Dynamic Changes in the Ability to Persist Through Interpersonal Adversity: A Fluid
Experimental Assessment of the Interpersonal Theory of Suicide

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Abstract

Given suicide risk is dynamic, research needs to identify the factors responsible for these changes. This can be achieved through experimentally manipulating putative causal risk factors. Two studies experimentally manipulated a change in interpersonal risk factors (thwarted belongingness and perceived burdensomeness) to assess the influence on participants' ability to persist through adversity. Study 1 ($N = 72$) found manipulating simultaneous changes in burdensomeness and belongingness rapidly changed participants' ability to persist. In Study 2 ($N = 54$), a change in only thwarted belongingness was still effective in quickly changing participants' ability to persist through the task, even in the presence of heightened feelings of burdensomeness. The findings speak to the causal role that changes in the levels of interpersonal risk factors may play in increasing suicide risk.

Keywords: interpersonal theory of suicide, belongingness, perceived burdensomeness, experimental psychopathology

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Suicide risk fluctuates over time. Consequently, dynamic changes in suicide risk cannot be fully captured by static measurements. This variability is a key premise of the Fluid Vulnerability Theory of Suicide (Rudd, 2006), which proposes that dynamic interplay between various risk factors (e.g., social support, insomnia, life events) can cause short-term periods of heightened suicide risk. Exploring these periods allows for an understanding of *when*, in addition to *why*, an individual will begin to think about and attempt suicide (Bryan & Rudd, 2016). As such, failing to acknowledge changes in suicide risk not only hinders clinical assessments of risk; it limits our understanding of suicide. Until recently the variability in suicide risk has received little empirical attention, with the focus being upon cross-sectional studies. In contrast, Kleiman et al. (2017) have repeatedly measured the suicidal thoughts of past suicide attempters, finding significant fluctuations within only a few hours. Their observation that individual variability was more common than stability points to the importance of measuring fluid vulnerability. Likewise, Kyron et al. (Under Review) found suicidal ideation to vary daily within an inpatient setting, with associated risk factors driving change. Building on these important studies, two further areas warrant investigation: firstly, the short-term impact of changes in suicide risks factors; and secondly, experimental studies that isolate and manipulate risk to determine causality. The current study looks to implement an experimental design to assess how changes in suicide risk variables can influence persistence through interpersonal adversity.

Experimental assessments of suicide risk are still uncommon; however, Collins, Best, Stritzke, and Page (2016) developed a laboratory-based paradigm capable of measuring the impact of manipulating risk factors for suicide and thereby testing the predictions of

conceptual models. Although the paradigm does not aim to induce suicidal risk, by manipulating the putative risk factors in a controlled setting, it does aim to test predictions of various models and thereby complement the broader suicide literature. The Interpersonal Persistence Task (Collins et al., 2016; Collins, Stebbing, Stritzke, & Page, 2017) provides interpersonal feedback to participants to manipulate two (of the three) key variables proposed in the Interpersonal Theory of Suicide (Joiner, 2005): thwarted belongingness, when an individual's innate desire to feel socially connected is not met; and perceived burdensomeness, when an individual feels they are a burden on those around them. An increase in both factors was effective in increasing participants' desire to drop out of the task. Thus, the paradigm tested predictions of the theory indirectly, by assessing persistence in the face of interpersonal adversity on the assumption that these interpersonal factors will have effects not only on suicide ideation, but also on conceptually related constructs (i.e., thwarted belongingness and perceived burdensomeness; see Collins et al., 2016). In addition, George and colleagues demonstrated that the detrimental effects of changes in thwarted belongingness and perceived burdensomeness in the task arose specifically as a result of their 'interpersonal' nature and not as a consequence of the negativity of the comments or the feedback about poor task performance (George, Collins, Cao, Stritzke, & Page, 2017).

Despite real-time assessments indicating swift variability in suicide risk, the extent to which rapid fluctuations could be driven by changes in interpersonal factors is not clear. The fluid vulnerability theory suggests that an increase in the number of suicide risk factors can trigger short-term periods of elevated suicide risk, while the removal of risk factors is theorized to resolve an episode. Thus, an increase in perceived burden (e.g., loss of a job) or thwarted belongingness (e.g., divorce) may cause sharp increases in a desire to suicide. On the other hand, a gain in interpersonal circumstances, such as acquiring a job or entering a positive relationship, may effectively resolve a high-risk period. Indeed, when assessing

factors over time in a clinical setting, Kleiman et al. (2017) noted that interpersonal factors tend to covary with changes in suicidal ideation. Therefore, while the fluid vulnerability theory suggests that a change in suicide risk factors would be sufficient to causes changes in suicidal ideation, this is yet to be explored in a controlled manner.

