of suicidal desire (Joiner, 2005). Results show that perceived burdensomeness and thwarted belongingness have reciprocal effects, and that burdensomeness is more proximally related to the desire to disengage. This indicates that interventions targeting the reduction of perceived burdensomeness should result in both the alleviation of diminished belongingness and an increased capability to persist through adversity.
Foreword to Chapter Five

The preceding Chapters employed a novel paradigm to test key predictions of the interpersonal theory regarding the role of its two putative drivers of suicidal desire. Findings support core assumptions of the theory and clarify complexities in the literature regarding the relative influence of the two interpersonal factors. Maintaining the focus on burdensomeness and thwarted belongingness, the current research now moves from testing theoretical predictions in the laboratory to addressing a gap in the theory using a prospective design.

Life-sustaining protective factors may circumvent the adverse effects of the interpersonal risk factors (e.g., Johnson et al., 2011), although the interpersonal theory does not explicitly account for resilience. To address this gap, Chapter Five sought to test the influence of zest for life, defined as a sense of connection to and enthusiasm for life, against the deleterious effects of the two interpersonal factors on suicide ideation.
Chapter Five

Adding Life to the Interpersonal Theory of Suicide:

Accounting for the Role of Zest for Life
Abstract

Desire to live must be eroded for suicidal behavior to ensue, yet existing models of suicide do not account for the role of zest for life. First, a new Zest for Life Scale was developed using exploratory ($n = 200$) and confirmatory factor analyses ($n = 411$). Second, the mediating and moderating influence of zest against the effects of the putative causal interpersonal factors of the interpersonal theory of suicide (perceived burdensomeness and thwarted belongingness) was tested using a prospective design ($n = 234$). Results show that while zest for life may be partly diminished by burdensomeness and thwarted belongingness, it also provides a protective barrier between the interpersonal factors and the development of suicidal desire. Findings highlight the importance of fostering engagement with life among those who are experiencing the thwarting of interpersonal needs and are contemplating suicide.

*Keywords: zest for life, resilience, protective factors, suicide, suicidal behavior, interpersonal theory of suicide, psychometrics*
Adding Life to the Interpersonal Theory of Suicide:
Accounting for the Role of Zest for Life

“Many factors, none of which alone seems sufficient… coexist in a suicidal case where
the negative, death-promoting elements overcome the normal, ordinary, almost ubiquitous
life-sustaining habits of our days” - Edwin S. Shneidman (1996, p. 90)

The World Health Organization (2014) estimates that one life is lost to suicide
every forty seconds. While various risk factors play a role in death by suicide, suicide is
ultimately about the erosion and exhaustion of the will to live (Shneidman, 1996).
Assessment of one’s level of engagement with and enthusiasm for life, or zest for life,
appears vital when evaluating risk. As zest for life diminishes, death by suicide may seem
a less daunting prospect with some perceived benefits (Harrison, Stritzke, Fay, Ellison, &
Hudaib, 2014). In contrast, a strong zest for life can work against engaging in suicidal
behavior (Linehan, Goodstein, Nielsen, & Chiles, 1983; O'Connor & Nock, 2014).
Nonetheless, existing theories have tended to overlook life-sustaining factors (Johnson,
Wood, Gooding, Taylor, & Tarrier, 2011) and have failed to account for the dynamic
relationship between risk and resilience (Bryan & Rudd, 2016). The interpersonal theory
of suicide proposes that the will to live must be drained by thwarted interpersonal needs
for suicidal thinking to ensue (Joiner, 2005), yet the theory does not make specific
predictions about the role of life-oriented factors.

This Chapter had two aims. Chiefly it aimed to test the role of zest for life against
the deleterious impacts of two key risk factors proposed by the interpersonal theory using
a prospective design. To achieve this aim it was first necessary to develop a new measure
of zest for life, defined as engagement with life accompanied by a positive life outlook
and free from recent depletions of enthusiasm and vigor for life.

Zest for Life and the Interpersonal Theory of Suicide
The interpersonal theory of suicide (Joiner, 2005; Van Orden et al., 2010) proposes that two factors are proximally and causally related to suicidal desire – thwarted belongingness and perceived burdensomeness. Thwarted belongingness consists of a sense of loneliness and a lack of mutually caring relationships, while perceived burdensomeness comprises a feeling of self-hatred coupled with a perception of liability on others (Van Orden et al., 2010). Both perceived burdensomeness and thwarted belongingness have been associated with suicide risk across a multitude of studies (e.g., Puzia, Kraines, Liu, & Kleiman, 2014; Van Orden, Cukrowicz, Witte, & Joiner, 2012).

In a recent review of the literature on the interpersonal theory, Ma and colleagues (2016) questioned whether there were other crucial variables not accounted for by the theory that may further strengthen the precision of risk estimates. It is indeed important to probe mediators and moderators of such theoretically-derived risk factors (e.g., Cero, Zuromski, Witte, Ribeiro, & Joiner, 2015; Johnson et al., 2011), to better understand why suicide risk occurs and to account for how it might be reduced or even neutralized.

A large body of literature indicates that considering a sense of connection to and engagement with life is critical when evaluating risk. A depleted wish to live is distinct from the wish to die (Bryan, Rudd, Peterson, Young-McCaughon, & Wertenberger, 2016; Orbach, Carlson, Feshbach, Glaubman, & Gross, 1983; Osman et al., 2000), and denotes increased suicide risk beyond desire for death alone (Brown, Steer, Henriques, & Beck, 2005; Kovacs & Beck, 1977; O'Connor, Jobes, Yergin et al., 2012). For example, the emergence of suicidal behavior in a two-year prospective study was more strongly associated with a diminished desire to live than a heightened desire for death, suggesting that suicidal behavior is driven mainly by the exhaustion of the will to live (Bryan et al., 2016). Similarly, suicide intent has been found to vary as a function of ratings of favorability of life (but not of death), where suicide intent was higher the more life was
viewed as unfavorable (Wetzel, 1975). Further, suicide ideation was more strongly related to diminished implicit self-associations with life, than implicit self-association with death (Harrison et al., 2014).

While diminished zest for life signals increased risk, heightened connection to life may denote resilience. Specific life-oriented factors, such as purpose in life, satisfaction with life, meaning in life, and reasons for living, each demonstrate significant inverse associations with suicide risk (Heisel & Flett, 2004; Kleiman & Beaver, 2013; Malone et al., 2000). It is similarly recommended that the management of risk indicators in suicidal individuals be complemented by ‘living talk’ with the aim of bolstering connection to life (Britton, 2015). Importantly, meaning in life has also been found to mediate the relationships between perceived burdensomeness and thwarted belongingness and suicide ideation, and may confer resiliency against the adverse effects of these interpersonal factors (Kleiman & Beaver, 2013). Further, individuals who possess markers of belongingness, such as cohabitating with others and having close confidantes, are more likely to respond affirmatively to the question, “do you have a zest for life?” compared to those who cite lower belongingness (Fagerstrom, 2010; Glasberg, Pellfolk, & Fagerstrom, 2014).

In addition to connection to and engagement with one’s current life, a positive life outlook is also important in the reduction of risk. Future optimism is negatively associated with suicide risk (Osman et al., 1998; Rasmussen & Wingate, 2011) and lowers the odds of making a suicide attempt (Muehlenkamp & Gutierrez, 2007). With respect to the interpersonal theory, dispositional optimism (Davidson & Wingate, 2013; Rasmussen & Wingate, 2011) and hope (Anestis, Moberg, & Arnau, 2014; Davidson, Wingate, Rasmussen, & Slish, 2009; Davidson, Wingate, Slish, & Rasmussen, 2010) were negatively associated with both thwarted belongingness and perceived
burdensomeness. Thus, a positive future outlook on life may confer resilience to suicide risk via its impact on thwarted belongingness and perceived burdensomeness.

Conversely, deficits in positive future thinking may undermine resilience. Indeed, such deficits were more strongly associated with suicide risk compared to heightened negative future thinking (Hunter & O'Connor, 2003; MacLeod, Pankhania, Lee, & Mitchell, 1997; MacLeod, Rose, & Williams, 1993; O'Connor, Connery, & Cheyne, 2000). Similarly, having difficulty pursuing new goals when an existing goal pursuit is thwarted is associated with heightened suicide risk (O'Connor, Fraser, Whyte, MacHale, & Masterton, 2009; O'Connor, O'Carroll, Ryan, & Smyth, 2012; Surrence, Miranda, Marroquin, & Chan, 2009). A person’s connection to life appears to remain strongest if ‘future-proofed’ by engaging in positive future thinking and adaptive goal pursuit when faced with life’s vicissitudes.

In sum, engagement with life (Malone et al., 2000) and a positive future life outlook (Osman et al., 1998) are associated with reduced suicide risk, while a diminished connection to life (Bryan et al., 2016) and deficits in positive future thinking (Hunter & O’Connor, 2003) denote heightened risk. Research on life-oriented factors has to date focused on specific aspects, such as specific reasons for living that inhibit suicidal behavior when suicide is being contemplated (Linehan et al., 1983), or cognitive appraisals of life purpose and satisfaction (Diener, Emmons, Larsen, & Griffin, 1985; Heisel & Flett, 2004). A general sense of connection to and enthusiasm for life, or ‘zest for life’, may underpin these more specific factors, providing a barrier between theoretically derived risk factors and suicide risk.

While the interpersonal theory does not make specific predictions about the role of life-oriented factors, the key causal interpersonal factors in the theory are described by Joiner and colleagues (2005) in relation to how they impact on, or are impacted upon, by
what we call here ‘zest for life.’ If belongingness is satisfied, the “will to live remains intact” (Joiner, 2005, p. 117). Likewise, if one feels like a contributor rather than a burden, this “can be life-saving” (Joiner, 2005, p. 100). According to Joiner (2005, p. 102), interpersonal effectiveness and connectedness are the key ingredients of the will to live; if they are both compromised, they act as ‘‘life-draining’’ forces that instill the desire for death.

That is, suicide is as much about rejecting life as it is about embracing death. Theories of suicide could be strengthened if they looked beyond death-promoting elements and account for occasions when these are insufficient to overcome life-sustaining forces, or how re-engagement with life can divert an individual’s trajectory on the path toward suicide. Though zest for life may be diminished by the “life-draining” (Joiner, 2005, p. 102) effects of thwarted belongingness and perceived burdensomeness, it may also provide a protective barrier between these interpersonal factors and the development of suicide ideation. Prior to testing specific hypotheses about the role of zest for life against the effects of burdensomeness and thwarted belongingness on suicidal desire, we first developed and validated a new measure of zest. While a number of measures of life-oriented constructs already exist (Diener, Emmons, Larsen, & Griffin, 1985; Kovacs & Beck, 1977; Linehan et al., 1983; Orbach et al., 1983; Park, Peterson, & Seligman, 2004; Ryff & Singer, 1996; Steger, Frazier, Oishi, & Kaler, 2006) they were not designed to capture a general sense of engagement with and enthusiasm for future life.

The Present Study

After developing a measurement model of a new Zest for Life Scale (ZLS), the relationships between zest for life and other indices of suicide risk and resilience were then tested. It was hypothesized that there would be significant inverse relationships
between zest scores and markers of risk (suicide attempts, suicide ideation, suicide intention, and readiness for suicide). Convergent validity of zest for life would be supported by a moderate positive association of the ZLS with a measure of meaning in life (Kleiman & Beaver, 2013).

We then tested predictions of the role of zest for life in relation to the interpersonal risk factors using a prospective design in order to probe temporal relationships between variables. As thwarted belongingness and perceived burdensomeness are posited to be “life-draining” forces (Joiner, 2005, p. 102), we anticipated that they would exert their adverse effects via zest for life, where both interpersonal factors would be negatively associated with zest, and zest would mediate their effects on suicide ideation.

As a test of mediation does not clarify whether zest for life also acts as a resilience factor (e.g., Johnson et al., 2011; Rutter, 2012), we examined whether zest for life also moderated the relationships between perceived burdensomeness and suicide ideation, and thwarted belongingness and suicide ideation. Consistent with findings that certain variables act as both mediators and moderators (cf. Holmbeck, 1997), we hypothesized that zest for life would also exert a protective influence by attenuating the adverse effects of the interpersonal factors on suicidal desire.

Development of the Zest for Life Scale

Method

Participants and procedures. Six hundred and eleven undergraduate students (159 males and 452 females) who took part in a study on the acquired capability for suicide (George, Page, Hooke, & Stritzke, 2016; see also Chapter Six) provided written informed consent and completed computer-based questionnaires in a supervised setting. Data were previously screened for invalid responding and six additional participants who
displayed evidence of careless or inconsistent responding were removed from all analyses (George et al., 2016). Participant age ranged from 17 to 55 years ($M = 20.93, SD = 4.72$). Self-reported ethnicity was Caucasian Australian (67.1%), Asian (17.4%), European (6.8%), African (1.8%), Aboriginal Australian (0.4%) and Other (6.4%). This dataset was randomly divided into two samples comprising 200 and 411 participants. The first was used for an exploratory factor analysis, and the second was used for confirmatory factor analysis and the testing of convergent validity of interpretations. The study was approved by the institution’s Human Research Ethics Committee, and participants were fully debriefed and received a list of campus and community mental health resources.

**Measures.**

**Zest for Life.** The Zest for Life Scale (ZLS) was developed from a pool of 26 items measuring connection to life. Most items were newly devised while some were adapted from existing measures, such as the Survival and Coping Beliefs subscale of the Reasons for Living Inventory (Linehan et al., 1983) and the ‘Zest’ subscale of the Values in Action Character Strengths Inventory (Peterson, Park, & Seligman, 2005). Items reflect engagement with life, a sense of living life to the fullest, and positive expectations for life (e.g., “I am embracing life”; “I look forward to each new day”). The scale also includes fourteen reverse-scored items designed to capture depletions in zest (e.g., “Life feels more dull as time moves on”). Respondents rate the degree to which each statement is true for them on a 9-point scale from ‘Not at all’ (0) to ‘Very strongly’ (8), with higher scores denoting heightened zest for life. The coefficient alpha for the 26-item version of the scale was .96 in the current sample.

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3 Further detail is provided in Appendix 1.
Suicide ideation and attempts. Two items adapted from the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007) were used to assess frequency of suicidal ideation in the past year ("How many times have you thought about suicide?") with six response options from ‘never’ to ‘almost every day,’ and history of suicide attempts ("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 five response options from ‘never’ to ‘five or more times.’ The SITBI is suitable for use in self-report format in non-clinical samples (Latimer, Meade, & Tennant, 2013) and has demonstrated inter-rater reliability, test-retest reliability, and convergent validity with measures of suicide risk (Nock et al., 2007).

Intent and readiness for suicide. Intent and readiness for lethal suicidal behavior were measured with two items ("I have no intention of killing myself in the near future" and "If I wanted to kill myself, I feel ready to do so") on a 0-8 scale. The intention item is reverse-scored, such that high scores suggest increased intention for suicidal behavior. Both items demonstrate good test-retest reliability and are significantly associated with other indices of suicide risk including prior suicide attempts (George et al., 2016).

General psychological distress. The 10-item Kessler Psychological Distress Scale (K10; Kessler et al., 2003) measures emotional states experienced in the past four weeks on a 5-point scale from 'none of the time' (1) to ‘all of the time’ (5), with high scores denoting heightened general psychological distress. The K10 demonstrates construct validity with mental health diagnoses (Andrews & Slade, 2001). Normative cut-off scores for 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; Stallman, 2010). Total scores ranged from 10 to 46 and internal consistency for the current sample was excellent (α = .94).
Meaning in Life Questionnaire (MLQ; Steger et al., 2006). The MLQ has two five-item subscales using a 7-point scale measuring search for and presence of meaning in life. The ‘presence of meaning’ subscale was used, where higher scores indicate heightened presence of meaning in life. The MLQ has good internal consistency and convergent and discriminant validity (Steger et al., 2006).

Data analytic strategy. Factor retention for the ZLS was first determined via parallel analysis using SPSS 21.0 and the syntax provided by O’Connor (O’Connor, 2000). Factors were retained when the Eigenvalues generated from the dataset were larger than the Eigenvalues from randomly generated correlation matrices (Hayton, Allen, & Scarpello, 2004; Horn, 1965). Principal axis factoring was selected over principal components analysis, as the latter assumes perfect measurement (Finch & West, 1997) and may lead to more spurious common variance (Comrey, 1988). Direct oblimin rotation was employed as it was anticipated that any factors that may emerge would be correlated (Tabachnick & Fidell, 2013). Items were retained if item factor loadings on the expected primary factor exceeded 0.45 (Meyers, Gamst, & Guarino, 2006), and if there was no evidence of cross-loading, specified a priori as a difference of at least .3 between the factor-loadings. As briefer scales are desirable for both research and clinical purposes, only the strongest loading items were then selected and the principal axis factoring was then run again with the reduced item set. To test the measurement model generated by the exploratory factor analysis, confirmatory factor analysis was next run with the second sample (n = 411) using AMOS.

Results

Sample characteristics. Mean levels of general psychological distress were at the low end of the high distress range (M = 21.71, SD = 7.29). Nearly half of the sample (49.1%) reported suicide ideation in the past year, with 13.5% thinking about suicide on
at least a monthly basis. At least one lifetime suicide attempt was reported by 13.4%, with 4.4% reporting multiple attempts.

**Exploratory factor analysis of the ZLS.** Item analysis did not reveal any skewness or problematic variances (Curran, West, & Finch, 1996). Parallel analysis of the 26 ZLS items yielded a two-factor solution. The first factor had an eigenvalue of 13.15, which was larger than the randomly generated eigenvalue (.99). The second factor had an eigenvalue of 1.76, which was also larger than the corresponding random eigenvalue (.85). All other eigenvalues were smaller than the corresponding randomly generated values, suggesting that only two factors should be retained.

Bartlett’s test of sphericity was significant, indicating that inter-item correlations were sufficiently large for the analysis. Sampling adequacy was also excellent, as evidenced by the Keiser-Meyer-Olkin measure (KMO) of .95 (Field, 2009). Together, the factors accounted for 56.14% of the variance.

Given our aim to develop a brief measure, the principal axis factoring was then repeated using the top six items from each subscale. Bartlett’s test of sphericity was again significant and the KMO (.93) indicated excellent sampling adequacy. Internal consistency for the 12-item scale was excellent ($\alpha = .93$).

