

A Brief Mindfulness Intervention Attenuates Desire to Escape Following the Experimental Induction of
Interpersonal Adversity: Implications for Suicide Prevention

Khan R. L. Collins, Claudia Stebbing, Werner G. K. Stritzke and Andrew C. Page

University of Western Australia

Address correspondence to Werner Stritzke at the School of Psychology, University of Western Australia,
M304, 35 Stirling Highway, Crawley, WA. 6009, Australia. Email: werner.stritzke@uwa.edu.au,
Phone: +61 8 6488 3578, Fax: +61 8 6488 1006.

Abstract

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

Keywords: interpersonal theory of suicide, experimental psychopathology, brief mindfulness intervention, resilience, suicide prevention

Introduction

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

Perceived burdensomeness and thwarted belongingness are linked to increased risk for suicidal behavior beyond other important risk factors such as depression, hopelessness, and previous suicide attempts (Christensen, Batterham, Soubelet, & Mackinnon, 2013; Jahn, Cukrowicz, Mitchell, Poindexter, & Guidry, 2015; Joiner et al., 2009). However, the effects of thwarted belongingness and, to a lesser extent, perceived burdensomeness on suicidal ideation vary across samples (Cero, Zuromski, Witte, Ribeiro, & Joiner, 2015; Ma, Batterham, Calear, & Han, 2016). One potential explanation for these inconsistencies is that the interpersonal theory does not account for resilience factors; personal qualities that increase an individual's ability to thrive even in a context of adversity (O'Connor & Nock, 2014).

Given resilience may buffer or moderate the relationship between risk and suicidality (Johnson, Wood, Gooding, Taylor, & Tarrrier, 2011), accounting for factors that confer resilience may increase the specificity of the theory's causal predictions (Cheavens, Cukrowicz, Hansen, & Mitchell, 2016). Moreover, establishing whether enhancing resilience can attenuate the deleterious impact of the theory's putative causal risk factors may aid suicide prevention efforts (Kleiman & Anestis, 2015).

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

Importantly, this experimental paradigm also provides an opportunity to safely identify ways to attenuate the impact of interpersonal risk factors. One intervention that holds promise here is mindfulness training. Mindfulness, the process of attending to current experience with awareness and acceptance, has been associated with reduced risk of suicidality in several cross-sectional studies (Anastasiades, Kapoor, Wootten, & Lamis, 2016; Chesin & Jeglic, 2016; Lamis & Dvorak, 2013) and is a key feature of clinical treatments shown to reduce risk for suicidality (e.g., Barnhofer et al., 2015; Linehan et al., 2006). Mindfulness may protect against suicidality by enhancing acceptance of negative thoughts and emotions and facilitating re-engagement with goal-directed activities even in the face of adversity (Garland, Farb, Goldin, & Fredrickson, 2015; Kabat-Zinn, 1992; Williams & Swales, 2004). This

approach may be particularly valuable for combatting perceived burdensomeness and thwarted belongingness given these are posited to be powerful yet dynamic cognitive-affective states (Van Orden et al., 2010) that may pass or be attenuated in impact if one is able to adopt an attitude of acceptance and non-reactivity.

In the first experimental test of mindfulness as a suicide protective factor, Collins et al. (2016) found a state mindfulness induction administered prior to the experimental induction of perceived burdensomeness and thwarted belongingness stabilized the desire to escape from this adversity across time relative to a control condition without a prior mindfulness induction. That is, although both conditions yielded similar levels of desire to escape initially, participants in the mindfulness condition remained stable at this level over time (i.e., an arrested desire to escape) while participants in the control condition continued to increase in desire to escape as the task progressed (i.e., an escalating desire to escape). This provided experimental support for mindfulness as a resilience factor that may confer protection against the deleterious effects of interpersonal adversity on persistence. Although these findings are promising, to establish the utility of mindfulness as an intervention strategy it is important to examine the effects of a state mindfulness induction delivered *after* perceived burdensomeness and thwarted belongingness are already elevated, rather than only prior to this experience.

