Mind Full of Life: Does Mindfulness Confer Resilience to Suicide by Increasing Zest for Life?

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Abstract

Background: Mindfulness is a trainable skill that may enhance resilience to suicidality among vulnerable groups such as young people. The current study examined whether mindfulness protects against suicidal desire in the face of heightened risk and adversity by increasing zest for life in a sample of university students.

Methods: In a prospective design, participants ($N = 233$) were assessed at two time points over eight weeks. Online surveys included the Mindful Attention and Awareness Scale, Zest for Life Scale, Interpersonal Needs Questionnaire, Kessler Psychological Distress Scale, and items assessing suicidal ideation and suicidal intent.

Results: Baseline mindfulness was associated with lower suicidal ideation and intent at follow-up. Moderated mediation analyses confirmed the effects of mindfulness on ideation and intent were mediated by zest for life and these indirect effects were stronger at higher versus lower levels of general (psychological distress) and suicide-specific (perceived burdensomeness and thwarted belongingness) risk.

Limitations: Single item assessments of suicidal desire.

Conclusions: Findings suggest that mindfulness protects against suicidal desire in conditions of heightened risk and adversity by enhancing one's orientation towards a life worth living.

Theories of suicide should consider the dynamic interplay between risk and life-sustaining resilience, while clinicians treating suicidality could use mindfulness strategies to strengthen the desire to (re)engage with life, thereby complementing direct amelioration of suicide risk factors.

Keywords: mindfulness, zest for life, suicide risk, suicide resilience, longitudinal design

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

Mindfulness, the process of paying attention to present-moment experience with acceptance and non-judgment, is one factor that may be pertinent to suicide resilience since it focuses on the manner in which one reacts to and copes with stressors, rather than on directly ameliorating risk (Arch and Craske, 2006; Collins et al., 2016; Desrosiers et al., 2014). A number of randomized controlled trials have shown that clinical treatments incorporating mindfulness training reduce suicidal cognitions and behaviors (e.g., Barnhofer et al., 2015; Forkmann et al., 2014; Gunderson, 2015; Linehan et al., 2006). However, these studies do not

elucidate the specific effects of mindfulness as an active ingredient in the mitigation of suicidality, nor do they provide insight into potential mechanisms by which mindfulness may reduce the likelihood of suicidal outcomes. One such potential mechanism is the enhancement of suicide resilience in the form of increased engagement with and zest for life.

Zest for life is a construct that reflects strong engagement with and a positive outlook on life; attributes that are associated with higher wellbeing (Peterson et al., 2007) and lower suicidality (Collins et al., 2016; George et al., 2017; Harrison et al., 2014). Positive future outlook is an important component of zest, however zest is a broader construct than optimism and hope because it also captures current engagement with and enthusiasm about life. This combination of positive present- and future-focused engagement is arguably critical for adaptive coping in contexts of adversity and for maintaining a sense that life is worth living, even if one's current circumstances are stressful or aversive (c.f., Linehan et al., 1983). Zest is also not simply the inverse of negative constructs such as depression, since factors that confer resilience exist on a separate dimension to risk and serve to buffer the association between risk factors and suicidal outcomes (Johnson et al., 2011). Thus, an absence of depression does not imply that one possesses a zest for life, and one can lack zest for life but not be depressed.

Recent experimental findings (Collins et al., 2016) showed that individuals who score higher on zest for life display greater persistence in the face of experimentally-induced perceived burdensomeness and thwarted belongingness (PB-TB), two interpersonal factors posited to be proximal antecedents of suicidal desire (Van Orden et al., 2010). Conversely, those who score lower on zest display less persistence in the face of this interpersonal adversity. Notably, this research found no differences in the persistence of high versus low zest individuals in the low adversity (i.e., low PB-TB) condition, indicating that the resilience conferred by zest was

relevant only when risk was elevated. This is consistent with the buffering hypothesis which states that when risk is low, resilience factors are dormant or irrelevant, since in these conditions there is no impetus for suicidality (Johnson et al., 2011). Shifting focus to the *enhancement* of resilience, research using this experimental paradigm also showed that mindfulness training delivered both prior to (Collins et al., 2016; Study 2) and during (Collins et al., 2017) the experience of interpersonal adversity increased willingness to persist. Thus, mindfulness and zest for life are factors that confer resilience to the deleterious effects of interpersonal risk factors for suicide within the laboratory.