As shown in Table 1, all items loaded cleanly on their respective factors, with loadings ranging from very good to excellent (Comrey & Lee, 1992). All reverse-coded items loaded strongly on the first factor, while all positively worded items loaded strongly on the second factor. Coefficient alphas for the two subscales were similarly strong for both the positively-worded ($M = 5.56, SD = 1.41; \alpha = .91$) and negatively-worded ($M = 5.81, SD = 1.82, \alpha = .92$) subscales.
<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>I used to think of life as ‘half full,’ now it feels more like ‘half empty.’</td>
<td>.92</td>
<td>-.10</td>
</tr>
<tr>
<td>I feel less alive than I used to.</td>
<td>.91</td>
<td>-.05</td>
</tr>
<tr>
<td>Life seems to hold less for me than it used to.</td>
<td>.80</td>
<td>.07</td>
</tr>
<tr>
<td>Life feels more dull as time moves on.</td>
<td>.76</td>
<td>.07</td>
</tr>
<tr>
<td>I never used to, but now I sometimes think ‘why bother.’</td>
<td>.74</td>
<td>-.003</td>
</tr>
<tr>
<td>Life has become a drag.</td>
<td>.69</td>
<td>.19</td>
</tr>
<tr>
<td>I am embracing life.</td>
<td>.02</td>
<td>.87</td>
</tr>
<tr>
<td>I wake up in the morning and look forward to what life has in store for me.</td>
<td>-.01</td>
<td>.81</td>
</tr>
<tr>
<td>I strive to participate fully in life, not just view it from the sidelines.</td>
<td>-.05</td>
<td>.76</td>
</tr>
<tr>
<td>I look forward to each new day.</td>
<td>.12</td>
<td>.75</td>
</tr>
<tr>
<td>I try to enjoy life no matter what.</td>
<td>-.05</td>
<td>.72</td>
</tr>
<tr>
<td>I am looking forward to all that life has to offer.</td>
<td>.18</td>
<td>.68</td>
</tr>
</tbody>
</table>

*Note.* Direct oblimin rotation was used. Bold values highlight the factor on which the item loads.

Although the two factors reflected distinct aspects of zest for life, with one representing engagement with life and a positive outlook, and the other denoting depleted connection to life and diminished positive future thinking, the two subscales are also distinguished by positive versus negative wording. As reverse-coded items may introduce additional shared method covariance (Williams, Ford, & Nguyen, 2002), it is unclear whether the emergence of the two subscales reflects the presence of two distinct facets of zest, or is due to the presence of a reverse-coded method factor. Accounting for the influence of reverse-coded method covariance is recommended when testing the
validity of multi-factor measurement models (DiStefano & Motl, 2006; Gignac, 2007), so we used confirmatory factor analysis in a separate sample to evaluate three measurement models: a parsimonious one-factor model, an oblique two-factor model, and a one-factor model with a latent reverse-coded method factor.

Confirmatory factor analysis. Using AMOS, the three models were identified by constraining the variances of all latent variables to 1.0 (Gignac, 2007). First, the 12 ZLS items were entered into the model as observed variables and were specified to load on one factor. Four fit indices were considered to determine model fit: the chi square, the root-mean-square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis index (TLI). While a non-significant chi-square value indicates a good fit (62), this index is sensitive to sample size and may consequently underestimate fit (Brown, 2006). Given the large sample used, emphasis was thus placed on the other fit indices. RMSEA values under 0.08 are considered adequate, and values below 0.05 are considered good (Brown, 2006; Byrne, 2010; Hu & Bentler, 1999). CFI and TLI values between .90 and .95 are acceptable (Bentler, 1990), while values above .95 are good (Byrne, 2010).

Fit indices for the one-factor model were poor: \( \chi^2 (54) = 412.42, p < .001; \) RMSEA = .127 (90% CI = .116, .139); CFI = .90, TLI = .87, suggesting that this model was an inadequate fit to the data. Therefore, the oblique two-factor model was next tested. The 12 items were each specified to load onto their respective positively- and negatively-worded factors and the factors were allowed to correlate, as they are expected to represent related facets of zest for life. The two-factor model was a good fit to the data, \( \chi^2 (53) = 113.83, p < .001; \) RMSEA = .053 (90% CI = .039, .066); CFI = .98; TLI = .98, and was significantly better than the one-factor model, \( \chi^2_{\text{diff}} (1) = 298.59, p < .01. \)
However, the correlation between the two latent variables was very high ($r = .83$), indicating that 69% of the variance between the two factors was shared.

Lastly, a one-factor model with a reverse-coded method factor was tested. Here, all items were specified to load on a latent zest factor, and all reverse-scored items were also specified to load onto a latent method factor. This model, demonstrated good fit, $\chi^2 (48) = 104.97, p < .001$; RMSEA = .054 (90% CI = .040, .068); CFI = .98; TLI = .98, that was also significantly better than the one-factor model, $\chi^2_{\text{diff}} (6) = 337.11, p < .01$, but did not significantly differ from the oblique two-factor model, $\chi^2_{\text{diff}} (5) = 8.86, p > .05$.

While the two-factor oblique model also displayed good fit, the two factors were highly correlated and could be distinguished based on positive versus negative item wording, suggesting the presence of a reverse-coded method factor (Williams, Ford, & Nguyen, 2002). Thus, the one-factor model with a latent reverse-coded method factor was deemed the best fit to the data.

Cronbach’s alpha was good for the full 12-item ZLS ($\alpha = .94$), and for the positively- and negatively-worded item sets ($\alpha = .90$ and $\alpha = .92$, respectively). Inter-item correlations ranged from .40 to .73, suggesting that multicollinearity was not a concern (Field, 2009).

**Associations between zest for life and suicide risk and resilience.** Total zest for life scores were positively correlated with meaning in life ($r = .63, p < .01$), and negatively correlated ($ps < .01$) with suicide ideation ($r = -.56$), suicidal intent ($r = -.33$), readiness for lethal suicidal behavior ($r = -.47$), and prior suicide attempts ($r = -.30$).

We next used a prospective design to test the role of zest for life in relation to the two causal drivers of suicidal desire central to the interpersonal theory.
Prospective Tests of the Mediating and Moderating Role of Zest for Life

Method

Participants and procedures. Two-hundred and thirty-four university students (168 females, 66 males) who took part in a study on the acquired capability for suicide (George et al., 2016) provided written informed consent and filled out an online survey on two occasions separated by an eight-week period. Data were previously screened for careless and inconsistent responding and three additional participants who displayed evidence of such invalid responding were removed from all analyses (George et al., 2016). The sample predominately comprised undergraduate students (65.8%) ranging in age from 17 to 74 years (M = 25.78, SD = 10.35). Ethnicity was mainly Caucasian Australian (60.3%), with participants also reporting European (15%), Asian (14.9%), Oceanian (1.7%) and Other (8.1%) ethnic backgrounds. All participants were provided with a list of mental health support services at the start and end of the study, and could also access this information via a link at each page of the survey. The study was approved by the institution’s Human Research Ethics Committee.

Measures. Measures were administered at both time points and included measures of the interpersonal factors and acquired capability, as well as all measures described in the above section, with two exceptions. The SITBI item about suicide ideation was re-worded in the follow-up questionnaire to reflect events in the past four weeks. This was designed to capture the stressful period leading up to exams, and to be consistent with the timeframe of the K10 administered to measure general psychological distress. Additionally, due to a clerical error, two ZLS items (“I strive to participate fully in life, not just view it from the sidelines,” and “I try to enjoy life no matter what”) were not included in this study. The measurement model with the included 10 items was tested and demonstrated good fit, $\chi^2 (29) = 69.18, p < .001$; RMSEA = .077 (90% CI = .054,
These items had good internal consistency at both baseline ($\alpha = .95$) and follow-up ($\alpha = .96$), and test-retest reliability was good ($r = .75$, $p < .01$).

When also tested using the sample from Aim 1 ($n = 611$), the 10-item measurement model also had good fit, $\chi^2 (29) = 66.39$, $p < .001$; RMSEA = .046 (90% CI = .031, .061); CFI = .99, TLI = .99, and the 10- and 12- item sets were strongly correlated ($r = .99$, $p < .01$), suggesting that the versions are equivalent.

**Interpersonal Needs Questionnaire (INQ; Van Orden, Witte, Gordon, Bender, & Joiner, 2008).** The INQ comprises six items about perceived burdensomeness (e.g., “The people in my life would be better off if I were gone”) and nine items about thwarted belongingness (e.g., “I feel disconnected from other people”) on a 7-point scale from 1-7. Higher scores suggest heightened levels of perceived burdensomeness and thwarted belongingness. Total scale scores ranged from 15 to 90 at Time 1 and from 15 to 83 at Time 2. The INQ has good construct validity and internal consistency (Van Orden et al., 2012; Van Orden et al., 2008) and internal consistency in the current sample was excellent at both Time 1 (PB subscale $\alpha = .92$; TB subscale $\alpha = .91$; Total INQ $\alpha = .93$) and Time 2 (PB subscale $\alpha = .94$; TB subscale $\alpha = .93$; Total INQ $\alpha = .95$).

**Acquired Capability with Rehearsal for Suicide Scale (ACWRSS; George et al., 2016).** The ACWRSS is a 7-item measure of three facets of acquired capability comprising two items measuring fearlessness of death (e.g., “Even if I wanted to, killing myself is too scary to follow through with it”), two items measuring pain tolerance (e.g., “I can tolerate pain much more than I used to”), and three items about preparation for suicide (e.g., “I have considered whether some ways to kill myself would be easier than others”). Items have a 9-point scale from 0-8, and higher scores denote heightened levels of acquired capability. The ACWRSS has good construct validity and internal consistency (George et al., 2016).
**Data analytic strategy.** To test the mediating role of zest for life in the relationships between the interpersonal factors and suicide ideation, a structural equation model was run using AMOS. To control for Type 1 error while obtaining an optimal estimate of indirect effects, 5000 bias-corrected bootstrapping samples were used (Jose, 2013). Two moderation analyses were next run using SPSS and PROCESS (version 2.16; Hayes, 2016) to test whether zest for life also buffers the adverse effects of perceived burdensomeness and thwarted belongingness on suicide ideation.

**Results**

**Sample characteristics.** Mean general psychological distress scores fell between the moderate and high bands at both baseline \(M = 21.43, SD = 8.07\) and eight-week follow-up \(M = 21.37, SD = 7.88\). At baseline, over half of the sample (50.9%) reported thinking about suicide in the past year, with over one fifth (21.8%) reporting thinking about suicide at least once a month. At least one lifetime suicide attempt was endorsed by 14.1% of the sample, with 4.4% endorsing multiple prior attempts.

**Does zest for life mediate the relationships between burdensomeness and thwarted belongingness and suicide ideation?** Baseline thwarted belongingness and perceived burdensomeness were each specified to predict suicide ideation at follow-up both directly and indirectly via their relationships with zest for life at follow-up (see Figure 1). This model demonstrated good fit: \(\chi^2 (288) = 611.70, p < .001; \text{RMSEA} = .069 (90\% \text{ CI} = .062, .077); \text{CFI} = .94, \text{TLI} = .93.\) Partly consistent with the interpersonal theory, perceived burdensomeness directly predicted suicide ideation (direct effect = .282, 95% CI: .065, .497, \(p = .014\)), though the direct effect of thwarted belongingness on ideation was not significant (direct effect = .085, 95% CI: -.042, .209, \(p = .17\)).

Consistent with Joiner’s (2005) proposal that thwarted interpersonal effectiveness and connectedness act as life-draining forces, baseline zest for life also partly mediated
relationship between perceived burdensomeness and suicide ideation at follow-up (indirect effect = -.051, 95% CI: .014, .116, \( p = .009 \)), and fully mediated the relationship between thwarted belongingness and suicide ideation at follow-up (indirect effect = .135, 95% CI: .067, .244, \( p = .001 \)). This pattern of both direct and indirect effects of perceived burdensomeness and thwarted belongingness on ideation partly supports the notion that life-sustaining habits must be overcome by death-promoting elements (Harrison et al., 2014).

**Figure 1.** Zest for life partly mediates the prospective relationships between the interpersonal factors and ideation \( (n = 234) \)

*Note. T1 = Time 1 (baseline); T2 = Time 2 (follow-up)*

\( *p < .05, ***p < .001 \)

A hierarchical multiple regression was run to verify that zest for life was not serving as a proxy for prior suicide ideation or general psychological distress. Zest for life at follow-up was significantly negatively associated with suicide ideation at follow-up after controlling for baseline suicide ideation, psychological distress, burdensomeness, and thwarted belongingness (\( \beta = -.21, p = .001 \)).
Does zest for life moderate the relationship between the interpersonal factors and suicide ideation? Two moderation analyses were conducted using PROCESS (Hayes, 2016) to test the buffering influence of zest for life against the influence of (a) perceived burdensomeness and (b) thwarted belongingness on suicide ideation. To maintain consistency with the mediation analyses, the interpersonal factors were measured at baseline and zest for life and suicide ideation were measured at follow-up.

Zest for life significantly moderated the relationship between perceived burdensomeness and suicide ideation, $F(3, 230) = 28.14, p < .001, R^2 = .48$. Zest for life was significantly inversely related to suicide ideation, and the interaction between zest and burdensomeness also significantly negatively predicted ideation (Table 2). As shown in Table 3, the interaction was explored by examining the conditional effects of perceived burdensomeness on suicide ideation at three levels of zest for life (one standard deviation below the mean, at the mean, and above the mean). Perceived burdensomeness was significantly inversely related to suicide ideation at high levels of zest for life and was significantly positively associated with suicide ideation at low levels of zest. Burdensomeness was not significantly associated with ideation at mean levels of zest. The Johnson-Neyman technique revealed that the relationship between perceived burdensomeness and suicide ideation was significant when zest for life was less than .41 standard deviations below the mean, and when zest for life was above 1.58 standard deviations above the mean.
Table 2

Zest Interacts with Perceived Burdensomeness to Predict Suicide Ideation

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zest for life</td>
<td>-.20</td>
<td>&lt; .001</td>
<td>-.27, -.13</td>
</tr>
<tr>
<td>Perceived burdensomeness</td>
<td>.04</td>
<td>.35</td>
<td>-.05, .14</td>
</tr>
<tr>
<td>Zest x Perceived burdensomeness</td>
<td>-.11</td>
<td>&lt; .001</td>
<td>-.15, -.07</td>
</tr>
</tbody>
</table>

Table 3

Conditional Effects of Perceived Burdensomeness on Suicide Ideation

<table>
<thead>
<tr>
<th>Zest for life</th>
<th>β</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>One SD below mean</td>
<td>.23</td>
<td>&lt; .001</td>
<td>.14, .34</td>
</tr>
<tr>
<td>At mean</td>
<td>.04</td>
<td>.35</td>
<td>-.05, .14</td>
</tr>
<tr>
<td>One SD above mean</td>
<td>-.15</td>
<td>.02</td>
<td>-.28, -.02</td>
</tr>
</tbody>
</table>

Zest for life also significantly moderated the relationship between thwarted belongingness and suicide ideation, $F(3, 230) = 28.14, p < .001, R^2 = .48$. As indicated in Table 4, thwarted belongingness, zest for life, and their interaction significantly predicted ideation. The interaction was probed by examining the conditional effects of thwarted belongingness on suicide ideation at three levels of zest for life (one standard deviation below, at, and above the mean). As shown in Table 5, thwarted belongingness was significantly positively related to suicide ideation at low and mean levels of zest for life, and this association was strongest at low levels of zest. At high levels of zest (one standard deviation above the mean), the association between thwarted belongingness and suicide ideation was negative and fell outside the conventional criteria for significance ($p$
The Johnson-Neyman technique revealed that the relationship between thwarted belongingness and suicide ideation was significant when zest for life was less than .19 standard deviations below the mean, and when zest for life was more than 1.96 standard deviations above the mean.

Table 4

Zest Interacts with Thwarted Belongingness to Predict Suicide Ideation

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zest for life</td>
<td>-.18</td>
<td>&lt; .001</td>
<td>-.24, -.12</td>
</tr>
<tr>
<td>Thwarted belongingness</td>
<td>.09</td>
<td>.009</td>
<td>.02, .15</td>
</tr>
<tr>
<td>Zest x Thwarted belongingness</td>
<td>-.11</td>
<td>&lt; .001</td>
<td>-.18, -.05</td>
</tr>
</tbody>
</table>

Table 5

Conditional Effects of Thwarted Belongingness on Suicide Ideation

<table>
<thead>
<tr>
<th>Zest for life</th>
<th>β</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>One SD below mean</td>
<td>.29</td>
<td>&lt; .001</td>
<td>.16, .41</td>
</tr>
<tr>
<td>At mean</td>
<td>.09</td>
<td>.009</td>
<td>.02, .15</td>
</tr>
<tr>
<td>One SD above mean</td>
<td>-.11</td>
<td>.075</td>
<td>-.24, .01</td>
</tr>
</tbody>
</table>

Discussion

The interpersonal theory of suicide identifies two interpersonal death-promoting elements posited to be proximal to suicidal thinking. Consistent with earlier proposals that the depletion of life-sustaining forces is also central to suicide (Shneidman, 1996),
we found that zest for life can act as a barrier between two presumed causal factors of the interpersonal theory and suicidal desire. Prior to testing the hypothesized role of zest for life in relation to the key interpersonal facets of the theory, parallel and confirmatory factor analyses suggested that the newly developed zest for life measure was best characterized by a one-factor model with a reverse coded method factor, supporting the latent construct of zest for life. The measure also had good convergent validity, and zest was significantly and moderately correlated with a measure of meaning in life, suggesting that zest is related to but distinct from this more specific life-oriented factor.

The influence of zest for life against the adverse effects of the interpersonal factors on suicide ideation was tested via both mediation and moderation analyses. Partly consistent with the interpersonal theory’s prediction that the interpersonal factors give rise to suicidal desire, perceived burdensomeness was directly associated with heightened suicide ideation at follow-up in the mediation model, though the direct effect of thwarted belongingness on ideation was not significant. Consistent with Joiner’s proposal that the thwarting of the needs to contribute and belong is “life draining” (Joiner, 2005, p. 102), both interpersonal factors affected ideation also indirectly via their inverse relationships with zest for life. Zest for life, in turn, negatively predicted suicide ideation, and this association was significant even after controlling for baseline ideation and general psychological distress capturing symptoms of both depression and anxiety (Andrews & Slade, 2001). This suggests that zest partly can counteract the influence of the thwarting of these interpersonal needs on the development of ideation.