The current study, therefore, examined the effect of a brief mindfulness intervention delivered mid-way through the experimental paradigm, after perceived burdensomeness and thwarted belongingness had already begun to exert their erosive effects on task persistence. Consistent with theory and previous evidence (Collins et al., 2016), we predicted a significant linear increase in desire to escape across the initial stages of the procedure. A brief mindfulness intervention was then delivered to examine whether the deleterious effects of heightened burdensomeness and thwarted belongingness can be attenuated. We predicted that the increase in desire to escape evident in the initial stages of the task would be attenuated in the latter stages of the task only in those individuals receiving a mindfulness intervention

mid-way through. In contrast, participants in two control conditions (unfocused attention intervention and no intervention) would continue to increase in desire to escape across the span of the entire task.

Method

Participants

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

Experimental Task and Procedure

The Interpersonal Persistence Task (Collins et al., 2016) is a three-player computer task requiring participants to judge whether a pair of symbols appearing in random locations on screen are matched or mismatched. Participants are told they will win and lose points on the basis of both speed and accuracy. Points won and lost as an individual contribute to a cumulative team total, and as a team, participants are

aiming to beat a target score they are told is based on the average performance of teams who have previously completed the task. Two manipulations are used to induce perceptions of burdensomeness and thwarted belongingness.

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

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

To increase the plausibility of the manipulation, two participants are tested concurrently in adjacent booths and are told there is a third participant in a laboratory down the hall. Where necessary, a confederate of the researcher plays the part of a fellow participant. The task begins with on-screen

instructions and participants are given the opportunity to complete a practice round. The main task then runs for six blocks, comprising three rounds of five trials each. Following each of the six time blocks participants rate the extent to which: (1) they feel a burden on their team (perceived burdensomeness); (2) they feel like they do not belong in the team (belongingness); and (3) if given the opportunity, they would rather drop out of the task (desire to escape) on a 7-point Likert scale ranging from 0 (not at all true for me) to 6 (very true for me). To account for levels of relaxation/distress experienced during the task, participants are asked to rate how they are feeling after each time block on a bi-directional scale ranging from 0 (relaxed) to 6 (distressed). After completion participants rate the extent to which they made an effort to do well and were interested in the task, also on a 7-point scale.

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

Mindfulness intervention (MI). The MI was adapted from the procedure of Arch and Craske (2006) and is based on strategies used in Mindfulness-Based Stress Reduction (Kabat-Zinn, 1992) and Mindfulness-Based Cognitive Therapy (Segal, Williams, & Teasdale, 2002). The intervention consisted of written information explaining mindfulness and a 10-minute audio exercise. In the audio exercise participants are instructed to focus their attention on the sensations of the breath (i.e., focused breathing). They are also invited to adopt an accepting stance towards any thoughts, emotions, or physical sensations that may arise before bringing their awareness back to the breath. This procedure has successfully induced state mindfulness in a number of previous experimental studies (e.g., Arch & Craske, 2006; Erisman & Roemer, 2010; McHugh, Procter, Herzog, Schock, & Reed, 2012).

Unfocused attention (UA) intervention. The UA intervention required participants to let their mind wander freely as they normally would throughout the day. This form of unfocused attention reflects baseline awareness (Mason et al., 2007), the opposite of a mindful mode of processing. After initial written instruction participants viewed a screen with a reminder prompt ('Please remain seated in your

chair and let your thoughts flow’) and a moving bar showing the overall time elapsed. The intervention was matched in length to the mindfulness intervention (i.e., 10 minutes).

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

Questionnaires

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

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

internal consistency reliability in the current sample was high for both burdensomeness ($\alpha = .92$) and thwarted belongingness ($\alpha = .86$) subscales.

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

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

Self-injurious thoughts and behaviors interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007). To assess suicidal ideation, an item taken from the SITBI asked participants to indicate the number of times they had thought about suicide over the past 12 months, ranging from 0 (never) to 5 (almost every day). Although traditionally a semi-structured interview, application of SITBI items in a self-report format is psychometrically sound (Latimer, Meade, & Tennant, 2013).

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

Data Analyses

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

Results

Data screening confirmed there were no univariate or multivariate outliers, and skew and kurtosis were within recommended limits in all experimental conditions (Field, 2013). On the desire to escape variable, skewness was relatively consistent across time and experimental conditions and remained above

-1.0 at all six measurement intervals (maximum skew = -0.91 in the high PB/TB condition at Time 6). Participants also endorsed the full range of response options (0-6) on desire to escape from Time 2 onwards in all three experimental conditions.