Rationale and Aims of the Current Study

Despite developments in experimentally assessing brief high-risk periods, there has not yet been an explicit assessment of changes in the risk factors. Given propositions from the Fluid Vulnerability Theory as to how interpersonal factors can trigger short-term changes in suicidal ideation, the literature would benefit from an experiment assessing the effects of stable and changing interpersonal experiences. Building on Collins et al. (2016), the interpersonal persistence task used in their study can be modified to manipulate changes in interpersonal conditions. This will provide an indication of the effects positive or negative changes in interpersonal settings can have on persistence. Interpersonal factors and persistence will be tracked throughout the experiment, allowing a comparison of before and after a change in interpersonal circumstances midway through the task. Study 1 will assess a rapid and dramatic change in both perceived burdensomeness and belongingness and Study 2 will assess a change in belongingness while keeping burdensomeness constantly high.

The current research will allow for an examination into the causal relationship between interpersonal factors and changes in persistence. Following the predictions of the Interpersonal Theory of Suicide, we expect two outcomes in both studies: (i) higher levels of interpersonal adversity to be associated with lower levels of persistence, as per Collins et al. (2016); and (ii) an increase in interpersonal adversity to be associated with a decrease in persistence, and vice versa.

Study 1

Method

Participants

Seventy-two introductory psychology students ($M_{age}=20.06$, $SD=4.44$, 57% female) participated in the study. Participants were invited if they had burdensomeness and belongingness scores that were in the middle two quartiles of the distribution of all students on the Interpersonal Needs Questionnaire. Participants were randomly allocated to a high or low perceived burdensomeness and thwarted belongingness (PB-TB) condition. All procedures were approved by the University's Human Research Ethics Committee.

Measures

Interpersonal Needs Questionnaire (INQ; Van Orden et al., 2012). The INQ is a 15-item measure with two subscales assessing perceived burdensomeness and thwarted belongingness. It has excellent psychometric properties (Van Orden et al., 2008). Participants rate their agreement with statements such as “The people in my life would be better off if I were gone” (perceived burdensomeness) and “I rarely interact with people who care about me” (thwarted belongingness) on a 7-point Likert scale ranging from 0 (not at all true for me) to 6 (very true for me), with higher scores indicating greater perceived burdensomeness and thwarted belongingness. Internal consistency in the current sample was high for both burdensomeness ($\alpha=.95$) and belongingness ($\alpha=.93$) scales.

Experimental Task and Procedure. The interpersonal persistence task is a three player team-based task, whereby participants score points by correctly and quickly indicating whether two stimuli (i.e., $\acute{Y}$ and $\ddot{U}$), displayed on a computer screen, were the same or different. Participants were informed that one point is awarded for a rapid and correct response, with a point deducted for a slow or incorrect response. The aim for each team member would be to score as many points as possible, with scores contributing to a team score. The goal of the task would be for the team to beat a target score, which is presented as

an average of prior teams partaking in the task at prior points in time. Not beating the target score would result in the team losing the game.

Structure of the Task. There were six rounds of testing to complete in the task, with each round comprising of fifteen trials. That is, each round a participant was required to differentiate between stimuli on fifteen occasions per round. At various stages throughout each round, participants were provided with a team score summary table, which presented their score, their teammates' scores, and the total team score. In addition, a target score to for the team to beat was presented to all participants. Therefore, participants were made aware as to whether they were performing better or worse than their teammates, and whether the team was winning or losing the task at various stages.

The current study was interested in comparing stable and changing interpersonal experiences. To do so, there would be a change in interpersonal conditions for some participants halfway through the task. That is, some participants would remain in the high or low PB-TB condition for the duration of the experiment, and some would transition between the two conditions. As such, the task could be broken into Phase 1 (Rounds 1-3) and Phase 2 (Rounds 4-6). In total, the task took roughly half an hour to complete.