Moderation analyses confirmed that zest for life also buffers (Johnson et al., 2011) the adverse effects of both perceived burdensomeness and thwarted belongingness on suicidal desire. Perceived burdensomeness was inversely associated with suicide ideation at high levels of zest, indicating that heightened zest neutralizes and reverses the adverse
effects of burdensomeness on the development of suicidal thinking. Burdensomeness was not significantly associated with ideation at mean levels of zest, suggesting that even average levels of zest for life are sufficient to circumvent the harmful effects of burdensomeness on ideation. Conversely, perceived burdensomeness was significantly positively associated with suicide ideation at low levels of zest, indicating that diminished zest may escalate the adverse effects of burdensomeness on suicidal thoughts.

A similar pattern was observed when probing the moderating effect of zest on the association between thwarted belongingness and ideation. Thwarted belongingness was inversely associated with suicide ideation at high levels of zest, indicating that zest also buffers the adverse effects of thwarted belongingness on ideation. This association was significant only at very high levels of zest for life (1.96 standard deviations above the mean) though, suggesting that very strong zest for life is required to neutralize the adverse effect of thwarted belongingness. Thwarted belongingness was also significantly positively associated with ideation at mean and low levels of zest, and this relationship was especially strong at low zest levels. This indicates that diminished zest may escalate the adverse effects of thwarted belongingness on suicide ideation.

Together, findings suggest that while zest for life may be partly diminished by the life depleting influence of perceived burdensomeness and thwarted belongingness, heightened zest also provides a protective barrier between these interpersonal factors and suicide risk. The buffering influence of zest for life is unique relative to other specific life-oriented factors that were once thought to be protective such as specific reasons for living and optimism, which are inversely associated with risk but that do not exert the moderating effects required to demonstrate protective properties (Johnson et al., 2011). Zest’s capacity to neutralize and even reverse the deleterious effects of the interpersonal
factors could explain why some studies have found inconsistent associations between the interpersonal factors and risk (cf. Ma et al., 2016).

The present findings highlight the importance of accounting for the relationship between risk and resilience in theories of suicide (e.g., Johnson et al., 2011). Zest for life may be eroded by unmet needs of belongingness and interpersonal effectiveness, but to the extent that zest for life is strong, or is actively nourished during threat posed by the confluence of thwarted interpersonal needs, it is potentially life-saving because it can stall or reverse progress toward suicide. As noted by O’Connor and Nock (2014), the refinement of psychological theories of suicide require programmatic testing of both risk and protective factors, and a better understanding of the factors that enable or impede behavioral enactment will inform the translation of this research into clinical practice.

Recent guidelines for the routinized assessment of suicide risk in clinical practice (Chu et al., 2015) recommend the inclusion of questions about thwarted belongingness and perceived burdensomeness as well as the simultaneous assessment of protective factors such as reasons for living has been advocated (Fowler, 2012). There is increasing recognition that the “unique balance” between individuals’ motivations for suicide and life-sustaining reasons may be a critical determinant of risk outcome (American Psychiatric Association, 2016). For example, an index that computes the balance between the wish to die and the wish to live was found to uniquely predict suicide in a 10-year follow-up study of psychiatric outpatients (Brown et al., 2005). As the influence of zest for life appears strong at the early ideation phase of the pathway toward suicide, it suggests that dimished zest is an important target for suicide prevention. Indeed, enhanced engagement in life is a core strategy of community mental health initiatives, such as the Act-Belong-Commit program, which encourages individuals to stay mentally, physically, and socially active, while fostering purpose in life by setting goals and
becoming involved in causes within the community (Anwar-McHenry, Donovan, Jalleh, & Laws, 2012; Donovan, James, Jalleh, & Sidebottom, 2006).

Also consistent with the current findings, eliciting reasons for living (Jobes, 2012) and bolstering connection to life (Britton, 2015; Britton, Patrick, Wenzel, & Williams, 2011) should complement the risk management of suicidal individuals. As the Zest for Life Scale enquires about engagement with life rather than suicide risk directly, it may be particularly useful in contexts where individuals may be reticent to disclose suicidal intent (Kupers, 2005).

Limitations and Directions for Future Research

The present results must be considered in the context of several limitations. Ideation, intent, and readiness for suicide were assessed using single-item measures, which may be more sensitive to measurement error (Sloan, Aaronson, Cappelleri, Fairclough, & Varricchio, 2002), although these items have been shown to significantly correlate with indices of risk such as past suicidal behavior (George et al., 2016; Nock et al., 2007).

Participants were predominately young females, of self-reported Australian and Asian ethnicities, and from a single University. Generalizability may therefore be limited to these groups. The significant proportion of Asian participants in the two samples, though, is a strength considering that over half of global suicides occur in Asia (World Health Organization, 2014). Findings may also not generalize to suicide attempts and mortality (Klonsky & May, 2014; Neuringer, 1962). Further study is needed to examine whether zest for life exerts a significant role at the behavioral stages of the motivational-volitional pathway toward suicide.

Internal consistency reliability of the zest for life scale was strong and remained high when the reduced 10-item set was used, suggesting that some items from the full 12-
item version may be removed without reducing validity. Further research using the scale among other high risk groups might investigate this possibility. It is noted also though that the high internal consistency of the full zest scale is similar to estimates obtained from the leading measure of thwarted interpersonal needs used throughout the literature, the longer Interpersonal Needs Questionnaire (Van Orden et al., 2008; α = .91 to α = .95 in the current studies).

The possibility remains that zest for life may comprise two distinct concepts, as the oblique two-factor model also demonstrated good fit that was not significantly different from the one-factor model with a reverse coded method factor. All positively-worded items refer to a sense of general engagement with life (e.g., ‘I am embracing life’), while all negatively worded items refer to depletions in zest over time (e.g., ‘Life seems to hold less for me than it used to’). It is possible that zest may be like other positive psychological constructs such as hope, comprising elements of both states and traits (Snyder et al., 2005). Positively-worded items may then be capturing a trait-like disposition toward living life to the fullest, while the negatively-worded items could capture a more temporary and malleable state of depleted engagement with life.

Further research is thus needed to better understand the nature of the zest for life construct. Relatedly, further research on the convergent validity of the zest for life scale could investigate the relationship between zest for life and other variables not included in the present research, such as hopelessness and psychological pain.

Conceptual overlap between independent and dependent variables is a common challenge in suicide research, and it should be acknowledged that diminished zest also has some conceptual overlap with suicide ideation. Zest was strongly yet not perfectly correlated with suicide ideation in the current study though, suggesting that the constructs are related but distinct. Moreover, individuals who were screened for average levels of
zest for life (Chapter Two) reported heightened rates of suicide ideation, further suggesting that depleted zest is distinct from suicidal thoughts.

Results suggest that zest for life partly explains the prospective association between the interpersonal factors and suicide ideation, though it was not possible to test full mediation, as zest for life and the risk variables were measured concurrently at Time 2. Further research is required to determine temporal relationships between zest for life and suicide ideation. Finally, the correlational prospective design precludes causal inferences about the relationships in the structural models. More experimental studies are needed (Collins et al., 2016) to clarify the causal, and most likely fluid and dynamic (Bryan & Rudd, 2016), relationships between the interpersonal theory of suicide variables and zest for life.

Conclusions

The current findings support the notion that suicidal desire is best understood as an outcome of a process where life-sustaining strengths have been eroded and overcome by death-promoting proximal risk factors (Kovacs & Beck, 1977; Shneidman, 1996). While it is critically important to understand why people die by suicide, we must not neglect to examine why people do not die by suicide. That is, the ideation-to-action framework for research on the transition from suicidal thought to behavior is incomplete, unless complemented by better understanding of the ideation-to-nonaction path, which is the path taken by most ideators (ten Have et al., 2009). The present research highlights the critical importance of fostering engagement with life among those who are experiencing the thwarting of interpersonal needs and are contemplating suicide.
Foreword to Chapter Six

The preceding chapters tested key predictions of the interpersonal theory regarding its two putative causes of suicidal desire, and demonstrate the importance of also considering the role of zest for life in the context of the interpersonal factors. It was necessary to better understand the processes via which suicidal desire may be fostered or neutralized prior to exploring subsequent stages in the pathway toward lethal readiness for suicide.

As the interpersonal theory acknowledges, desire for suicide is necessary but insufficient for death by suicide to ensue, as suicidal behavior also requires significant acquired capability to beat down and overcome ingrained self-preservation instincts. Turning now to this third cornerstone of the interpersonal theory, the upcoming chapter outlines the first longitudinal test of the associations between theoretically-derived facets of acquired capability for suicide and distinct steps along the pathway from ideation to lethal readiness. Prior to testing main predictions of the theory regarding the role of acquired capability, it was first necessary to address shortcomings in existing measures of capability for suicide by developing and validating a new scale. Additionally, as the thesis has up to this point focused on university students, generalization to an inpatient psychiatric sample was also tested.
Chapter Six

Multi-Facet Assessment of Capability for Suicide: Development and Prospective Validation of the Acquired Capability with Rehearsal for Suicide Scale
Abstract

The interpersonal theory of suicide proposes that acquired capability facilitates transformation of suicidal desire into lethal self-destructive behavior (Joiner, 2005). A new measure, the Acquired Capability with Rehearsal for Suicide Scale (ACWRSS), was devised to capture the key facets of acquired capability – pain tolerance and fearlessness of death -while also incorporating deliberate and active means to increase preparedness for suicide. The factor structure of the ACWRSS was tested using confirmatory factor analysis \((n = 611)\). The 7-item ACWRSS conformed to the hypothesized three-factor structure, demonstrating excellent fit and good internal consistency \((\alpha = .83)\). Measurement invariance across gender was also demonstrated on configural, metric, and scalar levels. Next, in the first longitudinal study of the association between acquired capability and suicide ideation, intention, and readiness \((n = 234)\), the acquired capability facets prospectively predicted specific phases in the motivational-volitional pathway toward suicide readiness. Moreover, two of the acquired capability components mediated the relationship between baseline non-suicidal self-injury and suicide readiness at follow-up. In an inpatient psychiatric sample \((n = 108)\), the ACWRSS was significantly correlated with prior suicide attempts and thoughts and episodes of non-suicidal self-injury, and its facets demonstrated differential sensitivity to change. The ACWRSS is the first measure of acquired capability that reliably and validly captures all key facets of this critical component of the interpersonal theory of suicide. Its brevity enhances its utility for both research and clinical settings.

Keywords: acquired capability for suicide, interpersonal theory of suicide, suicide, fearlessness and pain tolerance
Multi-Facet Assessment of Capability for Suicide: Development and Prospective Validation of the Acquired Capability with Rehearsal for Suicide Scale

Emergency care for suicide attempters inflates healthcare costs, and suicide attempts are traumatic for survivors and their loved ones. Although suicide-related behavior is preventable, identifying imminent risk is challenging because most people with known risk factors do not attempt suicide. The interpersonal theory of suicide suggests this is because desire for death is necessary but insufficient to engage in lethal self-harm. Individuals must first develop the capability for suicide by overcoming fear of death and reluctance to suffer self-inflicted pain (Joiner, 2005). Assessment of acquired capability could reduce the burden caused by suicide attempts by permitting the more accurate identification of self-harm risk.

While there have been no longitudinal investigations of acquired capability and suicidal behavior, cross-sectional studies identify acquired capability as a critical proximal moderator between suicidal desire and clinician-rated risk of suicidal behavior (e.g., Van Orden, Witte, Gordon, Bender, & Joiner, 2008). A direct relationship between acquired capability and suicidality has also been observed (e.g., Bryan, Clemans & Hernandez, 2012; Kene & Hovey, 2014) and when direct and moderation effects have been examined simultaneously, both are significant (Bryan, Morrow, Anestis, & Joiner, 2010). Thus, acquired capability can influence suicide risk directly and indirectly. While some studies found no relationship between acquired capability and suicidality (e.g., Bryan, Hernandez, Allison, & Clemans, 2013; Simlot, McFarland, & Lester, 2013), this is not inconsistent with the interpersonal theory since capability is relevant to risk only in the context of active suicidal desire (Van Orden et al., 2010). To advance understanding of this complex relationship, it is important to address several conceptual and psychometric limitations of existing measures of acquired capability.
The aim of the present studies was threefold. First, we developed a multidimensional scale that incorporated three facets of acquired capability as conceptualized by the interpersonal theory. That is, in addition to measuring reduced fear of death by suicide and increased pain tolerance, this is the first scale to assess deliberate and active means by which individuals increase preparedness for lethal self-harm. For example, Van Orden et al. (2010) proposed that “mental practice is an element of acquiring the capability for suicide” (p. 588) and this mental rehearsal can occur without suicidal behavior (Joiner, 2005). Yet, prior measures, such as the Acquired Capability for Suicide Scale (Van Orden, Witte, Gordon, Bender, & Joiner, 2008) and the Capability subscale of the Interpersonal Psychological Survey (Nademin et al., 2008), do not explicitly include this element of acquired capability. Second, we examined the validity of interpretations using the new scale by testing the predictive validity of the acquired capability components in the motivational-volitional pathway (cf. O’Connor & Nock, 2014) toward suicide readiness. Extending on previous cross-sectional studies, this is the first prospective evaluation of the relationship between acquired capability and suicide ideation, intention, and readiness. Finally, we tested the sensitivity of the acquired capability facets to change following inpatient treatment.

According to the interpersonal theory, thwarted belongingness and perceived burdensomeness underlie suicidal desire, while acquired capability enables an individual to act on that desire. Thrwarted belongingness arises from a sense of loneliness and diminished mutually caring relationships, while perceived burdensomeness refers to self-hatred and a perception that one is a burden on others. When both are high, suicidal ideation occurs. Acquired capability may act either as a moderator in the motivational volitional phase of the pathway toward suicide transforming suicidal desire into behavior (O’Connor, 2011), or by directly increasing suicidality (e.g., Bryan et al., 2012), or both
Two key facets of acquired capability are heightened pain tolerance and fearlessness of death by suicide, both of which can develop through direct means such as self-harm and mental rehearsal, or indirectly via traumatic experiences such as exposure to violence (Joiner, 2005). Thus, capability represents a product (fearlessness of suicide and pain tolerance) and a process (capability acquired directly or indirectly).

Items from the original 20-item Acquired Capability for Suicide Scale (ACSS; Bender, Gordon, Bresin & Joiner, 2011; Van Orden et al., 2008) refer to both product and process. However, process items only relate to indirect, passive ways of acquiring capability (e.g., “When I see a fight, I stop to watch;” and “I like watching the aggressive contact in sports games”), while direct, active pathways to acquired capability, such as mental rehearsal and planning to engage in suicidal behavior, are not accounted for. Consistent with the notion that capability for suicide is acquired, greater time spent visualizing suicide-related images is associated with prior suicide attempts (Crane et al., 2012). Suicide attempts often involve extensive mental planning (Anestis, Pennings & Williams, 2014). Greater planning is associated with more severe medical damage (Mann et al., 1996) and increased likelihood of death by suicide (Joiner et al., 2003). Thus, consideration of preparation and planning is paramount to suicide risk assessment (e.g., Joiner, Walker, Rudd, & Jobes, 1999).

Inclusion of a preparation facet would also mean that a direct association between acquired capability and risk would be anticipated. Fearlessness of death and pain tolerance can be acquired passively (Joiner, 2005) and are not necessarily associated with risk (e.g., Bryan et al., 2013). However, mental rehearsal for suicide may further strengthen ideation and intention.

In addition to capturing solely indirect means, the factor structure of the original ACSS has been inconsistent with the key theoretical facets of acquired capability. For
example, pain tolerance items load onto different factors, and fearlessness items cross-load with pain tolerance items (Smith et al., 2013). In a review of publications using the ACSS, Ribeiro et al. (2014) concluded that the theoretically proposed multi-facet factor structure of acquired capability has not yet been determined empirically. They also noted that most studies use a subset of five to eight items of the original ACSS, with those shorter scales having poor internal consistency.

In response to the conceptual and psychometric concerns, Ribeiro et al. (2014) revised the ACSS; retaining only items assessing fearlessness about death. This one-factor model yielded good internal consistency estimates. However, the authors noted that there remains a need to better capture the other facets identified by the interpersonal theory, such as pain tolerance, and fearlessness of death by suicide specifically (Ribeiro et al., 2014). Although a German measure of acquired capability captures fearlessness and pain tolerance (Wachtel et al., 2014), this scale does not assess direct means and incorporates a stand-alone item about perceived capability that does not load onto either factor. A third facet involving direct means of acquiring capability (e.g., mental rehearsal), is also a core aspect of acquired capability (Van Orden et al., 2010), and should be incorporated in a multi-faceted measure. While other measures of acquired capability have been used (Christensen, Batterham, Soubelet, & Mackinnon, 2013; Cramer et al., 2012; Ireland & York, 2012; Joiner et al., 2009; Nademin et al., 2008; Smith et al., 2012), these do not adequately capture all facets of capability as conceptualized by the interpersonal theory.

The first aim of the current studies was to develop a multi-facet measure – the Acquired Capability with Rehearsal for Suicide Scale (ACWRSS). Items were generated to reflect pain tolerance, fearlessness of death, and preparations for suicide. As suggested by Ribeiro et al. (2014), fearlessness items reflected fearlessness of death by suicide. We
used confirmatory factor analysis to test the three-facet measurement model. The second aim was to test measurement invariance across gender because men and women differ in pain tolerance (Fillingim, King, Ribeiro-Dasilva, Rahim-Williams, & Riley, 2009) and fear of suicide (McLaren, 2011). Finally, we tested the validity of interpretations of the ACWRSS in several ways.

First, we examined the relationship of the ACWRSS facets with indices of suicide risk and resilience. ACWRSS facets should correlate positively with self-harm and prior attempts. In contrast, facets should also correlate negatively with life-oriented resilience factors such as meaning in life (e.g., Kleiman & Beaver, 2013).