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

Manipulation Checks

Thirteen participants indicated in the suspicion probe that they may have guessed the nature of the study design and were excluded. Participants in the three high PB/TB conditions rated significantly lower interest and effort compared to participants in the low PB/TB condition ($p < .05$), and therefore these variables were controlled for in the analyses. A 4×6 ANOVA was used to examine the effects of condition and time on perceived burdensomeness ratings. There was only a main effect of condition, $F(3, 75) = 72.33, p < .001, \eta^2_{\text{partial}} = .74$. Participants in all three high PB/TB conditions reported higher levels of burdensomeness than those in the low PB/TB condition (all p values $< .001$) (Figure 1A). This confirms the experimental manipulation increased perceptions of burdensomeness in all three high PB/TB conditions as intended. A 4×6 ANOVA examining the effects of condition and time on belongingness ratings revealed a significant main effect of condition, $F(3, 75) = 50.89, p < .001, \eta^2_{\text{partial}} = .67$. Follow-up contrasts showed that belongingness ratings were significantly lower in the three high PB/TB conditions compared to the low PB/TB condition (all p values $< .001$) (Figure 1B). This confirmed that the belongingness manipulation was successful. In addition, there was a significant main effect of time, $F(5, 71) = 21.40, p < .001, \eta^2_{\text{partial}} = .60$, and a significant condition by time interaction, $F(15, 219) = 3.36, p < .001, \eta^2_{\text{partial}} = .19$. Follow-up tests revealed a significant effect of time in each of the high conditions,

$F(5, 14) = 11.66, p < .001, \eta^2_{\text{partial}} = .81$; $F(5, 15) = 11.68, p < .001, \eta^2_{\text{partial}} = .80$; $F(5, 15) = 15.61, p < .001, \eta^2_{\text{partial}} = .84$ (high PB/TB, high PB/TB-MI, and high PB/TB-UA, respectively), but no effect of time in the low PB/TB condition, $F(5, 15) = 1.26, p = .33, \eta^2_{\text{partial}} = .30$. Participants in the high PB/TB conditions diminished in belongingness over time, whereas participants in the low PB/TB condition reported a stable high level of belongingness over time.

Desire to Escape

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

Further examination of the effect of time pre and post intervention revealed that in the high PB/TB-MI condition, desire to escape increased significantly from Time 1 to Time 3, $F(1, 19) = 27.87, p$

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

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

Desire to Escape and Suicide Risk

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

Discussion

We examined whether a brief mindfulness intervention can attenuate the effects of experimentally-induced perceived burdensomeness and thwarted belongingness on desire to escape after these interpersonal factors are already elevated. As predicted, all three high PB/TB conditions displayed a linear increase in desire to escape across the initial stages of the task. This is consistent with literature showing the thwarting of fundamental needs for competence and relatedness has a negative impact on

intrinsic motivation and persistence, thereby contributing to potential antecedents of suicide risk (Collins et al., 2016; Deci & Ryan, 2000; Ryan & Deci, 2000; Twenge et al., 2002; Van Orden et al., 2010).

Following the mindfulness intervention, however, this linear increase was arrested, with desire to escape in this condition plateauing in the latter stages of the task. In contrast, desire to escape continued to escalate in both the unfocused attention intervention and no intervention control conditions across the entire span of the task.

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

Notably, while the current results suggest that the mindfulness intervention attenuated the desire to escape, the protective effects were similar in magnitude to those reported by Collins et al. (2016) who administered the induction prior to commencing the task. However, it is possible that mindfulness may be a better preventative than crisis intervention. Indeed, mindfulness training in the presence of stressful cognitive-affective states, such as perceived burdensomeness and thwarted belongingness, may undermine the effectiveness of the intervention (Lau et al., 2006; Williams & Swales, 2004). This is in

part the justification for the initial recommendation that mindfulness-based interventions be used when patients are relatively well, rather than during a suicidal crisis (e.g., Williams & Swales, 2004). To provide further clarity on this important issue of timing, future research is needed that directly compares the effectiveness of mindfulness training delivered prior to the task with an intervention delivered in the midst of the experimental procedure.