Manipulating Burdensomeness. Perceived burdensomeness was induced using performance related feedback delivered each round. As discussed, the situation presented to the participant was for the team to beat a target score to 'win' the game. Therefore, a poor individual score affected whether the team was successful in task. The success a participant had in each condition, and the performance of the team more generally was pre-determined, and therefore their actual performance was not reflected in the score. In the high PB-TB condition, the participant had a much lower chance of success, while in the low PB-TB condition they had a much higher chance of success. For instance, in the high PB-TB condition, odds were that a participant would have score correctly four out of ten times

regardless of how they were performing. This was to ensure that participants in the high PB-TB condition always performed worse than their teammates, and the team were unable to meet their target. On the other hand, in the low PB-TB condition the participant performed equal to or better than their teammates, with the team always beating the target score. Thus, participants in the high PB-TB condition were encouraged to perceive that they were not effectively contributing to their team and burdening the team's success in the task.

Manipulating Belongingness. Thwarted belongingness was manipulated through the use of interpersonal feedback statements from teammates. At the end of each round the participants were given the opportunity to provide and receive feedback to and from their teammates. Unbeknownst to the participant, teammates would be computer-controlled and the comments sent to the participant predetermined. This would allow for uniform interpersonal experiences for each participant. To reduce suspicions of the computer-generated nature of teammates, other participants were tested the same time in adjacent computer booths and presented as being part of the same team. As such, participants could see, but not communicate with each other. The participants in the high PB-TB condition consistently did worse than their teammates, and the team would fail to reach the target. Thus, the participants' teammates provided negative and critical feedback that they were letting down the team. Participants in the high PB-TB condition received comments such as "ur falling behind hang in there" and "try a bit harder next time". In the low PB-TB condition the participants would perform better than their teammates, as would the team overall. To compliment their performance, participants would receive positive feedback, such as "well done, keep it up!" and "good job, keep going like that".

Experimental Design. The current study was interested in whether a single interpersonal change was sufficient in affecting persistence. Participants were randomly assigned to begin the experiment in either a high or low PB-TB condition (i.e., Starting

Condition). Half way through the experiment, participants either continued in the same PB-TB condition (i.e., Stable) or they changed to the other PB-TB condition (i.e., Switch). Therefore, the study used a 2 (Starting Condition: Low or High PB-TB) x 2 (Stable or Switch: whether PB-TB condition changed halfway through the task) x 2 (Phase: Phase 1 and Phase 2) x 3 (Rounds Per Phase) Mixed-Design. In total, there would four experimental conditions: two *stable* control groups, who had a uniform experience for the duration (Low-Low or High-High PB-TB) and two *switch* groups who experienced changes in interpersonal adversity from high PB-TB to low PB-TB, or from low PB-TB to high PB-TB (High-Low or Low-High PB-TB, respectively).

Measuring Burdensomeness, Belongingness and Persistence. At the end of each round, participants were asked a series of questions to assess their feelings of burdensomeness, belongingness and desire to drop out. For burdensomeness, participants were asked, “*at the moment I feel like...*” providing their response on a 7 point Likert scale ranging from 0 = “*an asset on the team*” to 6 = “*a burden on the team*”. For belongingness, participants were asked “*at the moment I feel like...*” providing their response on a 7 point Likert scale ranging from 0 = “*an outsider*” to 6 = “*I belong on the team*”. Desire to drop out was measured by responses to a single question “*if I had the option, I would rather drop out of the game*” on a 7 point Likert scale (0 = *not at all true for me*, 6 = *very true for me*).

Results and Discussion

Suspicion Check

In total, two participants indicated they were suspicious of the nature of the task and were removed from the analyses, leaving 70 participants (although leaving them in the analysis did not change the pattern of results).

Assessing the Manipulation

Perceived Burdensomeness. To assess the effects of a switch in PB-TB condition on feelings of burdensomeness, a 2 (Starting Condition: Low or High PB-TB) x 2 (Stable or Switch: whether PB-TB condition changed halfway through the task) x 2 (Phase: Phase 1 and Phase 2) x 3 (Rounds) Mixed-Design ANOVA, was performed (Figure 1; panel A). The efficacy of the manipulation on burdensomeness was indicated by a significant three-way interaction between starting condition and whether conditions changed over the two experimental phases (i.e., Phase 1: Rounds 1-3 and Phase 2: Rounds 4-6), $F(1, 34) = 38.54, p < .01, n^2_{\text{partial}} = 0.36$.

Follow up contrasts revealed that for participants who remained in either high or low PB-TB conditions for the duration of the experiment, feelings of burden did not significantly change from phase 1 to phase 2, $F(1, 44) = 0.17, p > 0.05, n^2_{\text{partial}} = 0.08$. In contrast, for the participants who switched from low to high PB-TB (or vice versa) half way through the experiment, there was a significant interaction, $F(1, 26) = 25.40, p < 0.001, n^2_{\text{partial}} = 0.53$. That is, when there was a change in interpersonal conditions halfway through the task, there was a corresponding change in burdensomeness. Therefore, the task was successful in manipulating burdensomeness as intended.