Second, using a prospective design, we tested the predictions of the interpersonal theory regarding the role of acquired capability in transforming suicidal desire into greater intention and readiness for suicide. As shown in Figure 1, acquired capability influences the pathway from suicidal desire to intent to heightened readiness for suicide. Readiness for suicide was selected as we anticipated that this would be associated with prior attempts, and closely but differentially related to acquired capability facets, thus allowing for the testing of differential predictions. While the interpersonal theory initially conceptualizes acquired capability as a moderator and does not predict main effects (Joiner, 2005), direct associations of acquired capability with recent suicide attempt status have been observed (e.g., Kene & Hovey, 2014). Hence, we hypothesized that all facets of baseline acquired capability would positively predict readiness for suicide at follow-up. In addition, two of the separate acquired capability facets would influence readiness indirectly via key risk variables in the pathway. First, lowered fear of death is implicated in the transformation of active suicidal desire into suicidal intent (Van Orden et al., 2010, Ribeiro et al., 2014). Thus, baseline fearlessness would positively predict suicidal intent at follow-up. Second, although the interpersonal theory does not predict an association
between acquired capability and suicidal desire, it indicates that the confluence of perceived burdensomeness and thwarted belongingness is the proximal cause of active suicidal ideation (Van Orden et al., 2010), and planning and mental rehearsal for suicide may amplify this active suicidal desire (e.g., Crane et al., 2012). Therefore, we tested whether baseline preparation for suicide predicts readiness indirectly via a positive association with suicidal ideation at follow-up.

![Hypothized structural model adapted from Van Orden et al. (2010).](image)

*Figure 1.* Hypothesized structural model adapted from Van Orden et al. (2010).

Further, the relationships between non-suicidal self-injury, acquired capability, and readiness for suicide were examined. Non-suicidal self-injury is distinguished from suicidal behavior by an absence of any intent to die (Nock, 2010), but both behaviors frequently co-occur (Hamza, Stewart, & Willoughby, 2012), and non-suicidal self-injury is also associated with a decreased fear of making a suicide attempt (Muehlenkamp & Gutierrez, 2007). According to the interpersonal theory, non-suicidal self-injury represents a relatively direct and salient pathway for developing the capability for suicide.
through habituation to pain and a reduction of fear of serious self-injury (Van Orden et al., 2010). Hamza et al. (2012) thus hypothesized that acquired capability would at least partially mediate the relationship between non-suicidal self-injury and suicidal behavior. We hypothesized that baseline frequency of non-suicidal self-injury would prospectively predict all facets of acquired capability at follow-up, and that acquired capability would mediate the relationship between non-suicidal self-injury and suicide readiness.

As the abovementioned tests were conducted using three non-clinical student samples, we tested generalization to a clinical population. According to the interpersonal theory, “the same mental processes underlie all forms of suicidal behavior” (Van Orden et al., p. 591) and should hence apply to both non-clinical and clinical groups. We hypothesized that the preparation for suicide facet of acquired capability would decrease over the course of treatment targeting mental health and suicide risk, while fearlessness of death and pain tolerance would remain stable.

Test of the Measurement Model

Method

Participants and procedures. Undergraduate students ($n = 637$) completed anonymous lab-based computer scored questionnaires in individual cubicles during class, and 617 (97%) elected also to participate in the research. Computer scoring with a forced choice option was used so that all participants responded to all items, thus eliminating missing data (e.g., Johnson, 2005). There were 455 females (73.7%) and 162 males (26.3%) aged 17 to 57 ($M = 20.99$, $SD = 4.93$). Participants self-identified as Caucasian Australian (67.1%), Asian (17.4%), European (6.8%), African (1.8%), Aboriginal Australian (0.4%), and Other ethnicities (6.4%). Participants were debriefed and provided with a list of mental health resources. All studies were approved by the institution’s Human Research Ethics Office.
Measures.

**Acquired capability.** For the new Acquired Capability with Rehearsal for Suicide Scale (ACWRSS), items were constructed to capture fearlessness of death, pain tolerance, or preparation for suicide. Some fearlessness and pain tolerance items were adapted from an existing measure (Van Orden et al., 2008) and general fearlessness items were reworded to specifically reflect fear of suicide. New items were devised to capture direct means of acquiring capability via mental rehearsal and active planning.

Based on preliminary analyses, we identified a brief set of seven items that could capture the three hypothesized facets of acquired capability. The ACWRSS included two items about pain tolerance (e.g., ‘‘I can tolerate much more pain than I used to’’), two items about fearlessness (e.g., ‘‘Even if I wanted to, killing myself is too scary to follow through with it’’), and three items about preparation (e.g., ‘‘I have considered whether some ways to kill myself would be easier than others’’). As there is no established standard for the number of scale points to include, but more points can increase the scores’ reliability and sensitivity to change with reduced returns after 11-points (Nunnally & Bernstein, 1994), a 9-point scale was selected. Participants rated agreement with each statement ‘‘at this time in your life’’ on a scale from 0 (‘Not at all’) to 8 (‘Very strongly’). Higher scores indicate higher acquired capability for suicide. Internal consistency in this sample was good (α = .91).

**Suicide and self-harm risk.** Four items were adapted from the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007). Frequency of suicidal and self-harm ideation were assessed with two items (‘‘How many times in the past year have you thought about suicide?’’ and, ‘‘How many times in the

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4 See Appendix 2 for further detail.
past year have you thought about hurting yourself without wanting to die?’’) measured on a 6-point scale (‘never’ to ‘almost every day’). Lifetime history of suicide and self-harm attempts were also measured with single items (“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?” and, “How many times in your lifetime have you purposely attempted to hurt yourself without wanting to die?’’) on a 5-point scale (‘never’ to ‘five or more times’). The SITBI is suitable for administration in self-report format (Latimer, Meade, & Tennant, 2013), applicable to non-clinical samples, and scores have good inter-rater reliability, test-retest reliability, and good agreement with other measures of suicide risk (Nock et al., 2007).

**General psychological distress.** The 10-item Kessler Psychological Distress Scale (K10; Kessler et al., 2003) measures emotional states occurring in the past four weeks using a scale from ‘none of the time’ (1) to ‘all of the time’ (5). High scores indicate heightened psychological distress and probability of mental health diagnoses (Andrews & Slade, 2001). Commonly used 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).

**Interpersonal Needs Questionnaire (INQ; Van Orden et al., 2008).** The 15-item INQ assesses thwarted belongingness (six items) and perceived burdensomeness (nine items) on a scale from 1-7. The INQ has a robust factor structure, good internal consistency across various samples, and is significantly associated with other markers of burdensomeness and belongingness (Van Orden, Cukrowicz, Witte, & Joiner, 2012; Van Orden et al., 2008). Total scale scores ranged from 15 to 92, and internal consistency for the current sample was excellent (PB subscale α = .92; TB subscale α = .90; Total INQ α = .93).
**Intention and readiness for suicide.** Intent and readiness for suicide were each assessed with a single item (‘I have no intention of killing myself in the near future’’ and ‘If I wanted to kill myself, I feel ready to do so’”) on a scale from 0 (not at all) 8(very strongly). The intention item is reverse-scored. Intent and readiness were significantly correlated (all ps < .01) with prior suicide attempts (r = .33 and r = .33, respectively) and general psychological distress (r = .35 and r = .33, respectively).

**Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi & Kaler, 2006).** The 10-item MLQ has two subscales measuring presence and search for meaning in life. Only the 5-item ‘presence’ of meaning subscale was used, with participants rating each item on a 7-point scale. Higher scores indicate heightened presence of meaning in life. Evidence attests to the MLQ’s factor structure, internal consistency, and construct validity of interpretations with other related measures (Steger et al., 2006). Internal consistency for the subscale scores in the current study was good (α = .90).

**Results**

**Sample characteristics.** To screen for careless and invalid responding, three post-hoc calculations were computed (time spent on the questionnaire battery, the maximum number of consecutive identical responses for each response option, and within-person variances per scale; cf. Huang, Curran, Keeney, Poposki, & DeShon, 2012; Johnson, 2005; Meade & Craig, 2012). There was no evidence that participants rushed questionnaire completion, however six participants showed inconsistent responding and were removed (final n = 611).

Participants’ general psychological distress was just at the low end of the ‘high distress’ range (M = 21.71, SD = 7.29). Nearly half of the sample (49.1%) endorsed experiencing some suicidal ideation in the past year, with 13.5% thinking about suicide at
least once a month. Moreover, 13.4% (95% CI: 10.7% - 16.1%) of participants reported at least one lifetime suicide attempt, with 4.4% reporting multiple prior attempts.

**Confirmation of the three-factor measurement model.** Confirmatory factor analysis (CFA) was conducted using AMOS 21.0 to test the fit of the measurement model. To assess the model fit, the RMSEA, CFI, and TLI were considered. RMSEA values below 0.08 are adequate, while values below 0.05 indicate a good fit (Brown, 2006; Byrne, 2010). CFI and TLI values between .90 and .95 are acceptable (Bentler, 1990), while values above .95 are considered good (Byrne, 2010). The model was a good fit to the data: $\chi^2 (11) = 17.24, p = .10$; RMSEA = .030 (90% CI = .000, .057); CFI = .997; TLI = .994 (see Figure 2), and was significantly better than a one-factor model: $\chi^2 (14) = 366.94, p < .001$; RMSEA = .203 (90% CI = .186, .222); CFI = .82; TLI = .73 ($\chi^2_{\text{diff}} (3) = 349.70, p < .01$). Cronbach’s alpha was good ($\alpha = .83$).

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5 As the three-factor, seven-item measure may be limited by its brevity (Tabachnick & Fidell, 2013), the robustness of this solution was again tested using a CFA with an independent student sample ($n = 630$) comprising 175 males, 390 females and 65 participants who did not disclose their gender ($M_{\text{age}} = 25.29$, $SD = 10.12$). This yielded excellent fit, $\chi^2 (11) = 14.32, p = .22$; RMSEA = .022 (90% CI = .000, .099); CFI = .998; TLI = .996.
Figure 2. Confirmatory factor analysis of the three-factor model ($n = 611$).

In sum, confirmatory factor analysis indicated that acquired capability, as measured by the ACWRSS, may be separated into pain tolerance, fearlessness of death, and preparations for suicide. All observed variables were good indicators of their respective latent constructs and the total scale scores had good internal consistency. We next tested measurement invariance across gender, and also examined concurrent validity of interpretations.

**Measurement Invariance and Convergent Validity**

**Results**

**Measurement invariance.** ACWRSS internal consistency reliability score estimates were good for males ($\alpha = .75$) and females ($\alpha = .84$). The ACWRSS measurement model displayed excellent fit for females: $\chi^2 (11) = 17.15$, $p = .10$, RMSEA = .035 (90% CI = .000, .066), CFI = .996, TLI = .99, and moderately good fit for males: $\chi^2 (11) = 22.11$, $p = .02$; RMSEA = .080 (90% CI = .028, .128), CFI = .98, TLI = .95.
Configural invariance was then tested to ascertain whether both males and females shared a similar basic latent factor structure, whether item loadings were significant for both groups, and whether correlations between the three factors suggested any possible difficulties with collinearity (Steenkamp & Baumgartner, 1998). The configural model indicated good fit, $\chi^2 (22) = 39.26, p = .013$, RMSEA = .036 (90% CI = .016, .054), corrected RMSEA = .051 (Steiger, 1998), CFI = .991, TLI = .983. All items loaded significantly onto their factors and correlations between factors were significant across genders. Correlations between pain tolerance and fear, between pain tolerance and preparation, and between preparation and fear were .37, .32, and .29 for males, and .37, .54, and .66 for females, respectively.

Metric invariance was tested to determine whether the strength of associations between the factor loadings and latent factors was comparable across genders (Steenkamp & Baumgartner, 1998). The metric model did not display a significant decrease in fit, $\chi^2 (26) = 41.07, p = .031$; RMSEA = .031 (90% CI = .010, .048); corrected RMSEA = .044 (Steiger, 1998); CFI = .992; TLI = .987, when compared to the configural model ($\Delta$RMSEA = .007, $\Delta$CFI = -.001), indicating metric invariance (Chen, 2007). Given the lack of complexity of the metric model, the chi-square difference test was also considered, which was non-significant, $\chi^2_{diff} (4) = 1.81$, further attesting to metric invariance. Hence, items had comparable factor loadings across genders and responses may be meaningfully compared.

Scalar invariance was next assessed to ascertain whether factor scores across groups have both the same unit of measurement (factor loadings) and the same item

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6 The RMSEA generated by AMOS in multiple group analyses requires a correction, so we multiplied the RMSEA by the square root of the number of groups (cf. Steiger, 1998).
origin (item intercepts) (Chen, 2007). A multi-group analysis was conducted with both factor loadings and intercepts constrained as equal across males and females, while leaving factor means for males and females to be freely estimated. The initial scalar model did not evidence a decrement in fit, \( \chi^2 (30) = 51.26, p = .009; \) RMSEA = .034 (90% CI = .017, .050); corrected RMSEA = .048 (Steiger, 1998); CFI = .989; TLI = .985, when compared to the metric model (\( \Delta \)RMSEA = -.004, \( \Delta \)CFI = .003), suggesting scalar invariance.

To determine whether the variances of the ACWRSS facets were equivalent across genders, the latent variances were constrained to equal in the above model. This model (\( \chi^2 (33) = 55.63, p = .008; \) RMSEA = .034 (90% CI = .017, .048); corrected RMSEA = .048 (Steiger, 1998); CFI = .988; TLI = .985) did not evidence a decrement in fit compared to the scalar model (\( \Delta \)RMSEA = .000, \( \Delta \)CFI = .001). This suggests equivalence of latent variances.

**Gender differences in latent and observed scores.** Given the evidence for scalar invariance, equivalence of latent means was tested. Males demonstrated significantly higher latent mean scores than females on the preparation (.362, \( SE = .181, p = .045 \)), fearlessness of death (.639, \( SE = .159, p < .001 \)) and pain tolerance (.917, \( SE = .201, p < .001 \)) facets. Males also had significantly higher observed scores than females on the ACWRSS total (\( M = 3.25, SD = 1.59 \) vs. \( M = 2.52, SD = 1.83 \)), \( F(1, 615) = 20.09, p < .001, \) \( \eta^2 = .032, \) and subscales: preparation (\( M = 3.21, SD = 2.39 \) vs. \( M = 2.64, SD = 2.44 \)), \( F(1, 615) = 6.55, p < .05, \) \( \eta^2 = .011, \) fearlessness of death (\( M = 2.92, SD = 2.26 \) vs. \( M = 2.08, SD = 2.10 \)), \( F(1, 615) = 19.75, p < .001, \) \( \eta^2 = .031, \) and pain tolerance (\( M = 3.64, SD = 1.92 \) vs. \( M = 2.80, SD = 2.20 \)), \( F(1, 615) = 17.35, p < .001, \) \( \eta^2 = .027 \) (all \( ps < .001 \)).
**Convergent validity.** Inter-correlations between all study variables are presented in Table 1. Significant positive relationships (all $p < .01$) of moderate to large magnitude were observed between ACWRSS scores and thwarted belongingness, perceived burdensomeness, suicide ideation, intent, and readiness, as well as prior suicide attempts and non-suicidal self-injury thoughts and behaviors. In contrast, ACWRSS scores were moderately negatively correlated (all $p < .01$) with presence of meaning in life. Large correlations were observed between the preparation facet and thwarted belongingness, perceived burdensomeness, and suicide ideation.
Table 1

*Means, Standard Deviations, and Intercorrelations between Variables (n = 611)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
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<th>8.</th>
<th>9.</th>
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<th>11.</th>
<th>12.</th>
<th>13.</th>
<th>M</th>
<th>SD</th>
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<td>1. AC</td>
<td>-</td>
<td>.88</td>
<td>.72</td>
<td>.70</td>
<td>.51</td>
<td>.49</td>
<td>.61</td>
<td>.33</td>
<td>.60</td>
<td>.43</td>
<td>.44</td>
<td>.48</td>
<td>-.39</td>
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<td>.42</td>
<td>.53</td>
<td>.50</td>
<td>.64</td>
<td>.31</td>
<td>.52</td>
<td>.42</td>
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<tr>
<td>3. AC-Fear</td>
<td>-</td>
<td>.31</td>
<td>.33</td>
<td>.31</td>
<td>.41</td>
<td>.31</td>
<td>.50</td>
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<td>.28</td>
<td>.28</td>
<td>-.25</td>
<td>2.30</td>
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<td>4. AC-Pain</td>
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<td>.27</td>
<td>.30</td>
<td>.28</td>
<td>.13</td>
<td>.37</td>
<td>.24</td>
<td>.24</td>
<td>.31</td>
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<td>5. TB</td>
<td>-</td>
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<td>.43</td>
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<td>6. PB</td>
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<td>.31</td>
<td>.31</td>
<td>.47</td>
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<td>7. Ideation</td>
<td>-</td>
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<td>.36</td>
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<td>8. Intent</td>
<td>-</td>
<td>.30</td>
<td>.33</td>
<td>.24</td>
<td>.31</td>
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<td>9. Readiness</td>
<td>-</td>
<td>.34</td>
<td>.38</td>
<td>.43</td>
<td>-.32</td>
<td>0.94</td>
<td>1.71</td>
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<td>10. Attempts</td>
<td>-</td>
<td>.38</td>
<td>.28</td>
<td>-.22</td>
<td>1.20</td>
<td>0.59</td>
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<tr>
<td>11. NSSI Attempts</td>
<td>-</td>
<td>.60</td>
<td>-.26</td>
<td>1.95</td>
<td>1.44</td>
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<td>12. NSSI Thoughts</td>
<td>-</td>
<td>-.30</td>
<td>1.54</td>
<td>0.95</td>
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<tr>
<td>13. MLQ-P</td>
<td>-</td>
<td>4.61</td>
<td>1.42</td>
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*Note: AC-Prep. = Preparation for suicide subscale; AC-Fear = Fearlessness subscale; AC-Pain = Pain tolerance subscale; TB = Thwarted belongingness; PB = Perceived burdensomeness; MLQ-P = Presence of meaning in life; NSSI = Non-suicidal self-injury.*

*All correlations are significant at p < .01*
In sum, the ACWRSS demonstrates configural, metric, scalar and latent variance invariance across gender, suggesting that scores may be meaningfully compared. ACWRSS scores are also significantly correlated with multiple indices of suicide risk, and inversely correlated with a documented marker of resilience.