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

Limitations and Future Directions

The current findings should be interpreted in the context of some limitations. While the data suggest that mindfulness conferred protection against any further increase in the desire to escape post intervention, an alternative explanation is that participants in the MI condition who exhibited the strongest increase in desire to escape across the initial stages of the task had reached ceiling by Time 3, obviating further increases in the latter stages of the procedure. However, a ceiling effect is less likely for several reasons. First, responses on the desire to escape item were normally distributed for the duration of the

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

A second limitation concerns the screening process selecting individuals scoring in the mid-range on dispositional mindfulness. Specifically, it remains unclear whether our mindfulness intervention would have had the same beneficial effects for individuals who are lower on dispositional mindfulness. If mindfulness is a suicide resilience factor, it is likely that individuals prone to suicidality would be less inclined to adopt a mindful mode of processing in daily life. To minimize individual differences in dispositional mindfulness, and the potential impact this may have had on the mindfulness intervention, we deliberately excluded individuals who scored in the extremes on this variable. Future research might therefore test the effects of a mindfulness intervention in individuals who are either low or high on

dispositional mindfulness. It may be that people low in dispositional mindfulness show the greatest benefit from enhancing their mindfulness via an intervention. Alternatively, a moderate level of dispositional mindfulness may be required to benefit from such interventions to reduce interpersonal antecedents of suicidal desire.

A third limitation is the use of explicit questioning concerning perceptions of burdensomeness, belongingness, and desire to escape throughout the task raises the possibility of demand characteristics, although the large effects of condition evident by the first rating interval mitigate this concern somewhat. Lastly, it is still unclear what mechanism(s) underlie the protective effects of mindfulness. While the literature suggests that mindfulness may promote meaning-making and engagement with life despite adversity (e.g., Garland, Farb, Goldin, et al., 2015), the present study is unable to elucidate these potential mechanisms of action. Thus, future research may consider incorporating additional measures to provide further insight into the positive effects of mindfulness on persistence in adversity.

In conclusion, the current study complements existing literature suggesting mindfulness-based interventions may mitigate the likelihood of suicidal behavior. A mindfulness intervention delivered to participants reporting heightened perceived burdensomeness and thwarted belongingness attenuated the deleterious impact of these interpersonal factors on the desire to escape. These findings suggest that mindfulness training may help at-risk individuals persist with living in the face of thwarted interpersonal needs.

Compliance with Ethical Standards

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from all individual participants included in the study.

Conflict of Interest

The authors declare that they have no conflicts of interest.

References

- Anastasiades, M. H., Kapoor, S., Wootten, J., & Lamis, D. A. (2016). Perceived stress, depressive symptoms, and suicidal ideation in undergraduate women with varying levels of mindfulness. *Archives of Women's Mental Health*, 1–10. <https://doi.org/10.1007/s00737-016-0686-5>
- Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy*, 44(12), 1849–1858. <https://doi.org/10.1016/j.brat.2005.12.007>
- Barnhofer, T., Crane, C., Brennan, K., Duggan, D. S., Crane, R. S., Eames, C., ... Williams, J. M. G. (2015). Mindfulness-based cognitive therapy (MBCT) reduces the association between depressive symptoms and suicidal cognitions in patients with a history of suicidal depression. *Journal of Consulting and Clinical Psychology*, 83(6), 1013–1020. <https://doi.org/10.1037/ccp0000027>
- Baumeister, R. F. (1990). Suicide as escape from self. *Psychological Review*, 97(1), 90–113. <https://doi.org/10.1037/0033-295X.97.1.90>
- Cero, I., Zuromski, K. L., Witte, T. K., Ribeiro, J. D., & Joiner, T. E. (2015). Perceived burdensomeness, thwarted belongingness, and suicide ideation: Re-examination of the interpersonal-psychological theory in two Samples. *Psychiatry Research*. <https://doi.org/10.1016/j.psychres.2015.05.055>
- Cheavens, J. S., Cukrowicz, K. C., Hansen, R., & Mitchell, S. M. (2016). Incorporating Resilience Factors Into the Interpersonal Theory of Suicide: The Role of Hope and Self-Forgiveness in an Older Adult Sample. *Journal of Clinical Psychology*, 72(1), 58–69. <https://doi.org/10.1002/jclp.22230>
- Chesin, M. S., & Jeglic, E. L. (2016). Factors Associated with Recurrent Suicidal Ideation among Racially and Ethnically Diverse College Students with a History of Suicide Attempt: The Role of Mindfulness. *Archives of Suicide Research*, 20(1), 29–44. <https://doi.org/10.1080/13811118.2015.1004488>