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

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

Method

Participants and Procedures

University students ($N = 233$; 163 females; $M_{\text{age}} = 25.98$, $SD = 10.47$, range: 17–74 years) completed an online survey at the beginning of the teaching semester and again at an eight-week follow-up¹. The majority (65%) were undergraduates. Ethnicity included Caucasian-Australian (62%), European (15%), Asian (15%), and Other (8%). Participants were sent an

¹ Participants also took part in a study on acquired capability for suicide (George et al., 2016). While some of the variables examined here have some overlap with this existing research, the analyses in the present research are original.

initial invitation to participate via email and, after providing informed consent, generated their own unique identification code prior to completing the survey. Computer software with a forced-choice option was used to ensure no items were missed (Johnson, 2005). Participants had the option to view a list of available mental health resources at any point during or following completion of the questionnaires and were encouraged to make use of these resources in the event of any distress. At follow-up, participants were sent another link via email and asked to enter their unique identification code to enable data linkage with their original responses. All procedures were approved by the University's ethics review board.

Measures

Mindful Attention and Awareness Scale (MAAS short version; Brown and Ryan, 2003; Van Dam et al., 2010). The MAAS (short version) is a 5-item measure assessing dispositional mindfulness, the tendency to be mindful in daily life. It is adapted from the 15-item MAAS (Brown & Ryan, 2003) and has equivalent psychometric properties (Van Dam et al., 2010). Items such as *'It seems I am "running on automatic", without much awareness of what I'm doing'* are rated on a 6-point Likert scale ranging from 1 (*Almost Always*) to 6 (*Almost Never*). Responses are averaged such that higher scores indicate higher dispositional mindfulness. The MAAS was administered at baseline and again at follow-up. Internal consistency reliability was high on both occasions (baseline $\alpha = .89$, follow-up $\alpha = .92$).

Zest For Life Scale (ZLS; George et al., 2017). The 12-item ZLS measures engagement with, and positive outlook on, life. Agreement with questions such as 'I am embracing life' and 'I try to enjoy life no matter what' is rated on a 9-point Likert scale ('*not at all*' to '*very strongly*'), with higher scores indicating greater zest for life. The ZLS has good psychometric properties (Collins et al., 2016; George et al., 2017). The scale was administered at baseline and

follow-up and internal consistency reliability was excellent at both time points (baseline $\alpha = .95$, follow-up $\alpha = .96$).

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

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

Suicidal Ideation and Attempts (SITBI; Nock et al., 2007). Two items assessing suicidal ideation and previous suicide attempts were derived from the SITBI. Frequency of suicidal ideation over the past 12 months was assessed with one item (*'How many times in the*

past year have you thought about suicide?’) measured on a 6-point scale, with the following response options (0) = *Never*, (1) = *Once or twice a year*, (2) = *Once or twice a month*, (3) = *Once or twice a week*, (4) = *Three or four times a week*, (5) = *Almost every day*. Lifetime history of suicide attempts was measured with one item (‘*How many times in your lifetime have you made an actual attempt to kill yourself in which you had at least some intent to die?*’) rated on a 5-point scale, with the following response options (0) = *Never*, (1) = *Once*, (2) = *Twice*, (3) = *Three or four times*, (4) = *Five or more times*. The SITBI is suitable for use in non-clinical samples, has good psychometric properties (Nock et al., 2007), and can be administered in self-report format (Latimer et al., 2013). At follow-up, the items were altered to reflect incidents occurring only in the preceding four weeks.