**Direct and Indirect Effects of Acquired Capability on the Pathway to Suicide Readiness: A Prospective Analysis**

**Method**

**Participants and procedures.** University students \((n = 237; 68 \text{ males})\) aged 17 to 74 years \((M = 25.86, SD = 10.36)\) filled out an anonymous online survey at the start of semester and again at 8-week follow-up\(^7\). The study was advertised as a survey about engaging with life. The majority were undergraduate students (65.8%). Self-reported ethnicity included Australian (60.3%), Oceanian (1.7%), European (14.8%), Asian (13.5%) and Other (9.7%) ethnicities. Computer scoring with a forced choice option was again used to ensure that no items were missed (e.g., Johnson, 2005). Participants were provided with information about community and campus support services at the start and end of the survey, and could access a link to this information from any page of the survey.

**Measures.** Measures were the same as in the first studies and administered at both time points. Only the SITBI items (suicide and non-suicidal self-injurious ideation and attempts) were modified in the follow-up questionnaire to reflect incidents occurring...

\(^7\) The dataset \((n = 246)\) was screened for duplicate entries as recommended by Johnson (2005) and nine protocols were removed.

\(^8\) Findings from the online survey were compared to the controlled student sample \((n = 611)\). Descriptive statistics at baseline and follow-up for the preparation \((M = 2.96, SD = 2.08 \text{ and } M = 2.90, SD = 2.42)\), fearlessness \((M = 2.98, SD = 2.23 \text{ and } M = 2.61, SD = 2.08)\), and pain tolerance \((M = 3.42, SD = 2.23 \text{ and } M = 3.12, SD = 2.24)\) subscales were similar to those from Study 1 (Table 2). The structural model (Figure 3) was also tested using the cross-sectional dataset, yielding a good fit, \(\chi^2 (265) = 1012.33, p < .001; \text{ RMSEA } = .068 \text{ (90\% CI } = .064, .072); \text{ CFI } = .92; \text{ TLI } = .91, \) and similar path coefficients (all paths were significant except for the association between thwarted belongingness and suicide ideation). This suggests that responses were similar irrespective of whether questionnaires were administered in a controlled or uncontrolled (online) format.
only in the past four weeks. Baseline intent and readiness for suicide were again positively correlated ($p_s < .01$) with general psychological distress ($r = .38$ and $r = .31$) and history of prior suicide attempts ($r = .31$ and $r = .28$). Test-retest reliability was also significant ($p_s < .01$) for both intent ($r = .64$) and readiness for suicide ($r = .59$).

**Results**

**Sample characteristics.** Using the same strategies as in Study 1, three participants were identified as inconsistent responders and were removed. Participants’ general psychological distress fell between the ‘moderate’ and ‘high distress’ bands at both Time 1 ($M = 21.43, SD = 8.07$) and Time 2 ($M = 21.37, SD = 7.88$). At Time 1, over half of the sample (51.1%) reported having thought about suicide at least once in the past year, with 21.8% thinking about suicide at least once per month. Moreover, 14.1% (95% CI: 9.6% - 18.6%) reported at least one lifetime suicide attempt, with 4.4% reporting multiple prior attempts. One participant reported having made a suicide attempt between baseline and follow-up.

**Reliability of ACWRSS scores.** Test-retest reliability was high for males and females for total scale scores ($r = .85$ and $r = .85$), and for all subscale scores: preparation ($r = .85$ and $r = .84$), fearlessness of death ($r = .79$ and $r = .64$), and pain tolerance ($r = .79$ and $r = .75$). Internal consistency estimates were similar for males and females at baseline ($\alpha = .74$ and $\alpha = .78$) and follow-up ($\alpha = .81$ and $\alpha = .81$).

**Acquired capability predicting suicide readiness.** The hypothesized role of the acquired capability facets as key elements in the pathway from suicidal desire to heightened readiness for suicide was tested using structural equation modelling. The model had satisfactory fit: $\chi^2 (265) = 618.06, p < .001$; RMSEA = .076 (90% CI = .068,
Consistent with the interpersonal theory, baseline perceived burdensomeness and thwarted belongingness significantly predicted suicide ideation at follow-up. Only fearlessness of death significantly directly predicted readiness to die by suicide at follow-up. Fearlessness also had an indirect effect on readiness through its positive association with suicide intent at follow-up. In contrast, the preparation facet did not have a direct effect on readiness as hypothesized, but as predicted had a strong indirect effect through its positive association with suicide ideation at follow-up.

*Figure 3.* The main pillars of the interpersonal theory prospectively predict suicide readiness (n = 234).

*Note.* T1 = Time 1 (baseline); T2 = Time 2 (follow-up)

\(^{9}\) Modification indices suggested shared error variance between items 7 and 13 on the INQ, consistent with findings from the scale’s authors (Van Orden et al., 2012). When the error terms of these items were permitted to covary, all fit indices fell into acceptable ranges; \(\chi^2 (264) = 600.317, p < .01\); RMSEA = .073 (90% CI = .066, .081); CFI = .91; TLI = .90.

\(^{9}\) Modification indices suggested shared error variance between items 7 and 13 on the INQ, consistent with findings from the scale’s authors (Van Orden et al., 2012). When the error terms of these items were permitted to covary, all fit indices fell into acceptable ranges; \(\chi^2 (264) = 600.317, p < .01\); RMSEA = .073 (90% CI = .066, .081); CFI = .91; TLI = .90.
Two hierarchical regression analyses verified that the ACWRSS was not serving as a proxy for prior suicide ideation and attempts. Fearlessness of death at baseline positively predicted suicide intent at follow-up after controlling for baseline suicide ideation, prior suicide attempts, thwarted belongingness, and perceived burdensomeness ($\beta = .14, p = .03$). Fearlessness of death and pain tolerance at baseline both positively predicted suicide readiness at follow-up after controlling for suicide ideation, prior suicide attempts, thwarted belongingness, and perceived burdensomeness ($\beta = .41, p < .001$, and $\beta = .15, p = .010$, respectively).

**Acquired capability mediating the relationship between non-suicidal self-injury and suicide readiness.** To test the hypothesis that non-suicidal self-injury increases suicide readiness via its positive relationship with acquired capability (Hamza et al., 2012), a mediated path model was specified and the two items about non-suicidal self-injurious thoughts and behaviors were specified to load on a latent non-suicidal self-injury factor. To optimally estimate indirect effects while controlling Type-1 error, 5000 bias-corrected bootstrapping samples were used (Jose, 2013). This model (Figure 4) had a good fit: $\chi^2 (26) = 53.70, p = .001$; RMSEA = .068 (90% CI = .042, .093); CFI = .98; TLI = .96. Baseline non-suicidal self-injury had no direct effect on readiness for suicide at follow-up (direct effect = .027, 95% CI: -.206, .296, $p = .801$), but significantly predicted both the preparation and fearlessness of death facets of acquired capability at follow-up, which in turn were significantly associated with readiness. Inconsistent with the interpersonal theory, pain tolerance was not predicted by non-suicidal self-injury, nor was it associated with suicide readiness. The combined indirect effect of non-suicidal self-injury on readiness via acquired capability was significant (total effect = .279, 95% CI: .129, .447, $p < .001$). To calculate the specific indirect effects of each acquired capability facet, three independent phantom models comprised solely of latent variables were
constructed to replicate each specific effect, and equality constraints were placed on each phantom path coefficient to correspond with their respective coefficients in the main model (Macho & Ledermann, 2011). The effects of preparation (unstandardized indirect effect = .222, 95% CI: .024, .463, \(p = .030\)) and fearlessness (unstandardized indirect effect = .354, 95% CI: .141, .796, \(p < .001\)) were both significant, while the effect of pain tolerance (unstandardized indirect effect = -.003, 95% CI: -.070, .035, \(p = .64\)) was not significant.

![Diagram](image.png)

**Figure 4.** Acquired capability (AC) mediates the relationship between non-suicidal self-injury (NSSI) and suicide readiness (n = 234)

**Note.** T1 = Time 1 (baseline); T2 = Time 2 (follow-up)

\* \(p < .05\), \**p < .01\), \***p < .001

In sum, in this first prospective study of acquired capability and readiness for suicide, the acquired capability facets predicted different steps in the pathway toward suicide readiness. Preparation for suicide and fearlessness of death also fully mediated
the relationship between non-suicidal self-injury and suicide readiness. As the generalizability of the results is limited to university students, we next tested the associations between ACWRSS scores and prior suicide attempts and thoughts and episodes of non-suicidal self-injury in a clinical sample.

Testing the ACWRSS’ Sensitivity to Change During Inpatient Treatment

Method

Participants and procedures. One hundred and eight inpatients (83 females) completed questionnaires upon admission and discharge from a private psychiatric hospital specializing in acute care. Participants ranged in age from 18 to 73 years (\(M = 42.28; SD = 14.82\)). Nearly half (47.2%) were single, while 38.9% were married, and 13.0% were widowed, divorced or separated. All were diagnosed by a treating psychiatrist using ICD-10 criteria (NCCH, 2010). Primary diagnoses included affective (43.5%), neurotic, stress-related and somatoform (21.3%), substance use (14.8%), psychotic (6.5%), adult personality (6.5%) and other (7.4%) disorders. Length of stay ranged from one to 42 days, with an average length of stay of 13.49 days (\(SD = 8.47\)).

Measures. Six items from the ACWRSS were used to measure capability, as one item was not included due to administrative error. As such, each subscale contained two items and the preparation subscale contained its two strongest loading items from the CFA. Internal consistency reliability for scores on the 6-item scale was good (\(\alpha = .88\)). The SITBI was used to measure suicide ideation, prior suicide attempts, and thoughts and prior episodes of non-suicidal self-injury.

Results

Thirteen percent of the sample did not respond to items about prior ideation and attempts. Of those who did respond, the majority (81.9%) reported experiencing suicidal thoughts at least once in the past year, with over half (52.1%) thinking of suicide at least
monthly, 37.2% thinking about suicide at least weekly, and 10.6% endorsing daily suicidal thoughts. Over half (56.4%) of respondents reported having made at least one prior suicide attempt, with 30.3% reporting multiple prior attempts.

At time of admission, all facets of acquired capability were significantly correlated (all \( ps < .01 \)) with frequency of prior suicide attempts (preparation: \( r_s = .39 \); fearlessness: \( r_s = .58 \); pain tolerance: \( r_s = .33 \)) as well as with frequency of thoughts of self-injury (preparation: \( r_s = .40 \); fearlessness: \( r_s = .24 \); pain tolerance: \( r_s = .29 \)), and with frequency of prior episodes of non-suicidal self-injury (preparation: \( r_s = .30 \); fearlessness: \( r_s = .28 \); pain tolerance: \( r_s = .32 \)).

Eighty participants filled out all measures at both admission and discharge. Mean scores on the preparation for suicide facet of acquired capability decreased significantly over the course of treatment (\( M_{(\text{Admission})} = 8.25, SD = 5.29 \) vs. \( M_{(\text{Discharge})} = 4.98, SD = 4.99 \), \( F(1, 79) = 32.59, p < .001, \eta^2_p = .29 \)), as did scores on fearlessness of death by suicide facet (\( M_{(\text{Admission})} = 7.96, SD = 4.79 \) vs. \( M_{(\text{Discharge})} = 5.53, SD = 4.97 \), \( F(1, 79) = 23.13, p < .001, \eta^2_p = .23 \)). There was no significant change in pain tolerance (\( M_{(\text{Admission})} = 6.16, SD = 4.61 \) vs. \( M_{(\text{Discharge})} = 5.98, SD = 4.48 \), \( F(1, 79) = 1.11, p = .74, \eta^2_p = .001 \).

**Discussion**

Before examining theoretical predictions about the role of acquired capability in the path from desire to suicide readiness, we tested the psychometric properties of the new instrument. The measurement model was tested using confirmatory factor analysis with two independent samples\(^1\), yielding excellent fit on both occasions. Internal consistency of the final, brief 7-item scale was good. This improves on reliability estimates of existing brief multi-facet measures (e.g., Anestis & Joiner, 2011; Smith et al., 2012; Van Orden et al., 2008), and is comparable to a recently proposed 7-item scale.
(Ribeiro et al., 2014) which measures only one of the acquired capability facets. ACWRSS scores also had good test-retest reliability over a period of eight weeks.

Configural, metric, scalar and latent variance invariance across gender was demonstrated (Chen, 2007). Consistent with prior research (e.g., Anestis, Bender, Selby, Ribeiro, & Joiner, 2011), males had higher ACWRSS scores than females. Attesting to the convergent validity of interpretations of the ACWRSS, acquired capability scores were positively correlated with thwarted belongingness, perceived burdensomeness, suicide ideation, intent, and readiness, as well as prior suicide attempts and non-suicidal self-injury thoughts and behaviors, and were negatively correlated with presence of meaning in life. The latter is consistent with the interpersonal theory’s proposition that acquired capability undermines evolutionarily ingrained self-preservation instincts (Ribeiro, Bodell, Hames, Hagan, & Joiner, 2013).

A rigorous test of prospective validity of interpretations based on the ACWRSS was conducted using a structural model derived from the interpersonal theory. The model indicated that the acquired capability facets each play a specific role in facilitating the transformation of desire into suicide readiness. Fearlessness had a direct effect on future readiness for suicide, and both fearlessness and preparation for suicide had indirect effects on future readiness. The preparation facet significantly predicted suicidal ideation, suggesting that mental rehearsal for suicide may act to further amplify ideation and inject it with an active, volitional quality to put a modus operandi on the process of intention formation. This is consistent with the Integrated Motivational-Volitional Model of Suicidal Behavior (O’Connor, 2011), where capability and planning move an individual from the phase of ideation/intention formation toward the volitional phase of behavioral enactment.
Also consistent with the Integrated Motivational-Volitional model and the predictions of the interpersonal theory (Ribeiro et al., 2014; Van Orden et al., 2010), fearlessness of death in addition to its strong direct effect on suicide readiness also had a more tenuous effect on suicidal intent with this effect falling outside the conventional criteria for significance ($p = .066$). These relationships remained significant even after the influence of the interpersonal factors and prior ideation and attempts is accounted for. Thus, the fearlessness facet of acquired capability appears to increase readiness for suicide directly and indirectly by facilitating intention to act. While pain tolerance prospectively predicted suicide readiness in a hierarchical regression after controlling for the interpersonal factors and prior ideation and attempts, pain tolerance did not predict future readiness in the structural model. Since pain tolerance features more prominently in predicting lethality of a suicide attempt (Van Orden et al., 2010), it is possible that pain tolerance might emerge in future research examining its association with suicide-related behaviors of varying lethality.

Our findings of direct effects between acquired capability and suicide ideation, intention, and readiness are consistent with other recent reports (e.g., Kene & Hovey, 2014), and suggest that the influence of acquired capability may be particularly potent, increasing suicide ideation, intention, and readiness via direct and indirect means. The present findings also provide strong evidence that two of the acquired capability facets also mediate the previously well-established link between non-suicidal self-injury and suicide readiness. Frequency of non-suicidal self-injury, while not significantly directly related to readiness for suicide at follow-up, indirectly predicted readiness via its relationship with acquired capability.

Contrary to theoretical prediction, pain tolerance did not significantly predict readiness for suicide and unlike the other two acquired capability facets did not mediate
the link between non-suicidal self-injury and readiness. While inconsistent with the interpersonal theory, there is evidence that frequency of non-suicidal self-injury (Nock et al., 2006) and deliberate self-harm (Gordon et al., 2010) are associated with greater perceived pain (Nock et al., 2006), suggesting that the relationship between non-suicidal self-injury and pain tolerance may be less straightforward. For example, the theory also posits that escalation from non-suicidal self-injury to suicidal behavior is contingent on the intensity of suicidal desire (Joiner, Ribeiro, & Silva, 2012). Hence, variability in the intensity of suicidal desire may account for inconsistencies in findings in the relationship between pain tolerance and non-suicidal self-injury and suicide readiness. Additionally, it is possible that the eight-week window between baseline and follow-up was not sufficiently long to detect changes in pain tolerance following non-suicidal self-injury.

Finally, results from the clinical study indicate that ACWRSS scores are also significantly associated with prior suicide attempts and non-suicidal self-injury in a psychiatric inpatient sample. Both preparation for suicide and fearlessness of death significantly decreased over the course of short-term treatment targeting mental health and suicide risk. Pain tolerance scores did not change significantly, suggesting that short-term treatment to reduce risk would do little to diminish pain tolerance. It is interesting however that fear of death did increase over the course of short-term therapy. Future research might examine the process by which this occurred. These findings indicate that the acquired capability facets are differentially malleable and are consistent both with the initial proposal that acquired capability is relatively static (Joiner, 2005) and with later speculation that it is dynamic (Smith & Cukrowicz, 2010).

The present findings should be interpreted in the context of several limitations. The ACWRSS was not compared to existing measures of acquired capability and hence its incremental validity is unknown. However, the ACWRSS is the first measure to
capture all facets of acquired capability while demonstrating a theoretically consistent factor structure and good internal consistency. The new preparation facet unique to the ACWRSS also prospectively predicted ideation and mediated the prospective relationship between non-suicidal self-injury and suicide readiness.

Generalizability of results is limited to the samples used. The student samples were restricted in age and consisted predominately of females of Caucasian and Asian ethnicities from a single university. The high levels of psychological distress in the students were within normative bands indicative of increased risk of experiencing a mental health problem compared to their non-tertiary counterparts (Cvetkovski, Reavley & Jorm, 2012; Stallman, 2010). The rates of lifetime suicide attempts were also high, however the lower boundaries of the confidence intervals for our two student samples (95% CI: 10.7% - 16.1%; and 95% CI: 9.6% - 18.6%, respectively) approximate the lifetime prevalence rates of suicide attempts (8.9% to 10.7%) reported for similar student samples in the US (e.g., Bauer, Chestin, & Jeglic, 2015; Center for Collegiate Mental Health, 2015; Hirsch & Barton, 2011). Although the rates for our two student samples are considerably lower than those reported by our clinical sample 56% (95% CI: 46.38% - 66.42%), they are of concern and indicate that university students are an important target for prevention.

While inclusion of the inpatient sample did demonstrate generalizability to a clinical group, this clinical sample also comprised a majority of females. It is frequently documented however that females are at the highest risk for suicide attempts, and recent Australian data also shows an increase in deaths by suicide among females attributable to the use of more lethal means (Australian Bureau of Statistics, 2015). While this shows that this demographic is also pertinent to the scrutiny of suicide risk, it is unclear whether findings will generalize to other male-dominated groups at heightened risk of suicide.
Two of the ACWRSS factors comprise less than three items, which represents a limitation (e.g., Velicer & Fava, 1998). However, previous empirical efforts in developing multi-item measures of acquired capability (e.g., Smith et al., 2012; Smith et al., 2013; Wachtel et al., 2014) did not converge on a replicable, psychometrically sound factor structure representing all the core theoretical facets underlying the acquired capability construct. Hence, we endeavored to develop a brief scale with fewer good items, rather than a longer measure with more - albeit less adequate - items, which do not yield a consistent factor structure. Although two-item factors may not be ideal, the final measurement model provided an excellent fit in two independent samples, and represents an advance over previous measures, where capturing all the theoretically proposed facets proved challenging.