- Chesin, M. S., Sonmez, C. C., Benjamin-Phillips, C. A., Beeler, B., Brodsky, B. S., & Stanley, B. (2015). Preliminary Effectiveness of Adjunct Mindfulness-Based Cognitive Therapy to Prevent Suicidal Behavior in Outpatients Who Are at Elevated Suicide Risk. *Mindfulness*, 1–11.
<https://doi.org/10.1007/s12671-015-0405-8>
- Christensen, H., Batterham, P. J., Soubelet, A., & Mackinnon, A. J. (2013). A test of the Interpersonal Theory of Suicide in a large community-based cohort. *Journal of Affective Disorders*, 144(3), 225–234. <https://doi.org/10.1016/j.jad.2012.07.002>
- Collins, K. R., Best, I., Stritzke, W. G. K., & Page, A. C. (2016). Mindfulness and Zest for Life Buffer the Negative Effects of Experimentally-Induced Perceived Burdensomeness and Thwarted Belongingness: Implications for Theories of Suicide. *Journal of Abnormal Psychology*, 125(5), 704–714. <https://doi.org/10.1037/abn0000167>
- Cvetkovski, S., Reavley, N. J., & Jorm, A. F. (2012). The prevalence and correlates of psychological distress in Australian tertiary students compared to their community peers. *Australian and New Zealand Journal of Psychiatry*, 46(5), 457–467. <https://doi.org/10.1177/0004867411435290>
- Erisman, S. M., & Roemer, L. (2010). A preliminary investigation of the effects of experimentally induced mindfulness on emotional responding to film clips. *Emotion*, 10(1), 72–82.
<https://doi.org/10.1037/a0017162>
- Farb, N. A. S., Anderson, A. K., Mayberg, H., Bean, J., McKeon, D., & Segal, Z. V. (2010). Minding one's emotions: Mindfulness training alters the neural expression of sadness. *Emotion*, 10(1), 25–33. <https://doi.org/10.1037/a0017151>
- Field, A. (2013). *Discovering Statistics Using IBM SPSS Statistics* (4th ed.). London: SAGE.
- Forkmann, T., Wichers, M., Geschwind, N., Peeters, F., van Os, J., Mainz, V., & Collip, D. (2014). Effects of mindfulness-based cognitive therapy on self-reported suicidal ideation: results from a randomised controlled trial in patients with residual depressive symptoms. *Comprehensive Psychiatry*, 55(8), 1883–1890. <https://doi.org/10.1016/j.comppsy.2014.08.043>

- Garland, E. L., Farb, N. A. S., Goldin, P. R., & Fredrickson, B. L. (2015). Mindfulness Broadens Awareness and Builds Eudaimonic Meaning: A Process Model of Mindful Positive Emotion Regulation. *Psychological Inquiry*, 26(4), 293–314.
<https://doi.org/10.1080/1047840X.2015.1064294>
- Jahn, D. R., Cukrowicz, K. C., Mitchell, S. M., Poindexter, E. K., & Guidry, E. T. (2015). The Mediating Role of Perceived Burdensomeness in Relations Between Domains of Cognitive Functioning and Indicators of Suicide Risk. *Journal of Clinical Psychology*, n/a-n/a.
<https://doi.org/10.1002/jclp.22190>
- Johnson, J., Wood, A. ., Gooding, P. A., Taylor, P. J., & Tarrier, N. (2011). Resilience to suicidality: The buffering hypothesis. *Clinical Psychology Review*, 31(4), 563–591.
<https://doi.org/10.1016/j.cpr.2010.12.007>
- Joiner, T. E., Van Orden, K. A., Witte, T. K., Selby, E. A., Ribeiro, J. D., Lewis, R., & David, M. (2009). Main predictions of the interpersonal–psychological theory of suicidal behavior: Empirical tests in two samples of young adults. *Journal of Abnormal Psychology*, 118(3), 634–646.
<https://doi.org/10.1037/a0016500>
- Kabat-Zinn, J. (1992). *Full Catastrophe Living: How to cope with stress, pain and illness using mindfulness meditation*. Hachette UK.
- Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L. T., ... Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, 32(06), 959–976.
<https://doi.org/10.1017/S0033291702006074>
- Kleiman, E. M., & Anestis, M. D. (2015). Introduction to the Special Issue: Recent Advances in Suicide Research: Mediators and Moderators of Risk and Resilience. *International Journal of Cognitive Therapy*, 8(2), 95–98. <https://doi.org/10.1521/ijct.2015.8.2.95>