Thwarted Belongingness. In addition to changes in burdensomeness, a successful manipulation would require a similar pattern of changes in belongingness (Figure 1; Panel B). A 2 (Starting Condition: Low or High PB-TB) x 2 (Stable or Switch: whether PB-TB condition changed halfway through the task) x 2 (Phase: Phase 1 and Phase 2) x 3 (Rounds) Mixed-Design ANOVA was run, with belongingness as the dependent variable. There was a significant three-way interaction, indicating that the groups who changed PB-TB condition across the two phases of the experiment had different patterns of belongingness, $F(1.79, 73.82) = 11.47, p < .001, n^2_{\text{partial}} = 0.14$. That is, feelings of belongingness did not change over the two experimental phases (i.e., rounds 1-3 versus 4-6), for participants who remained

in either high or low PB-TB conditions for the duration of the experiment, $F(1.73, 44.6) = 1.194, p > 0.05, n^2_{\text{partial}} = .26$. In contrast, the belongingness scores changed in the expected direction when PB-TB condition changed mid-way through the experiment, $F(1.873, 35.50) = 23.64, p < 0.001, n^2_{\text{partial}} = .48$. Therefore, the manipulation was successful in changing belongingness as desired.

A

B

Figure 1: Self-reported ratings across Phase 1 (Rounds 1-3) to Phase 2 (Rounds 4-6)

for all four groups. Panel A shows changes in burdensomeness, while Panel B shows changes in belongingness.

Evaluating Effects of a Change in Interpersonal Circumstances on Persistence

Our main interest was whether a short-term change in burdensomeness and belongingness would change the desire to drop out of the task. Results indicated a significant three-way interaction between starting condition and whether or not a change in conditions occurred throughout the task, from phase 1 to phase 2, $F(1, 70) = 25.39, p < 0.01, n^2_{\text{partial}} = .27$. Follow-up contrasts revealed that participants who were exposed to the same high or low levels of burdensomeness and belongingness for the duration of the experiment did not report significantly different desire to drop out over the experiment, $F(1, 44) = 1.42, p > 0.05, n^2_{\text{partial}} = .03$. Importantly, desire to drop out immediately changed for those who switched from Low to High PB-TB conditions (Phase 1 = 1.41 versus Phase 2 = 2.88) and for participants who switched from High to Low PB-TB conditions (Phase 1 = 2.71 versus Phase 2 = 1.95; $F(1, 26) = 25.30, p < 0.001, n^2_{\text{partial}} = .49$). Therefore, significant changes in the desire to escape the interpersonal adversity occurred in response to changes in interpersonal circumstances.

Figure 2: Self-reported desire to drop out scores over both phases (Phase 1 = Rounds 1-3, Phase 2 = Rounds 4-6) for the four groups.

While the results indicate a change in persistence occurred through a change in interpersonal feedback, it was not clear whether this occurred for both change conditions. Follow-up tests showed that for participants who switched from the low PB-TB condition in Phase 1 ($M = 1.41$, $SD = 1.69$) to the high PB-TB condition in Phase 2 ($M = 2.88$, $SD = 2.00$), there was a significant increase in desire to drop out, $t(13) = -4.11$, $p < 0.001$, Cohen's $d = 1.16$. In the high-low condition there was also a significant drop in desire to drop out from Phase 1 ($M = 2.71$, $SD = 1.27$) to Phase 2 ($M = 1.95$, $SD = 1.38$), $t(13) = 2.90$, $p < 0.01$, Cohen's $d = 0.93$. These two results taken together suggest that changes in interpersonal circumstances, in either direction, result in significant changes in a desire to drop out.

The current study experimentally manipulated a change in feelings of belongingness and burdensomeness through changes in comments from teammates and feedback about performance on the task, respectively. Both groups that experienced a switch in conditions reported significant changes in desire to drop out. A rise in interpersonal risk factors raised the desire to drop out of the task, while a removal of these risk factors caused a decline in desire to drop out. Therefore, despite experiencing interpersonal success or adversity early in the experiment, these effects were effectively reversed with a change of interpersonal circumstances.