Six items from the ACWRSS were used in the clinical study, which represents a limitation; however these scale scores demonstrated good internal consistency reliability and were sensitive to change. Risk was also assessed using single-item measures, which may limit comprehensiveness (Sloan et al., 2002). However, single-item measures of suicide-related constructs have also demonstrated good test-retest and inter-rater reliability, as well as adequate validity of interpretations with other measures of risk (Nock et al., 2007; Zimmerman et al., 2006).

The follow-up item about suicide attempts inquired about the past four weeks and thus was not sensitive to attempts that may have occurred in the first four weeks of the eight-week follow-up. Risk was also measured using self-report of intent and readiness for suicide, rather than behavior itself. However, these items were significantly positively associated with past suicide attempts in two independent samples, indicating that they are valid indices of suicide-related behaviors. Thus, the present research makes an important contribution in that it is the first demonstration of the prospective
association between acquired capability and suicide ideation, intention, and readiness. However, more extensive longitudinal studies are needed to examine the ability of the ACWRSS to predict future suicidal behavior and completed attempts. As the current research did not examine mortality, findings may not generalize to suicide deaths (cf. Neuringer, 1962).

The prospective study was administered online and is thus limited by administration in an uncontrolled environment (e.g., Noyes & Garlane, 2008). However, caution was taken to control for and use post hoc methods to detect invalid responding. Findings from the online study were similar to those from our study administered in a controlled setting, indicating that online data collection did not likely result in biased response patterns. Notwithstanding, it is a significant weakness that a formal measure of inconsistent responding was not included a priori in the batteries. The use of infrequency items is recommended as a simpler alternative to the more complex methods of detecting response inconsistency employed in the present research (Huang, Bowling, Liu, & Li, 2015) and might have served to flag additional careless responders.

While our findings are strengthened by prospective analyses, changes in capability scores observed during inpatient treatment may represent regression to the mean rather than sensitivity to treatment. However, only two of the three acquired capability facet scores changed over the course of treatment, with only the one not addressed during treatment (i.e. pain tolerance) remaining unchanged. Findings are also correlational in nature and causality cannot be inferred. Future studies using novel experimental manipulations of the core components of the interpersonal theory could shed additional light on these relationships. For example, drawing on the attention bias modification literature where implicit threat bias has been successfully modified (e.g., Bar-Haim,
In conclusion, the ACWRSS is the first measure of acquired capability that captures three key facets of this critical component of the interpersonal theory of suicide. While multi-faceted, the ACWRSS is nonetheless brief, which enhances its utility especially in clinical settings. The current findings add to advances in the assessment of acquired capability and pave the way for further investigations into the role of this hypothesized causal factor in transforming suicidal desire into lethal suicidal behavior.
Foreword to Chapter Seven

Confirming further key predictions of the interpersonal theory, Chapter Six demonstrates the pernicious effects of the acquired capability facets in facilitating the transformation of suicidal thinking into readiness for lethal suicidal behavior. It is critical to understand this trajectory via which thoughts of suicide transition into lethal behavior, though factors that may circumvent this process must also not be neglected. Findings from Chapter Five show that zest for life mitigates the adverse effects of the interpersonal factors on suicide ideation, highlighting the importance of considering the role of zest within the key facets of the interpersonal theory. The recent development of reliable and valid measures of both zest for life and acquired capability in the current thesis facilitate a final aim of clarifying their relationships in the pathway from suicidal thinking to lethal readiness.
Chapter Seven

Examining the Interplay between Zest for Life and the Acquired Capability for Suicide along the Pathway from Suicide Ideation to Readiness for Lethal Suicidal Behavior
Abstract

There is an urgent need to better understand the factors that advance or circumvent the trajectory from suicide contemplation to readiness for lethal suicidal behavior (Nock, Kessler, & Franklin, 2016). The influence of zest for life against the adverse effects of acquired capability on suicide risk was first examined using three structural models representing three distinct phases in the trajectory from suicidal thoughts to readiness for action. Results showed that the mediating influence of zest on the relationship between the acquired capability facets (mental preparation, fearlessness of death, and pain tolerance) and prospective risk indicators depended on whether the outcome criterion was earlier or later within the ideation-to-action framework (Klonsky & May, 2014). Follow-up tests revealed that zest for life also buffered the adverse effects of mental preparation on increased suicide ideation and intention. Findings highlight the importance of considering zest for life within the key facets of the interpersonal theory. When evaluating risk of progression from suicide ideation to lethal readiness, it is important to assess the presence of acquired capability and zest for life.

Keywords: acquired capability, interpersonal theory of suicide, zest for life, mental rehearsal for suicide, fearlessness of death, pain tolerance
Examining the Interplay between Zest for Life and the Acquired Capability for Suicide along the Pathway from Suicide Ideation to Readiness for Lethal Suicidal Behavior

The accurate identification of those at highest risk for suicidal behavior remains a difficult challenge for both clinicians and researchers alike (e.g., Isometsa et al., 1995; Younes et al., 2015). Though numerous risk factors for suicide ideation have been identified, significantly less is known about what factors transform suicidal desire into lethal readiness for suicide (May & Klonsky, 2016). The interpersonal theory of suicide proposes that those who desire suicide differ from those who act in that they have developed sufficient fearlessness of death and pain tolerance to beat down and overcome evolutionarily ingrained survival drives (Joiner, 2005; Ribeiro, Bodell, Hames, Hagan, & Joiner, 2013). Such acquired capability for suicide is thought to develop indirectly via painful and provocative experiences such as skydiving, or directly through practice via prior suicide attempts or mental preparation and rehearsal for suicide (George et al., 2016; Van Orden et al., 2010).

In addition to better understanding the role of acquired capability in facilitating the transition from suicidal desire to readiness for lethal self-destructive action, it is similarly essential to understand factors that can circumvent this trajectory. A sense of connection to and enthusiasm for life, or ‘zest for life’ recently emerged as an important mitigating factor against the adverse effects of the interpersonal theory’s two putative causes of suicidal desire – perceived burdensomeness and thwarted belongingness (Chapter Five). It is important to consider the role of zest, though its influence against the theoretically-derived facets of acquired capability is as yet untested. The current study sought to investigate the relationships between zest and for life and acquired capability along what has been termed the motivational-volitional (O’Connor & Nock, 2014) and...
the ideation-to-action (Klonsky & May, 2014) pathway from suicidal desire to readiness for lethal action.

**Acquired Capability for Suicide and Zest for Life**

According to the interpersonal theory, suicidal desire is driven by the confluence of perceived burdensomeness and thwarted belongingness, while acquired capability moderates the effects of these interpersonal factors, transforming suicidal thinking into lethal suicidal behavior (Joiner, 2005; Van Orden et al., 2010). Though acquired capability was initially conceptualized as distinct from suicidal desire (Joiner, 2005), a recent review of evidence for the interpersonal theory indicated that over half of the studies that tested the association between acquired capability and suicide ideation found a significant relationship between the two variables. Findings from this review also revealed that most studies examining the effect of the three-way interaction between the two interpersonal factors and acquired capability on suicide risk were non-significant (Ma et al., 2016). There is hence mixed support for the main predictions of the theory regarding the role of acquired capability, and there is a need for alternate hypotheses and additional empirical scrutiny of this novel construct.

To date, challenges adequately measuring all components of acquired capability (Ribeiro et al., 2014) may also have clouded the complex relationship between the acquired capability facets and suicide risk. Recently, a new measure was devised that reliably and validly captured three key components of capability – mental preparation and rehearsal for suicide, fearlessness of death by suicide, and pain tolerance (George et al., 2016; see also Chapter Six). Findings showed that the three acquired capability facets play differential roles in the transformation of suicide ideation into readiness for suicide (George et al., 2016).
Zest for life, defined as a sense of connection to and enthusiasm for life, recently emerged as both a partial mediator and as a moderator of the adverse effects of thwarted belongingness and perceived burdensomeness on suicide ideation (Chapter Five), highlighting the importance of accounting for the influence of zest within the key pillars of the interpersonal theory. While the theory does not make predictions about the role of zest for life against the acquired capability facets, it does acknowledge that instinctual survival drives must be beaten down and overcome by acquired capability for suicidal behavior to ensue (Joiner, 2005). Though zest for life is a broader construct than the evolutionarily ingrained will to live, it may similarly stand in the way between the mental preparation facet of acquired capability and heightened suicidal desire and intention. In contrast, the role of zest for life against the fearlessness of death and pain tolerance facets of acquired capability at later stages of the motivational-volitional pathway may be more ambiguous. For instance, while fearlessness of death could be fostered by diminished zest as life is perceived as less valuable, fearlessness may also arise from zestful activities (e.g., skydiving; Joiner, 2005). There is a need to better understand the roles of zest for life and the acquired capability facets in facilitating or circumventing each point in the ideation-to-action pathway from the initial contemplation of suicide, to the formation and solidification of suicide intention, to lethal readiness for suicidal behavior (Nock, Kessler, & Franklin, 2016).

The Present Study

We first sought to examine the relationships between three acquired capability facets (preparation, fearlessness of death, and pain tolerance) and three indices of risk that represent distinct steps along the motivational-volitional pathway toward suicide – (a) suicide ideation, (b) intent, and (c) readiness for lethal suicidal behavior (O’Connor & Nock, 2014).
First, we predicted a strong inverse relationship between zest for life and the preparation/rehearsal facet. Moreover, the hypothesized mediating influence of zest on the direct effect of the preparation facet on risk would diminish as a person progresses from ideation to intention formation to increased readiness. That is, beating down zest by preparatory actions is necessary for ideation and intent to firm up, but as readiness increases, the influence of direct or indirect effects of actively acquiring capability should diminish.

In contrast, while the second facet, fearlessness of death, is thought to be critical in enhancing readiness for enacting suicidal behavior, its relationship with zest for life is ambiguous. While diminished zest might foster fearlessness of death because life is perceived as less precious, zestful activities such as skydiving may in contrast also foster fearlessness (Joiner, 2005). Hence, we made no a priori predictions regarding the influence of zest in the relationship between fearlessness and suicide risk.

With respect to the third facet of acquired capability, pain tolerance is thought to increase readiness for engaging in suicidal behavior. However, there is evidence that physiological pain tolerance is positively associated with hope (Berg, Snyder, & Hamilton, 2008; Snyder et al., 2005), with the latter reflected in the positive outlook facet of zest for life. Those high in hope may seek out more challenging situations (Davidson, Wingate, Slish, & Rasmussen, 2010), thus encountering more pain and consequently heightening pain tolerance. Hence, it is possible that pain tolerance may indirectly decrease suicide ideation, intention, and readiness via its positive association with zest for life.

Tests of moderation are required to demonstrate buffering effects (e.g., Johnson, Wood, Gooding, Taylor, & Tarrier, 2011) and zest for life has previously been shown to act as both a mediator and moderator of the adverse influence of the interpersonal factors
(Chapter Five). Heightened zest may similarly stand in the way and fight back against the deleterious effects of mental preparation on heightened suicide ideation and intention, while depleted zest could amplify these relationships. Two final moderation analyses were run to test these hypotheses.

Method

Participants and Procedures

Two hundred and thirty-four university students (66 males, 168 females) who took part in a study on the acquired capability for suicide (George et al., 2016) filled out an online questionnaire on two occasions separated by an eight-week period. Details about participant demographics and characteristics, and measures taken to screen for careless and inconsistent responding were outlined earlier in the thesis (Chapters Five and Six).

Measures

Questions about acquired capability and zest for life were administered at baseline, and questions about suicide ideation, intention and readiness were administered at follow-up. Details about measures used and their psychometrics were outlined in Chapters Five and Six.

Data Analytic Strategy

Three structural equation models were run using AMOS to test the mediating role of zest for life in the relationships between the three facets of acquired capability and indices of suicide risk. To obtain an optimal estimate of indirect effects while controlling for Type 1 error, 5000 bias-corrected bootstrapping samples were used (Jose, 2013). Two moderation analyses were next run using SPSS and PROCESS (version 2.16, Hayes, 2016) to examine whether zest for life buffered the relationships between the mental preparation facet of acquired capability, and suicide ideation and intention.
Results

Does Zest for Life Mediate the Relationships between Acquired Capability and: (a) Ideation, (b) Intent, and (c) Readiness for Suicide?

Three structural models were specified to test the mediating role of zest for life (Time 1) against the influence of acquired capability (Time 1) on three steps in the motivational-volitional pathway (O’Connor & Nock, 2014) from (a) suicide ideation to (b) intent to (c) readiness for lethal suicidal behavior (Time 2) (Figure 1). All models demonstrated good fit: Model (a) $\chi^2 (120) = 207.24$, $p < .001$, RMSEA = .056 (90% CI = .043, .068), CFI = .97, TLI = .96; Model (b) $\chi^2 (120) = 213.94$, $p < .001$, RMSEA = .058 (90% CI = .045, .070), CFI = .97, TLI = .96; Model (c) $\chi^2 (120) = 223.98$, $p < .001$, RMSEA = .061 (90% CI = .048, .073), CFI = .97, TLI = .96.

Zest for life partly mediated the relationships between the preparation facet of acquired capability and both suicide ideation (indirect effect = .205, 95% CI: .129, .305, $p < .001$; direct effect = .376, 95% CI: .236, .515, $p < .001$) and suicide intent (indirect effect = .141, 95% CI: .053, .239, $p = .001$; direct effect = .241, 95% CI: .030, .412, $p = .027$). In contrast, the mediating effect of zest on the relationship between preparation and readiness fell outside the conventional criteria for significance (indirect effect = .086, 95% CI: -.004, .195, $p = .062$), and the direct effect of this acquired capability facet on readiness was not significant, (direct effect = .024, 95% CI: -.188, .202, $p = .86$). Thus, the mediating influence of zest for life was strongest early in the ideation to action pathway, and diminished in strength in the subsequent stages from intention formation to readiness for suicide.

Consistent with the ambiguous possibilities that the second facet of acquired capability, fearlessness of death, might be associated with either diminished zest if life has become less valuable relative to death, or heightened zest if life is perceived as enriched
by death-defying activities such as skydiving, zest did not mediate the associations between fearlessness of death and suicide ideation, intention, or readiness \((ps > .05)\). Nor were the direct effects of fearlessness of death significant for the early stages in the ideation to action pathway (ideation and intention; \(ps > .05\)), but there was a strong direct effect of fearlessness on readiness for suicide (direct effect = .534, 95% CI: .315, .719, \(p < .001\)).

Finally, zest for life fully mediated the relationships between the third facet of acquired capability, pain tolerance, and suicide ideation (indirect effect = -.052, 95% CI: -.114, .001, \(p = .054\)), suicide intention (indirect effect = -.036, 95% CI: -.095, -.003, \(p = .031\)) and suicide readiness (indirect effect = -.023, 95% CI: -.071, .001, \(p = .063\)), although the indirect effects for both ideation and readiness fell just outside the conventional criteria for significance. As expected, pain tolerance was positively associated with zest for life, which in turn was inversely associated with suicide ideation, intention, and readiness.
Figure 1. Three mediation models of zest for life and the acquired capability facets in the pathway from (a) ideation to (b) intention to (c) readiness for suicide ($n = 234$)

Note. AC = Acquired capability; T1 = Time 1 (baseline); T2 = Time 2 (follow-up)

* $p < .05$, ** $p < .01$, *** $p < .00$
Does Zest for Life Moderate the Prospective Relationships between Mental Preparation and Suicide Ideation and Intention?

A first moderation analysis was run to test whether zest for life (Time 1) moderated the relationship between the mental preparation facet of acquired capability (Time 1) and suicide ideation (Time 2). This model was significant, $F(3, 230) = 28.66, p < .001, R^2 = .45$. As shown in Table 1, zest for life, mental preparation for suicide, and their interaction significantly prospectively predicted suicide ideation. The interaction was probed by examining the conditional effects of mental preparation on suicide ideation at three levels of zest (one standard deviation below, at, and above the mean). Mental preparation was significantly positively related to suicide ideation at low and mean levels of zest for life, but not at high levels of zest (Table 2). The Johnson-Neyman technique revealed that the relationship between mental preparation and suicide intention was significant when zest for life was less than .93 standard deviations above the mean.

Table 1

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zest for life</td>
<td>-.15</td>
<td>&lt; .001</td>
<td>-.19, -.09</td>
</tr>
<tr>
<td>Mental preparation</td>
<td>.09</td>
<td>&lt; .001</td>
<td>.05, .13</td>
</tr>
<tr>
<td>Zest x Mental preparation</td>
<td>-.05</td>
<td>&lt; .001</td>
<td>-.07, -.03</td>
</tr>
</tbody>
</table>
Table 2

**Conditional Effects of Mental Preparation on Suicide Ideation**

<table>
<thead>
<tr>
<th>Zest for life</th>
<th>β</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>One SD below mean</td>
<td>.17</td>
<td>&lt; .001</td>
<td>.11, .23</td>
</tr>
<tr>
<td>At mean</td>
<td>.09</td>
<td>&lt; .001</td>
<td>.05, .13</td>
</tr>
<tr>
<td>One SD above mean</td>
<td>.0009</td>
<td>.97</td>
<td>-.05, .05</td>
</tr>
</tbody>
</table>

A second moderation analysis was specified to determine whether zest for life (Time 1) moderated the relationship between mental preparation (Time 1) and suicide intent (Time 2). This model was significant, $F(3, 230) = 8.84, p < .001, R^2 = .23$. As shown in Table 3, zest for life, mental preparation for suicide, and their interaction significantly prospectively predicted suicide intent. The interaction was probed by examining the conditional effects of mental preparation on suicide intent at three levels of zest for life (one standard deviation below, at, and above the mean). Mental preparation was significantly positively related to suicide intention at low and mean levels of zest for life, but not at high levels of zest (Table 4). The Johnson-Neyman technique revealed that the relationship between mental preparation and suicide intention was significant when zest for life was less than .34 standard deviations above the mean.