Suicidal Intent. Suicidal intent was assessed at baseline and follow-up using a single item (‘*I have no intention of killing myself in the near future*’) measured on a 9-point scale (‘*agree not at all*’ to ‘*agree very strongly*’), so that at one end of the dimension people indicated that they agreed they did not have an intention to kill themselves and at the other they indicated that they could not agree with the absence of an intention to kill themselves (i.e., there was an intention). For ease of interpretation, data were reverse scored so that higher scores reflected greater suicidal intent.

Overview of Analyses

Descriptive statistics for risk and resilience variables were first used to characterize the study sample. Next, the bivariate relationships between variables at baseline and follow-up were examined using Pearson correlation coefficients. To examine our primary hypothesis, the effects of baseline mindfulness on suicidal desire at follow-up both directly and indirectly through zest for life at high, medium, and low levels of our three suicide risk factors were tested using

moderated mediation analyses (Preacher and Hayes, 2008). These conditional process models enable quantification of the conditional indirect effects between predictor and outcome variables (Hayes, 2013). To test the hypothesis that baseline mindfulness at Time 1 would act to prospectively influence the interaction between risk (psychological distress, perceived burdensomeness, thwarted belongingness) and resilience (zest for life) and levels of suicidal desire at Time 2, mindfulness (Time 1) was specified as the predictor, zest for life (Time 2) as the mediator, suicidal ideation and intent (Time 2) as the outcome variables, with psychological distress, perceived burdensomeness, and thwarted belongingness (Time 2) as the moderators. Models were tested separately for each of the two outcome and three moderator variables. Confidence intervals were generated for the conditional indirect effects at low (1 SD below the mean), moderate (mean), and high (1 SD above the mean) levels of the moderators. All models were run specifying 5,000 bias-corrected bootstrap samples with 95% confidence intervals and baseline levels of the respective outcome variables (ideation and intent) included as statistical controls². Point estimates are considered significant if the 95% confidence interval does not contain zero.

Results

Sample Characteristics

Data were first screened for invalid or careless responding, resulting in the exclusion of three cases. Descriptive statistics for the final sample at baseline and follow-up are displayed in Table 1. At baseline, 50.9% of participants reported having thought about suicide at least once in the past year and 11.7% reported thinking about suicide at least once in the past month. A substantial proportion (14.8%) also reported at least one lifetime suicide attempt. Mean

² Analyses were also run controlling for age, gender, and suicide attempt history. Given this did not alter the pattern of effects, results have been reported without these additional covariates.

psychological distress fell at the lower end of the ‘high distress’ band ($M = 21.43$, $SD = 7.94$), while levels of perceived burdensomeness and thwarted belongingness were comparable to other university student samples (e.g., Collins et al., 2017).

Bivariate Relationships between Risk, Resilience, and Suicidal Desire

Bivariate correlations between risk and resilience variables and suicidal desire at Time 1 and Time 2 are displayed in Table 1. Higher mindfulness at baseline was associated with higher zest for life and lower suicidal ideation and intent at follow-up. Similarly, higher levels of zest were associated with lower suicidal ideation and suicidal intent, while higher levels of the suicide risk factors (psychological distress, perceived burdensomeness, and thwarted belongingness) were associated with higher levels of ideation and intent, and lower levels of mindfulness and zest for life at both time points.

The Effects of Mindfulness on Suicidal Desire via Zest for Life

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

Suicidal Ideation. The model incorporating baseline mindfulness as the predictor, zest for life as the mediator, and psychological distress as the moderator explained a significant 64.49% of the variance in suicidal ideation at follow-up, $F(5,224) = 38.24$, $p < .001$. There was a significant negative indirect effect of baseline mindfulness on suicidal ideation via zest for life at high (indirect effect = $-.10$, 95% CI: $-.17$, $-.05$) and moderate levels of distress (indirect effect = $-.04$, 95% CI: $-.08$, $-.01$) but not low (indirect effect = $.02$, 95% CI: $-.01$, $.06$) levels of distress

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

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

burdensomeness and thwarted belongingness) risk moderator variables. Next, a second series of models were tested using suicidal intent as the outcome variable.