Study 2

Having demonstrated that changes in a desire to escape from interpersonal adversity was a function of the levels of perceived burdensomeness and thwarted belongingness, Study 2 aimed to assess the influence of interpersonal factors when varied independently. While cross-sectional assessments indicate the combined presence of perceived burdensomeness and thwarted belongingness has a greater effect on suicide risk than either factor alone, the transition between these states has not been explored (Van Orden et al. 2008). Therefore, the

magnitude of change in suicide risk due to a change in only one interpersonal variable is unclear.

Similar to the previous study, two groups would experience stable positive or negative interpersonal feedback, while other groups would experience a change. However, performance feedback would be manipulated to remain poor for all individuals. That is, all participants would always score worse than their teammates, and the team would fail to score above the target as a result. With perceptions of burdensomeness remaining high, the study can investigate the degree to which thwarted belongingness can independently affect persistence in the face of interpersonal adversity.

Method

Participants. Fifty-Four first year psychology students, scoring in the middle 50% of the INQ measure, participated in the study in exchange for course credit points ($M_{age} = 19.67$ years, $SD = 4.02$, 63% female).

Materials. The INQ measure outlined in Study 1 was used to ensure pre-existing high or low levels of interpersonal factors were not evident.

Procedure. The procedure was identical to Study 1, with the exception that burdensomeness remained high for the duration while levels of belongingness during the task were varied. That is, all participants would score poorly on the task, with predetermined comments from teammates remaining positive or negative, or transitioning between the two over the experiment. For example, the high-low thwarted belongingness (TB) condition would receive feedback like “why can’t everyone pull their weight in this, its really not that hard” in phase 1 of the task, but will experience more supportive comments in phase 2, such as “I’m sorry for being rude earlier, keep trying😊” or “you seem to be improving!”. As the study aimed to keep burdensomeness stable for all groups, some participants were excluded if

they reported greater than a two standard deviation change in burden from the beginning (Round 1) to the end of the experiment (Round 6).

Results and Discussion

Suspicion and Stable Burdensomeness Check

In total, four participants indicated they were suspicious of the nature of the task and were removed from the analyses (although including these participants did not change the pattern of results). In addition, four participants were removed from analyses due to reporting significant variation in burdensomeness over the experiment, leaving 46 participants in total.

Assessing the Manipulation

Thwarted Belongingness. For the manipulation to be successful, a significant change in belongingness would be required for groups experiencing a change in TB condition, but not for stable groups. A 2 (Starting Condition: Low or High TB) x 2 (Stable or Switch: whether TB condition changed halfway through the task) x 2 (Phase: Phase 1 and Phase 2) x 3 (Rounds) Mixed-Design ANOVA was run for both stable and switch groups, with belongingness as the dependent variable (Figure 3: Panel A). Participants that remained in the same TB condition for the duration of the experiment did not report a change in belongingness, $F(1, 27) = 2.97, p > 0.05, n^2_{\text{partial}} = .10$. In contrast, participants that experienced a change in TB condition mid-way through the task reported a change in belongingness in the expected direction, $F(1, 19) = 28.19, p < 0.001, n^2_{\text{partial}} = .61$. Therefore, the manipulation was successful in changing thwarted belongingness in the switch conditions, and keeping belongingness consistent in the stable conditions.

Perceived Burdensomeness. As the study was interested in the comparison between stable levels of burdensomeness, analysis was required to identify whether burdensomeness remained relatively stable for four conditions. A 2 (Starting Condition: Low or High TB) x 2 (Stable or Switch: whether TB condition changed halfway through the task) x 2 (Phase: Phase

1 and Phase 2) x 3 (Rounds) Mixed-Design ANOVA was run for both stable and switch groups (Figure 3: Panel B). Feelings of burdensomeness did not significantly change over time for participants who remained in either a Low or High PB-TB condition for the duration of the experiment, $F(1, 27) = 3.46, p > 0.05, n^2_{\text{partial}} = .11$. In addition, feelings of burden did not significantly change over time for participants who experienced a change in conditions over the experiment, $F(1, 19) = 3.75, p > 0.05, n^2_{\text{partial}} = 0.17$. Therefore, the study was successful in manipulating changes in belongingness over the experiment, while keeping burdensomeness stable.

A

B

Figure 3: Self-reported ratings across Phase 1 (Rounds 1-3) to Phase 2 (Rounds 4-6) for all four groups. Panel A shows changes in belongingness, while Panel B shows changes in perceived burdensomeness.