Table 3

**Zest Interacts with Mental Preparation to Prospectively Predict Suicide Intent**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zest for life</td>
<td>-.13</td>
<td>.005</td>
<td>-.21, -.04</td>
</tr>
<tr>
<td>Mental preparation</td>
<td>.11</td>
<td>.005</td>
<td>.03, .19</td>
</tr>
<tr>
<td>Zest x Mental preparation</td>
<td>-.08</td>
<td>&lt; .001</td>
<td>-.13, -.04</td>
</tr>
</tbody>
</table>
Table 4

*Conditional Effects of Mental Preparation on Suicide Intent*

<table>
<thead>
<tr>
<th>Zest for life</th>
<th>β</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>One SD below mean</td>
<td>.25</td>
<td>&lt; .001</td>
<td>.15, .36</td>
</tr>
<tr>
<td>At mean</td>
<td>.11</td>
<td>.005</td>
<td>.03, .19</td>
</tr>
<tr>
<td>One SD above mean</td>
<td>-.03</td>
<td>.57</td>
<td>-.15, .08</td>
</tr>
</tbody>
</table>

**Discussion**

The present study sought to explore the relationships between zest for life, the key facets of acquired capability for suicide, and indices of suicide risk along the motivational-volitional pathway toward suicide readiness. The mediating influence of zest for life on the impact of the acquired capability facets (mental preparation, fearlessness of death, and pain tolerance) on the risk criteria at follow-up varied depending on which step in the pathway toward suicide served as the criterion; ideation, intention, or readiness. While zest for life negatively prospectively predicted suicide ideation, intention, and readiness for suicide, these associations were of diminishing strength, respectively. This suggests that zest for life primarily exerts its influence earlier in the pathway during ideation and intention formation. Moreover, zest for life partly mediated the relationships between the preparation facet of acquired capability and both early steps of suicide ideation and intent, but did so only marginally for the later step of readiness, with the size of the indirect effect diminishing with each step closer to readiness.

Zest for life did not significantly mediate any of the associations between fearlessness of death and suicide ideation, intent, or readiness. This is not unexpected given that fearlessness of death may be fostered by zestful activities such as skydiving (Joiner, 2005), but could also stem from diminished zest when life is perceived as less
precious. However, fearlessness of death had a significant direct effect on readiness, indicating that this facet of acquired capability acts directly, but not indirectly via zest, to amplify readiness for suicidal behavior. This non-significant indirect effect of fearlessness via zest for life is consistent with the interpersonal theory’s proposal that fearlessness of death enhances readiness regardless of whether fearlessness is acquired passively through trauma exposure, pursuit of high risk leisure activities, deliberate non-suicidal self-injurious behavior, or active mental practice (Van Orden et al., 2010). As zest for life appears not to counter fearlessness of death, but fearlessness has strong direct effects on readiness for suicide, more direct counter-conditioning strategies may be needed. For example, bias-modification techniques have successfully been used to reduce disproportionate fear of objects or situations (Hakamata et al., 2010; MacLeod & Mathews, 2012). Such techniques could be modified for the reverse aim of re-instating the diminished evolutionarily ingrained and adaptive fear of death.

Zest for life mediated the relationships between pain tolerance and both suicide ideation and suicide intent, but consistent with previous evidence, pain tolerance was positively associated with zest. Recent studies showed that other life-sustaining factors such as mastery (Christensen, Batterham, Mackinnon, Donker, & Soubelet, 2014) and hope (Davidson et al., 2010) are positively associated with acquired capability as measured by self-reported pain tolerance and fearlessness of death, and hope is also positively associated with physiological pain tolerance (Berg et al., 2008; Snyder et al., 2005). Davidson and colleagues (2009) suggest that those high in hope experience more pain since they may seek out more challenging situations. Those high in zest may similarly seek out challenging experiences with a greater probability of encountering more physical pain, consequently heightening pain tolerance. Conversely, heightened pain tolerance may facilitate greater engagement with and enjoyment of life by permitting
one to experience challenging and novel situations. Additional research is needed to clarify the complex relationship between life-sustaining constructs such as zest for life, hope, and mastery and greater pain tolerance.

In addition to the mediating influence of zest, zest for life also moderated the adverse effects of mental preparation and heightened suicide ideation and suicide intent. At high levels of zest, mental preparation was not significantly associated with either suicide ideation or intent, indicating that zest for life can neutralize the adverse effects of mental preparation on heightened suicidal desire and intention. Conversely, mental preparation was most strongly associated with both ideation and intent at low zest levels, indicating that depleted zest for life amplifies the adverse effects of mental preparation on the solidification of suicidal desire and suicide intention. It is important to devise interventions that target and foster zest for life as this would divert the amplification of suicidal desire and the development of suicide intention.

**Limitations**

Findings should be considered in the context of some limitations. Generalizability is limited to the population examined. Suicide risk indices were measured using single items, which can be more sensitive to measurement error (Sloan, Aaronson, Cappelleri, Fairclough, & Varrichio), though single-item measures have been shown to correlate significantly with other indices of suicide risk (e.g., Nock, Holmberg, Photos, & Michel, 2007). It was not possible to test full mediation, which requires temporal precedence between variables, as zest for life and the acquired capability facets were both measured at Time 1. Future prospective research should endeavor to replicate the current findings measuring capability, zest, and the risk indices at three time points.

Finally, although the outcome variables in the current research were selected to represent distinct steps in the pathway from suicidal thoughts to readiness for action...
(Nock, Kessler, & Franklin, 2016), the eight-week period of the prospective design was insufficient to examine prospectively suicide attempts and deaths by suicide. Hence, findings may not generalize to suicide attempts and mortality (Klonsky & May, 2014; Neuringer, 1962). Further study is needed to examine whether zest for life exerts a significant role at the behavioral enaction stages of the motivational-volitional pathway toward suicide.

**Conclusion**

The mediating influence of zest for life between the acquired capability facets and prospective risk indicators depends on which acquired capability facet was examined and whether the outcome criterion was earlier or later in the motivational-volitional pathway. Findings highlight the importance of considering the role of zest for life within the key facets of the interpersonal theory. When evaluating risk of progression from suicide ideation to lethal readiness, it is important to assess the presence of acquired capability and zest for life. Clinical interventions that target and foster zest for life (e.g., Britton, 2015) would buffer the adverse effects of mental preparation for suicide, circumventing the amplification of suicidal desire and diverting its transition into intention for lethal suicidal behavior.
Chapter Eight

General Discussion
The present research addressed critical gaps in the literature on the interpersonal theory of suicide and in so doing, substantiated key predictions of the model. This thesis provided the first causal experimental evidence for the theory’s proposal that it is the interpersonal nature of burdensomeness and thwarted belongingness that makes these risk factors especially pernicious (Chapter Two). Results distinguish the theory from others focusing on general failure (e.g., Baumeister, 1990) and confirm the more specific core interpersonal emphasis of the model.

Findings also supported another previously untested proposal of the theory that burdensomeness perceptions have adverse effects even when such perceptions are mistaken. Individuals high in perceived burdensomeness were predisposed to believing that they were an interpersonal liability even in the face of feedback indicating the converse, and expressed a strong desire to escape this interpersonal adversity (Chapter Three), affirming the theory’s emphasis on the ‘perception’ facet of perceived burdensomeness (Joiner, 2005).

Chapter Four disentangled the temporal reciprocal effects of burdensomeness and thwarted belongingness to confirm initial speculation by Joiner (2005) that the interpersonal factors mutually influence each other. Findings explain why the interpersonal factors are often highly correlated (e.g., Anestis, Bagge, Tull, & Joiner, 2011) and shed further light on why their confluence is posited to be especially pernicious (Joiner, 2005; Van Orden et al., 2010).

In addition to supporting key predictions about the interpersonal factors using a novel experimental paradigm, some of the theory’s main predictions were also supported longitudinally. Consistent with the proposal that the interpersonal factors drive suicidal thinking, perceived burdensomeness prospectively predicted increased suicide ideation, confirming longitudinal evidence (e.g., Podlogar, Ziberna, & Postuvan, 2016; Puzia,
Kraines, Liu, & Kleiman, 2014) that burdensomeness is not only a correlate of risk, but directly precedes increased ideation. The acquired capability facets similarly preceded heightened ideation and readiness for suicide, supporting the theory’s proposal that capability facilitates the transformation of suicidal desire into lethal readiness for suicide.

In addition to confirming the model’s main predictions about the role of acquired capability in conferring risk, results support a further proposal of the theory that non-suicidal self-injury increases suicide risk via its indirect amplifying effect on capability (Joiner, 2005). These results explain the well-documented association between non-suicidal self-injury and suicide risk (Hamza, Stewart, & Willoughby, 2012; Klonsky, May, & Glenn, 2013). Findings highlight that affect regulation (e.g., Chapman et al., 2006; Klonsky, 2007) and suicidal impulse control (Firestone & Seiden, 1990; Himber, 1994; Suyemoto, 1998) via non-suicidal self-injury is accompanied by the dangerous consequence, whether intended or not, of increasing one’s capability to enact suicidal behavior.

Though most of the current findings support the interpersonal theory, some modifications to the model as initially conceptualized are indicated. First, though both perceived burdensomeness and thwarted belongingness were prospectively associated with heightened suicide ideation and their effects were of similar strength (Chapter Six), when the influence of zest for life was accounted for, thwarted belongingness influenced ideation only indirectly via zest (Chapter Five). Experimental findings similarly indicate that thwarted belongingness exerts its adverse effects on the desire to escape only indirectly via burdensomeness (Chapters Three and Four). The finding that thwarted belongingness influences risk only indirectly via other key factors differs from the interpersonal theory’s initial conceptualization that both interpersonal factors are proximal causes of risk (Joiner, 2005), and suggests that thwarted belongingness plays a
more distal role than initially posited. These findings are consistent with accumulating evidence that of the two factors, burdensomeness tends to emerge as the stronger interpersonal predictor (e.g., Ma et al., 2016).

Second, though the theory originally posits that acquired capability is unrelated to suicidal desire (Van Orden et al., 2010), the current findings indicate that the capability facets also directly predict increased suicidal thinking and readiness. Of course, the inclusion of direct means of acquiring capability, such as mental preparation for suicide, within the newly developed ACWRSS meant that it would be anticipated that this facet would be directly associated with ideation. However, the fearlessness of death facet also directly predicted suicide readiness, which was consistent with other observations that acquired capability as measured by fearlessness and pain tolerance is directly associated with risk (e.g., Bryan, Clemans, & Hernandez, 2012; Kene & Hovey, 2014). Findings hence suggest that the theory might be revised to acknowledge that the acquired capability facets act independently of the interpersonal factors to facilitate the transformation of suicidal desire into readiness for lethal suicidal behavior.

Third, results raise questions about the proposed stability of acquired capability. While the pain tolerance facet remained stable over the course of short-term psychiatric inpatient treatment (Chapter Six), consistent with Joiner’s (2005) prediction that capability is static once acquired, the preparation and fearlessness of death facets decreased significantly over the course of this brief period. This latter finding is consistent with speculation that capability may be more dynamic than initially envisaged (Smith & Cukrowicz, 2010), and suggests that the theory may be revisited to account for the malleability of the preparation and fearlessness of death facets.

Finally, and perhaps most notably, findings indicate that in addition to evaluating the presence of the interpersonal factors and the acquired capability facets, it is important
to also consider the role of zest for life. Zest for life played a critical role in circumventing the adverse effects of perceived burdensomeness, thwarted belongingness, and mental preparation on the formation of suicidal desire and on the solidification of suicide intention. While the addition of zest for life to the interpersonal theory of suicide makes the model less parsimonious (Cronbach & Meehl, 1955), it has been questioned whether the criteria of parsimony may apply to the current state of suicide prevention science, since no theory has yet managed to predict suicide (Van Orden, 2015).

Moreover, accounting for the protective role of zest would improve the theory’s specificity. Zest for life’s capacity to neutralize risk has important implications for prevention and could explain why certain studies have failed to find support for the model (e.g., Pfeiffer et al., 2013; Teismann, Glaesmer, Brachel, Siegmann, & Forkmann, 2017).

Considering the theoretical modifications indicated by the current data, findings suggest an updated model. First, burdensomeness, either actual or perceived, plays a potent proximal role in driving thoughts of escape and suicidal desire. Next, mental preparation for suicide and fearlessness of death independently facilitate movement down the ideation-to-action pathway toward increasing risk. Insofar as zest for life is strong though, it can circumvent this lethal trajectory.

In addition to the present contribution to suicide theory, findings also have several implications for clinical practice. Results confirm calls emphasizing the importance of assessing thwarted interpersonal needs in clinical settings (e.g., Chu et al., 2015). As thwarted belongingness and perceived burdensomeness mutually amplified each other, it may be anticipated that therapy targeting the reduction of one interpersonal factor would result in the subsequent depletion of the other. Given that only burdensomeness acted directly to influence the desire to escape and thoughts of suicide, it would be pragmatic to first target the alleviation of perceived burdensomeness as it is anticipated that this would
result in both the lessening of thwarted belongingness and the strengthening of the ability to persist through adversity.

Given that perceptions of burdensomeness have adverse effects even when they are mistaken, therapy that assists clients to reappraise and to challenge these maladaptive thought patterns (e.g., Butler, Chapman, Forman, & Beck, 2006) or to manage such thoughts with non-judgmental present awareness (Buitron, Hill, & Pettit, 2016) may be useful. It will be necessary to devise and refine treatments specifically targeting the reduction of burdensomeness perceptions since they tend to improve only marginally following the receipt of up to 30 sessions of therapy for other mental health problems (Teismann, Forkman, Rath, Glaesmer, & Margraf, 2016).

Since actual burdensomeness and thwarted belongingness also had adverse effects, clients may also be encouraged to engage in activities that fulfill interpersonal needs, such as volunteering to increase a sense of contribution, or engagement in social activities to foster belongingness. Such activities may simultaneously activate zest by making life feel more fulfilling.

Zest for life was especially influential at the early stages of the pathway toward lethal suicidal behavior, indicating that therapy that specifically fosters and strengthens zest for life would circumvent the amplification of suicidal thinking and the formation of suicide intention. Findings support recommendations that treatment for suicide focus on stimulating clients to “construct a life worth living” (Linehan, 1993, p. 100) by eliciting reasons for living (e.g., Jobes, 2012) and fostering connection to life (Britton, 2015; Britton, Patrick, Wenzel, & Williams, 2011). Moreover, the strong associations between zest and suicide risk indices indicate that the assessment of zest for life would be informative in circumstances where individuals may be reluctant to disclose suicidal
thoughts and intent (e.g., Kupers, 2005). The brevity of Zest for Life Scale makes it practical for use in clinical settings.

Findings indicate that those who engage in non-suicidal self-injury are at heightened risk for suicide readiness via increased mental preparation and fearlessness of death, highlighting the importance of monitoring suicide risk among those who self-harm. Encouragingly, mental preparation and fearlessness of death also diminished significantly over the course of short-term inpatient treatment, suggesting that the process by which these components of capability for suicide increase can also be reversed. Treatment for at-risk individuals should monitor the presence and fluctuation of levels of the acquired capability facets. The ACWRSS represents a brief yet reliable and valid means of doing so.

In addition to the current contribution to suicide theory and clinical practice, this thesis paves the way for several key avenues for further research. The development of the new measures of capability and zest facilitate further examination of these critical constructs. Zest for life has important implications for suicide prevention and it is critical to better understand the process by which zest may be elicited and fostered in therapy. Motivational interviewing has recently been proposed as a means of strengthening connection to life (Britton, 2015), though further research is required (e.g., Britton, Conner, & Maistro, 2012). Similarly, interventions that involve evoking reasons for living can reduce the likelihood of future self-harm and suicide attempts (Andreasson et al., 2016) and may represent another means of eliciting zest.

In addition to better understanding how zest may be fostered through intervention, it is likewise important to examine the mechanism of change via which the mental preparation and fearlessness of death facets diminish over the course of therapy. For example, could the weakening of mental preparation for suicide result from the
strengthening of zest for life? Better understanding such mechanisms of change would facilitate the development of targeted interventions to reduce capability for suicide.

Diminished zest for life is thought to cause engagement in self-destructive behavior (Church & Brooks, 2009; Farberow, 1980), which represents a proposed indirect means of acquiring capability (Joiner, 2005). Future study could use the Zest for Life Scale to test these hypotheses empirically by examining the relationships between zest and other self-destructive behaviors such as self-harm and drug and alcohol abuse.

Current findings indicate that only perceived burdensomeness directly drives thoughts of escape, while thwarted belongingness exerts its influence indirectly via other key factors. These results do not rule out the possibility though that thwarted belongingness may re-emerge as an important factor later in the ideation-to-action pathway, which would be consistent with some findings that relative to burdensomeness, thwarted belongingness featured more prominently in suicide notes (Gunn, Lester, Haines, & Williams, 2012; Lester & Gunn, 2012). Thwarted belongingness was also more strongly associated with suicidal behavior in some studies (e.g., Conner, Britton, Sworts, & Joiner, 2007) though this was not consistent across all research (Ma et al., 2016). Future research might hence investigate the role of belongingness at the behavioral phase of lethal self-harm, by testing the relationships between thwarted belongingness and both attempted and completed suicide.

Given that perceived burdensomeness tends to emerge as the more noxious interpersonal factor across most existing research, it has also been questioned whether the existing gold-standard measure of thwarted belongingness, the belongingness subscale of the Interpersonal Needs Questionnaire (INQ; Van Orden et al., 2008), adequately captures this key construct (e.g., Ma et al., 2016). The present Interpersonal Persistence Task experiments employed a different brief measure of thwarted belongingness relative
to team-mates, and results corroborated existing findings that burdensomeness has stronger adverse effects compared to thwarted belongingness. This suggests that existing findings (e.g., Ma et al., 2016) are not only due to the belongingness measure used. It is possible though that both a general sense of thwarted belongingness as measured via the INQ (Van Orden et al., 2008), and specific thwarted belongingness relative to peers could be less important than other specific types of diminished belongingness, such as in relation to one’s family (Wong et al., 2011). Future research could seek to replicate the current findings using other such types of specific thwarted belongingness.