- Kohls, N., Sauer, S., & Walach, H. (2009). Facets of mindfulness – Results of an online study investigating the Freiburg mindfulness inventory. *Personality and Individual Differences, 46*(2), 224–230. <https://doi.org/10.1016/j.paid.2008.10.009>
- Lamis, D. A., & Dvorak, R. D. (2013). Mindfulness, Nonattachment, and Suicide Rumination in College Students: The Mediating Role of Depressive Symptoms. *Mindfulness, 5*(5), 487–496. <https://doi.org/10.1007/s12671-013-0203-0>
- Latimer, S., Meade, T., & Tennant, A. (2013). Measuring engagement in deliberate self-harm behaviours: psychometric evaluation of six scales. *BMC Psychiatry, 13*(1), 4. <https://doi.org/10.1186/1471-244X-13-4>
- Lau, M. A., Bishop, S. R., Segal, Z. V., Buis, T., Anderson, N. D., Carlson, L., ... Devins, G. (2006). The toronto mindfulness scale: Development and validation. *Journal of Clinical Psychology, 62*(12), 1445–1467. <https://doi.org/10.1002/jclp.20326>
- Leary, M. R., Kelly, K. M., Cottrell, C. A., & Schreindorfer, L. S. (2013). Construct Validity of the Need to Belong Scale: Mapping the Nomological Network. *Journal of Personality Assessment, 95*(6), 610–624. <https://doi.org/10.1080/00223891.2013.819511>
- Linehan, M. M., Comtois, K. A., Murray, A. M., Brown, M. Z., Gallop, R. J., Heard, H. L., ... Lindenboim, N. (2006). Two-Year Randomized Controlled Trial and Follow-up of Dialectical Behavior Therapy vs Therapy by Experts for Suicidal Behaviors and Borderline Personality Disorder. *Archives of General Psychiatry, 63*(7), 757–766. <https://doi.org/10.1001/archpsyc.63.7.757>
- Ma, J., Batterham, P. J., Calear, A. L., & Han, J. (2016). A systematic review of the predictions of the Interpersonal–Psychological Theory of Suicidal Behavior. *Clinical Psychology Review, 46*, 34–45. <https://doi.org/10.1016/j.cpr.2016.04.008>
- Mason, M. F., Norton, M. I., Horn, J. D. V., Wegner, D. M., Grafton, S. T., & Macrae, C. N. (2007). Wandering Minds: The Default Network and Stimulus-Independent Thought. *Science, 315*(5810), 393–395. <https://doi.org/10.1126/science.1131295>