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

direct effect of mindfulness on suicidal intent at follow-up was non-significant (direct effect = .06, $p = .42$, 95% CI: -.09, .21).

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

Discussion

We examined whether mindfulness protects against future suicidal desire by enhancing zest for life in the face of heightened risk and adversity. In line with our first hypothesis, baseline mindfulness was significantly inversely associated with suicidal ideation and suicidal intent at follow-up. This is consistent with previous clinical trials showing mindfulness-based treatments reduce suicidal cognitions and behaviors (e.g., Barnhofer et al., 2015; Forkmann et al., 2014; Gunderson, 2015; Linehan et al., 2006) and with experimental studies showing an induced state of mindfulness confers protection against the effects of interpersonal adversity implicated as causal antecedents of suicide risk (Collins et al., 2016, 2017; Joiner, 2005). Extending these findings, we found a prospective association between mindfulness and lower levels of suicidal desire.

We then turned to the question of *how* mindfulness might have this protective effect on suicidal desire. Previous evidence suggested that mindfulness may facilitate a greater level of engagement with life that serves to offset risk and reduce the likelihood of suicide (Collins et al., 2016). According to the buffering hypothesis, this form of life-sustaining resilience is relevant only when risk is elevated (Collins et al., 2016; Johnson et al., 2011). We therefore expected to see an indirect effect of mindfulness on suicidal desire through zest for life that was stronger at higher versus lower levels of suicide risk factors. Consistent with our hypothesis, zest for life

mediated the indirect relationship between baseline mindfulness and suicidal desire at follow-up and these effects were conditional upon the level of broad and suicide-specific risk factors. Specifically, the indirect effect of mindfulness through zest for life was consistently strongest at high levels of general psychological distress, perceived burdensomeness, and thwarted belongingness. At moderate levels of these risk factors the mediation effects were relatively weaker, although in five out of the six models tested, still statistically significant. As predicted, at low levels of the moderators there were no discernible effects of mindfulness on suicidal ideation and intent through zest for life. Importantly, the conditional process models confirmed that the interaction between zest and each of the three risk factors (distress, burdensomeness, and thwarted belongingness) explained unique variance in suicidal ideation and intent at follow-up.

The current findings suggest that mindful awareness increases zest for life and this heightened zest acts as a buffer to reduce the likelihood of suicidal desire in the face of risk and adversity. This aligns with the predictions of the buffering hypothesis and previous experimental evidence showing the moderating effects of resilience are relevant only when individuals are also experiencing heightened levels of suicide risk factors (Collins et al., 2016; Johnson et al., 2011). According to fluid vulnerability theory (Rudd, 2006), suicidality has both stable and dynamic properties, including the relative balance between the wish to live and the wish to die. Treatments for suicidality may be effective because they influence both stable and dynamic aspects of this suicidal ambivalence, by increasing the wish to live as an offset to the wish to die (Bryan et al., 2016). The current results suggest that treatments that increase mindfulness may help to shift these decisional balance processes towards living over dying by enhancing zest for life. This would be consistent with research showing reduced suicidality following mindfulness-based treatments, such as Mindfulness-Based Cognitive Therapy (Barnhofer et al., 2015;

Forkmann et al., 2014) and Dialectical Behavior Therapy (Linehan et al., 2015, 2006). For instance, a primary goal in DBT is to build a life worth living by enhancing factors such as emotion regulation (Linehan, 1993). The current study suggests that mindfulness may not only enhance the capacity to regulate emotion, but also facilitate a more vigorous embracing of life despite heightened risk and adversity, thereby mitigating the likelihood of seeking escape from this perceived adversity via suicide. Moreover, engaging suicidal patients in treatment can be challenging, perhaps due in part to their ambivalence over living versus dying (Britton, 2015; Britton et al., 2011, 2008). To the extent that mindfulness-based strategies can enhance zest for life, this also might increase motivation to engage in treatment to assist in the pursuit of a life worth living (cf., Britton et al., 2011). Indeed, there is emerging evidence that mindfulness-based adjuncts to treatment are well received by suicidal individuals and enhance outcomes when used alongside more established interventions that include a structured risk management framework (Chesin et al., 2015).