It is valuable to integrate theories of suicide (e.g., Kleiman, Law, & Anestis, 2013) and since the interpersonal theory’s initial proposal, other models have identified additional putative factors that influence the development of suicide ideation and its transition to lethal behavior (O’Connor, 2011; Klonsky & May, 2015). Future research could test the influence of the key facets of the interpersonal theory in the context of other theoretically-derived risk and protective factors. For example, both the integrated-motivational volitional model (O’Connor, 2011) and the three-step theory (Klonsky & May, 2015) expand Joiner’s (2005) notion of acquired capability to also highlight the importance of practical contributors to suicidal behavior such as knowledge of and access to lethal means. Future study might examine the influence of the interpersonal theory’s acquired capability facets in the context of these broader definitions of capability for suicide.

The three-step theory also highlights the importance of ‘connectedness,’ be it to others, to a vocation, or to anything else that gives life meaning, as a key buffer against suicidal thinking (Klonsky & May, 2015; Klonsky, May, & Saffer, 2016). This concept of connectedness is similar to that of zest for life introduced in this thesis, and it would be
interesting to examine the relationships between these constructs and to compare their protective properties.

Relatedly, it is speculated here that a general sense of zest for life underpins specific life-oriented factors, such as cognitive appraisals of life satisfaction (Diener et al., 1985) or specific reasons for living that inhibit suicidal behavior when suicide is being contemplated (Linehan et al., 1983), and it would be useful to test how zest for life is similar or different from such specific life-oriented factors.

Findings from Chapters Two and Three support the validity of the brief Interpersonal Persistence Task as a manipulation of the confluence of the interpersonal factors, and the task represents a means of further testing other moderators of the causal effects of burdensomeness and thwarted belongingness. It is important to better understand moderators of the effects of the interpersonal factors (e.g., Van Orden, Witte, Gordon, Bender, & Joiner, 2008) and there may exist other factors in addition to zest that further neutralize the causal adverse effects of burdensomeness and thwarted belongingness. For example, the non-judgemental observation of thoughts of burdening others (mindfulness) may stimulate a change in perspective, subsequently reducing the adverse impact of such cognitions on suicide ideation (Buitron, Hill, & Pettit, 2016). Similarly, self-forgiveness may attenuate the deleterious influence of thwarted interpersonal needs by fostering acceptance and kindness (Cheavens, Cukrowicz, Hansen, & Mitchell, 2015).

In addition to testing other moderators of the interpersonal factors, future research using the task might also test how burdensomeness and thwarted belongingness influence acquired capability. Some suggest that the pain caused by the two interpersonal factors may heighten pain tolerance (Ribeiro & Joiner, 2009; Van Orden, Merrill, & Joiner, 2005), consistent with findings that physical and emotional pain from social exclusion
share common neurological pathways (e.g., Eisenberger, Lieberman, & Williams, 2003; MacDonald & Leary, 2005) and social exclusion results in heightened pain tolerance (DeWall & Baumeister, 2006). The brief Interpersonal Persistence Task would facilitate the examination of causal effects of burdensomeness and thwarted belongingness on the capability facets.

Finally, the current findings raise alarm that the Australian university student population examined is an important target for prevention. The current student samples reported heightened levels of general psychological distress that fell within normative bands consistent with increased likelihood of experiencing a mental health problem (Cvetkovski, Reavley, & Jorm, 2012; Stallman, 2010). Rates of suicide ideation and past attempts were also high and like rates reported in some clinical and forensic samples (Ireland & York, 2012; Van Orden et al., 2008). Frequency of ideation was high even among those recruited for average levels of thwarted interpersonal needs and zest for life (Chapter Two), and while these rates were lower than those reported by participants in the other studies comprising the thesis, together results highlight the importance of developing targeted suicide prevention initiatives for this student population.

**Limitations**

Findings from this thesis should be considered in the context of some limitations. Apart from the inpatient psychiatric sample, the samples examined comprised a majority of female students from a single university who were of self-reported Caucasian and Asian ethnicities. Generalizability of findings is limited to the populations examined and may not necessarily have relevance for other high risk groups, such as forensic samples (Fruhwald & Frottier, 2005), Indigenous populations (e.g., Gone, 2004), and individuals from low and middle income countries (World Health Organization, 2014). Tertiary students are an important target for prevention though (Cukrowicz et al., 2011; Lamis,
Drum, & Swanbrow Becker, 2015) as emphasized by the high rates of psychological
distress and suicide risk voiced by the current samples. Moreover, it is commonly noted
that females are at the highest risk for suicide attempts, with Australian data also
indicating a recent increase in female deaths by suicide (Australian Bureau of Statistics,
2015), highlighting the importance of preventing suicidal behavior among females.
Furthermore, the interpersonal theory posits however that the same mental processes
underlie all forms of risk ‘regardless of the population being studied’ (Van Orden,

Findings may also not generalize to suicide mortality (e.g., Neuringer, 1962).
Though death by suicide is frequently conceptualized as an end point on a continuum
from contemplation to behavior (e.g., Crosby, Cheltenham, & Sacks, 1999; Perez, 2005),
the processes via which ideation first develops and progresses to lethal action are
different (Klonsky & May, 2014; May & Klonsky, 2016). The current thesis elucidates
the critical roles of zest for life and the cornerstones of the interpersonal theory predicting
erlier stages of the pathway from ideation to suicide readiness, which is particularly
important given calls to address suicidal thinking when it first emerges (O’Connor &
Nock, 2014), and to better understand each stage in the pathway (Nock, Kessler, &
Franklin, 2016). Future research is required to clarify whether the variables tested might
re-emerge as key factors later in the pathway. For instance, while pain tolerance did not
significantly predict readiness, it is thought to feature more prominently at the later stage
of fostering medical lethality (Van Orden et al., 2010).

Single item measures were used to measure suicide risk and the desire to
disengage and interpersonal variables assessed during the Persistence Task. While this
facilitated information gathering, the use of one-item measures may be limited in
comprehensiveness (Sloan, Aaronson, Cappelleri, Fairclough, & Varricchio, 2002).
However single-item measures of risk show good inter-rater and test-retest reliability, and correlated significantly with other indices of risk such as past suicidal behavior (Nock, Holmberg, Photos, & Michel, 2007; Zimmerman et al., 2006).

Findings from the experimental studies (Chapters Two to Four) tested the theory’s predictions with strong internal validity, though may be limited to the paradigm used. There is hence a need to examine converging evidence from studies with greater external validity.

Experimental feedback regarding players’ relative contribution to the team was provided more frequently throughout task participation (scoreboard displayed after each set of five trials for a total of nine occasions) relative to belongingness feedback (written comments exchanged on three occasions). While it was envisaged that the written co-player feedback would be more aversive than the numerical scoreboard, it is possible that the increased frequency of burdensomeness feedback may have strengthened the potency of the burdensomeness relative to the belongingness manipulation. Future iterations of the paradigm may endeavor to modify the relative frequencies of the burdensomeness and belongingness feedback and to examine their effects.

**General Conclusion**

In sum, this thesis used a variety of methodologies to address critical gaps in the literature on the interpersonal theory of suicide. Findings support the core interpersonal emphasis of the model, and highlight that both perceived burdensomeness and actual thwarted interpersonal needs have adverse effects, driving a strong desire to escape. Results also support the role of the acquired capability facets in transforming suicidal thoughts into readiness for lethal action. Consistent with recent guidelines for empirically informed suicide risk assessment (e.g., Chu et al., 2015), findings underscore the critical
importance of evaluating and monitoring perceived burdensomeness, thwarted belongingness, and acquired capability.

While most of the current findings support the interpersonal theory, three modifications to the model as initially conceptualized are indicated. First, though perceived burdensomeness and thwarted belongingness are both thought to confer risk (Joiner, 2005), thwarted belongingness exerted its adverse effects on disengagement only indirectly via burdensomeness. This finding suggests that burdensomeness is a more proximal cause of thoughts of escape, and in more extreme cases of burdensomeness, may even be more proximal to thoughts of escaping life. Second, while capability for suicide is thought to be relatively static once acquired (Joiner, 2005), the mental preparation and fearlessness facets encouragingly emerged as malleable to short-term intervention, suggesting that the progression of risk along the trajectory from suicidal thinking to readiness for action can be reversed via the targeting of these facets of capability for suicide.

Lastly, it is critical to also consider the role of zest for life within the key components of the model as zest can neutralize the adverse effects of perceived burdensomeness, thwarted belongingness, and the mental preparation facet of acquired capability. Findings underscore the importance of considering both risk and resilience in suicide theory, highlighting that while it is critical to understand why people die by suicide, it is also important not to neglect the study of why people do not. Assessing zest for life in the context of theoretically derived risk factors would improve the precision of risk estimates, while interventions that foster zest would result in an enhanced capacity to persist through interpersonal adversity, circumventing the development of suicidal desire and lethal intention.
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Appendices
Appendix 1

The 26-item pool for the Zest for Life Scale contained four items adapted from the Survival and Coping Beliefs subscale of the Reasons for Living Inventory (Linehan et al., 1983) and two items adapted from the ‘Zest’ subscale of the Values in Action Character Strengths Inventory (Peterson, Park, & Seligman, 2005). Twenty items were also devised by researchers to capture a general sense of connection to and enthusiasm for life. The final 12-item ZLS comprised two of the adapted items and ten of the new items.
Appendix 2

Development of a Measurement Model for the ACWRSS

Method

Participants and procedures. The sample comprises 200 individuals randomly selected from the cross-sectional database (see pages 93-94, 123). There were 157 females (78.5%) and 43 males (21.5%) with a mean age of 20.6 years ($SD = 4.6$). Most participants identified themselves as being of Caucasian Australian (68%) and Asian (17.5%) ethnicities. The sample also comprised European (6%), African (2%), Aboriginal Australian (1.5%) and Other ethnicities (5%).

Measures.

Acquired capability. For the new Acquired Capability with Rehearsal for Suicide Scale (ACWRSS), an initial pool of 14 items was constructed based on theoretical considerations to capture the facets of fearlessness of death, pain tolerance, and preparation for suicide. Additional detail about item construction is outlined earlier on p. 124. The item pool included four items about pain tolerance (e.g., ‘‘I can tolerate much more pain than I used to’’), five items about fearlessness (e.g., ‘‘Even if I wanted to, killing myself is too scary to follow through with it’’), and five items about preparation (e.g., ‘‘I have considered whether some ways to kill myself would be easier than others’’). Participants rate their agreement with each statement ‘‘at this time in your life’’ on a scale from 0 (‘Not at all’) to 8 (‘Very strongly’). Higher scores are indicative of higher acquired capability for suicide. Coefficient alpha in this sample was good ($\alpha = .91$).

Results

Exploratory factor analysis of the ACWRSS. Examination of items revealed no concerns with skewness or kurtosis. To determine the number of factors to retain while also controlling for sample error, parallel analysis was conducted (Hayton, Allen, &
Scarpello, 2004; Horn, 1965) using SPSS 21.0 and the syntax provided by O’Connor (2000). Factors were retained if eigenvalues from the dataset were larger than their corresponding randomly generated eigenvalues (Dinno, 2014). This yielded a three-factor solution, where only three eigenvalues (6.24, .99, .58) were larger than their respective randomly-generated eigenvalues (.69, .53, .41). While this solution involves the retention of factors with eigenvalues lower than one, which is in contrast to the Kaiser criterion, the Kaiser criterion can sometimes lead to the underestimation of factors, particularly when factor analysis is conducted using parallel analysis (e.g., Dinno, 2014; Zwick & Velicer, 1986). As no factor retention method is perfect, recommendations to use parallel analysis in conjunction with the scree plot (e.g., Hayton et al., 2004) were also followed.

Inspection of the scree plot also suggested a three-factor solution. Because previous attempts to empirically determine a viable factor structure reflecting distinct factors consistent with theory have proven elusive (Ribeiro et al., 2014), we aimed to identify items that achieve clear differentiation between the hypothesized facets of acquired capability. Therefore, although capability facets are presumed to be correlated, we used principal axis factoring (Comrey, 1988; Floyd & Widaman, 1995) with varimax rotation, as this drives correlated factors apart, enabling maximal distinction between factors and permitting the selection of optimal (i.e., non-cross-loading) items (Tabachnick & Fidell, 2013). Bartlett’s test of sphericity was significant, suggesting that inter-item correlations were sufficiently large for the analysis. Sampling adequacy was also excellent, as evidenced by the KMO of .91 (Field, 2009). Together, the three factors accounted for 56.82% of the total variance.

Items were retained if factor loadings on the expected primary factor were greater than 0.4 and if there was no evidence of cross-loading (Field, 2009; Stevens, 2012).
Cross-loading was defined *a priori* as any factor loading on secondary factors that accounted for more than 10% of the variance (> .32).

Six items displayed evidence of cross-loadings. These items were: ‘‘I could put up with the pain involved in ending in my life,’’ ‘‘I could overcome my instinct to live,’’ ‘‘I feel capable of ending my own life,’’ ‘‘I have thought about dying and now it frightens me less,’’ ‘‘The prospect of dying bothers me less than it used to’’ and ‘‘These days, I am less afraid of death being the end of life as I know it.’’ These items were removed and the principal axis factoring was repeated using the remaining eight items. Bartlett’s test of sphericity was again significant and the KMO (.81) suggested excellent sampling adequacy. The 8-item scale yielded a three-factor solution conforming again to the hypothesized factors. All items loaded clearly on their respective factors, except for one item, ‘‘I have experimented with how much pain I can take.’’ Although this item loaded moderately strongly on the preparation for suicide factor (.62), it exceeded our criterion for cross-loadings on the pain tolerance factor (.36), and hence was also eliminated.

Bartlett’s test for this 7-item scale remained significant and sampling adequacy was again excellent (KMO = .76). The analysis yielded a three-factor solution: preparation for suicide (three items), fearlessness of death (two items), and pain tolerance (two items). Items cleanly loaded on their respective factors (see Table 1). Factor loadings ranged from good to excellent (Comrey & Lee, 1992), and internal consistency was good (α = .82).

In sum, exploratory factor analyses indicated that acquired capability, as measured by the ACWRSS, may be meaningfully separated into three distinct facets – pain tolerance, fearlessness of death, and preparation for suicide.
Table 1

*Rotated three-factor Principal Axis Factoring solution for the Acquired Capability with Rehearsal for Suicide Scale and Descriptive Statistics (n = 200)*

<table>
<thead>
<tr>
<th>Item</th>
<th>Fearlessness Factor</th>
<th>Pain Factor</th>
<th>Preparation Factor</th>
<th>Corrected Item-Total Correlation</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picturing my own death is very scary</td>
<td>.71</td>
<td>.22</td>
<td>.22</td>
<td>.53</td>
<td>2.80</td>
<td>2.58</td>
</tr>
<tr>
<td>Killing myself too scary to follow through</td>
<td>.69</td>
<td>.08</td>
<td>.16</td>
<td>.41</td>
<td>1.72</td>
<td>2.27</td>
</tr>
<tr>
<td>Can tolerate much more pain than used to</td>
<td>.14</td>
<td>.61</td>
<td>.22</td>
<td>.47</td>
<td>3.46</td>
<td>2.56</td>
</tr>
<tr>
<td>Learned to overcome fear of pain</td>
<td>.12</td>
<td>.75</td>
<td>.15</td>
<td>.44</td>
<td>2.44</td>
<td>2.42</td>
</tr>
<tr>
<td>Thought of least difficult ways to kill self</td>
<td>.22</td>
<td>.16</td>
<td>.90</td>
<td>.71</td>
<td>2.44</td>
<td>2.72</td>
</tr>
<tr>
<td>Gone through in my mind - dying</td>
<td>.20</td>
<td>.32</td>
<td>.59</td>
<td>.63</td>
<td>3.40</td>
<td>2.74</td>
</tr>
<tr>
<td>Considered if some ways easier</td>
<td>.22</td>
<td>.23</td>
<td>.91</td>
<td>.74</td>
<td>2.56</td>
<td>2.76</td>
</tr>
<tr>
<td><em>M</em></td>
<td>2.26</td>
<td>2.95</td>
<td>2.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>SD</em></td>
<td>2.13</td>
<td>2.16</td>
<td>2.47</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Varimax rotation was used. Bold values highlight the respective factor onto which each item loads.
Appendix 3

The Zest for Life Scale (ZLS)

The following questions refer to *your thoughts and feelings* about *life*. Please indicate how much you agree with the statements below by circling the number corresponding most closely how you feel about life at this time in your life. Your answers may range from AGREE NOT AT ALL (0) with the statement to AGREE VERY STRONGLY (8) with the statement.

<table>
<thead>
<tr>
<th>I AGREE WITH THIS STATEMENT…</th>
<th>Not At All</th>
<th>Very Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I look forward to each new day</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>2. Life feels more dull as time moves on</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>3. Life seems to hold less for me than it used to</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>4. I used to think about life as ‘half full’, now it feels more like ‘half empty’</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>5. I feel less alive than I used to</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>6. I strive to participate fully in life, not just view it from the sidelines</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>7. Life has become a drag</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>8. I wake up in the morning and look forward to what life has in store for me</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>9. I am embracing life</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>10. I am looking forward to all that life has to offer</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>11. I try to enjoy life no matter what</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>12. I never used to, but now I sometimes think ‘why bother’</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
</tbody>
</table>

Reverse-scored items: 2, 3, 4, 5, 7, 12
### Appendix 4

**The Acquired Capability with Rehearsal for Suicide Scale (ACWRSS)**

The following questions refer to *your thoughts and feelings* about *suicide*. Please indicate how much you agree with the statements below by circling the number corresponding most closely how you feel about suicide at this time in your life. Your answers may range from AGREE NOT AT ALL (0) with the statement to AGREE VERY STRONGLY (8) with the statement.

![I AGREE WITH THIS STATEMENT…](image)

<table>
<thead>
<tr>
<th></th>
<th>Not At All</th>
<th>Very Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Picturing my own death is a very scary thing for me</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>2. I have thought of ways to kill myself that would be the least difficult for me to pull off</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>3. I can tolerate pain much more than I used to</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>4. Even if I wanted to, killing myself is too scary to follow through with it</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>5. I have learned to overcome fear of pain</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>6. I have considered whether some ways to kill myself would be easier than others</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>7. I have gone through in my mind what it would be like to die</td>
<td>0 1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
</tbody>
</table>

**Subscales:**
- Pain tolerance: 5, 3
- Fearlessness of death (items are reverse scored): 1, 4
- Preparation for suicide: 6, 2, 7
Appendix 5

Awards and Presentations

Awards
Winner, Best publication Prize (2016) – Arts, Humanities, & Social Sciences
University of Western Australia


Presentations of findings from this thesis