- McHugh, L., Procter, J., Herzog, M., Schock, A.-K., & Reed, P. (2012). The effect of mindfulness on extinction and behavioral resurgence. *Learning & Behavior, 40*(4), 405–415.
<https://doi.org/10.3758/s13420-011-0062-2>
- Nock, M. K., Holmberg, E. B., Photos, V. I., & Michel, B. D. (2007). Self-Injurious Thoughts and Behaviors Interview: Development, reliability, and validity in an adolescent sample. *Psychological Assessment, 19*(3), 309–317. <https://doi.org/10.1037/1040-3590.19.3.309>
- O'Connor, R. C. (2011). Toward an integrated motivational – volitional model of suicidal behavior. In R. C. O'Connor, S. Platt, & J. Gordon (Eds.), *International Handbook of Suicide Prevention: Research, Policy and Practice* (pp. 181–198). Chichester: Wiley Blackwell.
- O'Connor, R. C., & Nock, M. K. (2014). The psychology of suicidal behaviour. *The Lancet Psychiatry, 1*(1), 73–85. [https://doi.org/10.1016/S2215-0366\(14\)70222-6](https://doi.org/10.1016/S2215-0366(14)70222-6)
- Page, A. C., & Stritzke, W. G. K. (2015). *Clinical Psychology for Trainees: Foundations of Science-Informed Practice* (2nd ed.). Cambridge: Cambridge University Press.
- Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based Cognitive Therapy for Depression: A New Approach to Preventing Relapse*. Guilford Press.
- Van Orden, K. A., Cukrowicz, K. C., Witte, T. K., & Joiner, T. E. (2012). Thwarted belongingness and perceived burdensomeness: Construct validity and psychometric properties of the Interpersonal Needs Questionnaire. *Psychological Assessment, 24*(1), 197–215.
<https://doi.org/10.1037/a0025358>
- Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S. R., Selby, E. A., & Joiner, T. E. (2010). The interpersonal theory of suicide. *Psychological Review, 117*(2), 575–600.
<https://doi.org/10.1037/a0018697>
- Walach, H., Buchheld, N., Buttenmüller, V., Kleinknecht, N., & Schmidt, S. (2006). Measuring mindfulness—the Freiburg Mindfulness Inventory (FMI). *Personality and Individual Differences, 40*(8), 1543–1555. <https://doi.org/10.1016/j.paid.2005.11.025>

Williams, J. M. G., & Pollock, L. R. (2000). The Psychology of Suicidal Behaviour. In K. Hawton & K. van Heeringen (Eds.), *The International Handbook of Suicide and Attempted Suicide* (pp. 79–94). London: John Wiley.

Williams, J. M. G., & Swales, M. (2004). The Use of Mindfulness-Based Approaches for Suicidal Patients. *Archives of Suicide Research*, 8(4), 315–329.
<https://doi.org/10.1080/13811110490476671>

World Health Organization. (2014). *Preventing suicide: a global imperative*. World Health Organization.

Table 1

Descriptive Statistics for the Questionnaire Variables.

	<i>M</i>	<i>SD</i>
Perceived burdensomeness	.84	.99
Thwarted belongingness	1.32	.89
Dispositional mindfulness	2.71	.45
Suicide ideation	1.60	.83
Suicide intent	2.12	2.44
Suicide likelihood	2.21	2.52
Psychological distress	19.89	5.57
Need to belong	4.10	.65

Table 2

Mean Desire to Escape Ratings Across Time Blocks and Conditions.

	Low PB/TB <i>M (SD)</i>	High PB/TB <i>M (SD)</i>	Mindfulness <i>M (SD)</i>	Unfocused <i>M (SD)</i>
Time 1	0.65 (1.23)	2.05 (1.27)	2.35 (1.45)	2.15 (1.42)
Time 2	0.55 (0.76)	2.95 (1.62)	3.80 (2.07)	2.90 (2.08)
Time 3	0.40 (0.60)	3.37 (1.67)	4.10 (2.07)	2.70 (1.98)
Time 4	0.45 (0.76)	3.05 (1.72)	3.75 (2.07)	2.65 (2.01)
Time 5	0.40 (0.68)	3.84 (2.01)	4.10 (1.94)	2.90 (2.20)
Time 6	0.40 (0.68)	4.16 (1.74)	4.40 (1.82)	3.40 (2.40)

Table 3

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

	<i>b</i>	SE <i>b</i>	β	R^2	R^2 Change
Step 1				.37**	
Effort	-.30	.15	-.22*		
Interest	-.32	.11	-.32**		
Distress	.61	.15	.45**		
Step 2				.50**	.13**
Effort	-.36	.14	-.26*		
Interest	-.11	.11	-.12		
Distress	.13	.19	.10		
Burdensomeness	.64	.21	.41**		
Belongingness	-.48	.18	-.31*		