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

The current study should be interpreted in the context of some limitations. First, our measures of suicidal ideation and intent were single item scales for which certain psychometric properties cannot be estimated. While we found consistent results across two measures reflecting key points along the motivational-volitional pathway to suicide (i.e., thoughts of suicide and intention to act on these thoughts; O'Connor, 2011), future research could consider other indicators of risk along the ideation-to-action pathway measured over a longer follow-up period, such as suicide attempts (Klonsky et al., 2016). Second, our suicidal intent item was phrased in a way that captures absence of intent, but with reverse scoring allowing for an estimate of the degree of presence of an intent. During the ethics review process for our study, this wording was deemed less confronting and less likely to cause distress for participants. Phrasing the question in this way makes sense conceptually, since lack of intent is likely to be the opposite of the presence of intent, and the consistent pattern of results across the ideation and intent items indicates convergent validity. However, it is possible that positive and negatively-worded items tap different constructs (c.f., Greenberger et al., 2003) and therefore future research might consider using a more direct measure of suicidal intent. Third, while a key strength of our study was its prospective design, ideally variables would be measured also at a third time point. This would enable confirmation of the direction of the effects of the mediator (zest for life) and moderator variables (distress, perceived burdensomeness, and thwarted belongingness) on suicidal desire. Fourth, the current study was conducted in a non-clinical sample of university students. Consistent with other university student samples (e.g., Collins et al., 2016; Johnson et al., 2010), levels of psychological distress and suicidality in the current study were elevated relative to the normative population (King et al., 2015; Stallman, 2010), reinforcing the notion that university students are a vulnerable group in need of more effective preventative

interventions. However, while there are arguably common core processes that underpin suicidality irrespective of clinical status (Klonsky et al., 2016; Van Orden et al., 2010), the extent to which the protective effects of mindfulness on suicidal desire through zest for life observed in the current study can be generalized to clinical samples remains unclear. Future research could therefore examine whether the current moderated mediation effects replicate in a clinical sample. Especially during recovery following a suicide attempt, mindfulness-based treatments might assist in helping patients to re-engage in a more zestful life. To the extent that zest for life is elevated and stabilized, it protects against momentary fluctuations in the dynamic balance of the wish to live and the wish to die (cf., Bryan et al., 2016). Fifth, our study did not manipulate mindfulness but rather examined the effects of dispositional mindfulness at baseline on zest for life and suicidal desire at follow-up. When taken with prior experimental research showing that even brief mindfulness training mitigates the impact of proximal risk factors within the laboratory (Collins et al., 2016, 2017), the current findings provide important preliminary evidence for the effects of mindful awareness on suicide resilience in the form of enhanced zest for life. Nevertheless, it is still unclear whether training people who are experiencing risk and adversity to be more mindful would have the same beneficial effects on zest for life and suicidal outcomes. Examining the effects of such training across both clinical and non-clinical groups with varying levels of dispositional mindfulness would be an important next step.

Finally, future research might examine the specific mechanism(s) underpinning the relationship between mindfulness and zest for life. Mindfulness-to-meaning theory (Garland et al., 2015) proposes that the ability to bring mindful awareness to current experiences enables one to reappraise stressful events and savor positive emotions, leading to an increased sense of meaning and purpose. This increase in perceived meaningfulness may in turn generate a vitality

and excitement for life as one perceives that one has a reason for living (Frankl, 1959).