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

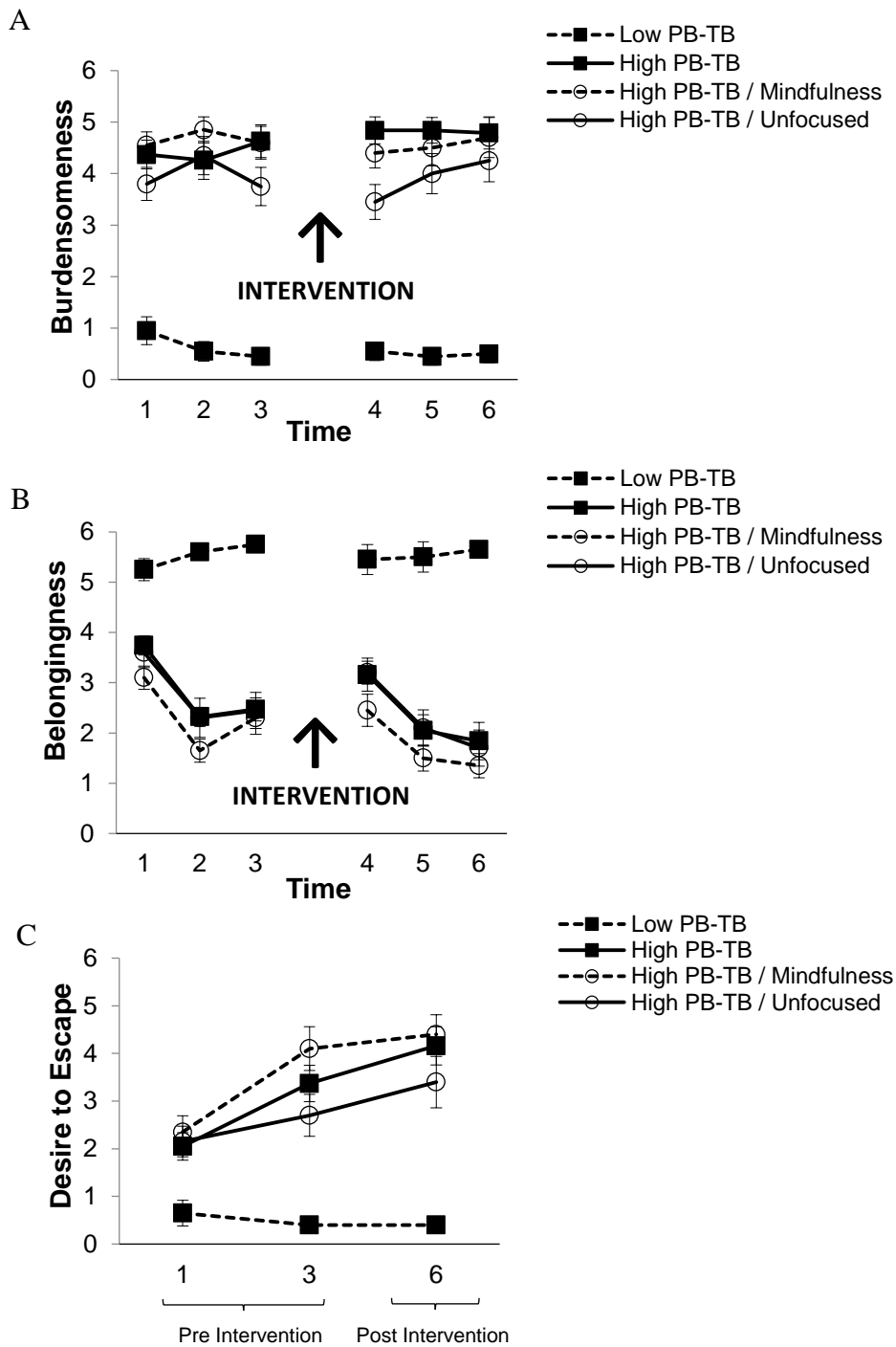


Figure 1. Interpersonal Persistence Task ratings. Panel A shows mean burdensomeness; Panel B shows mean belongingness; and Panel C shows mean desire to escape ratings depicted as linear trends pre and post intervention. Error bars represent standard error of the mean.