Alternatively, it is possible that mindfulness has an acute effect on emotion-focused factors such as grit (Duckworth et al., 2007), helping one to persevere towards valued goals even in adverse conditions. Over time this goal-oriented behavior may serve to enhance meaning and zest for life and protect against suicide (cf., Kleiman et al., 2013). Future research could examine whether factors such as perceived meaning and grit explain the relationship between mindfulness and zest for life.

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

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

Table 1.

Descriptive statistics and correlations between questionnaire variables at baseline and follow-up.

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

Note. T1 = Variable measured at baseline (Time 1); T2 = Variable measured at follow-up (Time 2)

* $p < .001$

Table 2.

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

Suicidal Ideation							Suicidal Intent						
Predictor		Coeff.	SE	t	p	95% CI	Predictor		Coeff.	SE	t	p	95% CI
A	Zest	-.07	.04	-2.11	.036	-.15, -.01	A	Zest	-.13	.06	-2.23	.026	-.24, -.01
	Mindfulness	.03	.04	.75	.454	-.05, .10		Mindfulness	.12	.08	1.43	.155	-.05, .29
	K10	.01	.01	.94	.350	-.01, .02		K10	.02	.01	1.38	.169	-.01, .05
	Zest × K10	-.01	.01	-4.27	.000	-.02, -.01		Zest × K10	-.01	.01	-2.86	.004	-.02, -.01
	Baseline ideation	.35	.05	7.70	.000	.26, .45		Baseline intent	.50	.05	10.06	.000	.40, .59
B	Zest	-.11	.04	-2.97	.003	-.19, -.04	B	Zest	-.20	.05	-3.91	.000	-.30, -.09
	Mindfulness	.03	.04	.92	.356	-.04, .10		Mindfulness	.09	.08	1.13	.259	-.07, .25
	Burden	-.03	.05	-.65	.516	-.14, .07		Burden	-.06	.09	-.64	.521	-.24, .12
	Zest × Burden	-.08	.03	-2.78	.005	-.14, -.02		Zest × Burden	-.12	.03	-3.56	.000	-.18, -.05
	Baseline ideation	.36	.05	7.36	.000	.27, .46		Baseline intent	.49	.05	9.84	.000	.39, .59
C	Zest	-.07	.03	-2.06	.040	-.13, -.01	C	Zest	-.18	.06	-3.05	.002	-.29, -.06
	Mindfulness	.01	.03	.36	.715	-.06, .08		Mindfulness	.06	.08	.80	.424	-.09, .21
	Thwarted belong	.05	.03	1.41	.158	-.02, .12		Thwarted belong	-.01	.08	-.02	.985	-.15, .15
	Zest × Thwart belong	-.09	.02	-3.56	.000	-.14, -.04		Zest × Thwart belong	-.10	.03	-3.55	.000	-.16, -.05
	Baseline ideation	.36	.04	8.39	.000	.28, .45		Baseline intent	.50	.05	10.10	.000	.40, .60

Note. A = Psychological distress as the moderator; B = Perceived burdensomeness as the moderator; C = Thwarted belongingness as the moderator; K10 = Kessler Psychological Distress Scale. The direct effects of mindfulness on zest for life, after controlling for the other variables in the final models, were as follows. Mindfulness at baseline significantly predicted zest for life at follow-up while controlling for psychological distress (K10) and suicidal ideation, ($\beta = .13$, $p = .039$), and psychological distress and suicidal intent, ($\beta = .14$, $p = .043$). Similarly, baseline mindfulness significantly predicted follow-up zest for life while controlling for perceived burdensomeness and suicidal ideation, ($\beta = .17$, $p = .005$), and burdensomeness and suicidal intent, ($\beta = .22$, $p < .001$). Finally, mindfulness at baseline also predicted zest for life at follow-up while controlling for thwarted belongingness and suicidal ideation, ($\beta = .13$, $p = .017$), and thwarted belongingness and suicidal intent, ($\beta = .19$, $p = .001$).