Evaluating Effects of a Change in Thwarted Belongingness on Persistence

Similar to Study 1, we were interested as to whether the experimental condition in Phase 1 (i.e., Starting Condition) would interact whether a change in conditions occurred in Phase 2. Only switch groups would experience a change in thwarted belongingness, and a significant change in desire to drop out for these groups would be expected. A 2 (Starting Condition: Low or High TB) x 2 (Stable or Switch: whether TB condition changed halfway through the task) x 2 (Phase: Phase 1 and Phase 2) x 3 (Rounds) Mixed-Design ANOVA was run for both stable and switch groups (Figure 4). Participants who remained in the same TB condition for the duration of the experiment did not report a change in desire to drop out over time, $F(1, 27) = .05, p > .05, n^2_{\text{partial}} = .00$. As expected, participants in the High TB condition for the duration reported a greater desire to drop out than those in the Low TB condition, $F(1, 27) = 4.82, p < .05, n^2_{\text{partial}} = .15$, indicating consistent support from teammates reduced desire to drop out even in the presence of heightened feelings of burden. Participants who experienced a change in interpersonal conditions reported a change in desire

to drop out over the task, $F(1, 19) = 14.44$, $p < .001$, $n^2_{\text{partial}} = .45$. Therefore, a change in only thwarted belongingness was still sufficient in causing changes in participants' desire to drop out.

Figure 4: Self-reported desire to drop out scores over Phase 1 (Rounds 1-3) and Phase 2 (Rounds 4-6) for the four groups.

In sum, a single (albeit abrupt) change in support from teammates resulted in significant changes in desire to drop out, despite all participants experiencing poor performance on the task for its duration. Positive changes in interpersonal feedback caused a significant decrease in desire to drop out, while a negative change caused a significant increase. As expected, stable groups did not experience significant changes in desire to drop out over the experiment.

General Discussion

The current studies investigated the dynamic effects of a change in interpersonal risk factors. As predicted, Study 1 showed that a rapid change in interpersonal feedback was sufficient to immediately change persistence. That is, as the two interpersonal risk factors were elevated, participants wanted to escape, but if they were reduced, the desire to escape declined. Thus, the data points to the pernicious effects of a decline in interpersonal factors

and also the protective effects of a rise in these factors. Considering the implications for the phenomenon of suicide risk more generally, these data are consistent with the observation that suicidal ideation can vary within short periods of time (Kleiman et al., 2017; Kyron et al., submitted). The experimental data would suggest that a single abrupt change in interpersonal circumstances may be sufficient to alter an individual's suicide risk and future research can investigate this prediction.

Study 2 used a similar structure to Study 1, aiming to assess whether a change in only belongingness could affect persistence, even when burdensomeness remained heightened. An experience of high thwarted belongingness and perceived burdensomeness (i.e., poor performance and negative comments) resulted in a greater desire to drop out than perceived burdensomeness alone (i.e., poor performance and supportive comments). Over time, a change in interpersonal comments from teammates was sufficient in altering participants' desire to escape from the task. That is, an increase in thwarted belongingness was sufficient in increasing a desire to escape from the task, while a decrease in thwarted belongingness decreased a desire to escape, essentially protecting against the effects of high burdensomeness. Thus, the observation in Study 2 that persistence changes efficiently is consistent with Kleiman et al. (2017), who found suicidal ideation to be prone to change over short periods of time. Supporting research is needed to explore whether changes in belongingness are sufficient in offsetting the effects of burdensomeness on an individual's suicide risk over time.

Clinical and Theoretical Implications

There are several theoretical implications from the current studies. First, both studies suggest that the experimental manipulation of interpersonal risk factors is causally related to changes in persistence. This is consistent with the premise of the Interpersonal Theory of Suicide that increases in thwarted belongingness and perceived burdensomeness are causally

related to a desire to quit or give up on life. Second, if perceived burdensomeness and thwarted belongingness are causally related to persistence, then experiencing both concurrently, rather than individually, should result in a greater desire to quit in the face of adversity. The findings from Study 2 provide supporting evidence to this stance, with the manipulation of thwarted belongingness in addition to stable perceived burdensomeness conditions causing a greater desire to drop out than perceived burdensomeness alone. Third, the efficient change in desire to drop out due to a change in condition in the current study is consistent with a theoretical position from Rudd (2006) that an increase in suicide risk factors can quickly trigger short-term periods of heightened suicidal ideation.

There are also notable clinical implications. First, the current studies have shown how effectively an increase or a reduction in interpersonal adversity can alter persistence. While the effects of a negative change in interpersonal conditions are rapid, they fortunately appear to be remediable in an efficient manner. In a clinical setting it may therefore be important to address interpersonal factors to increase an individual's ability desire to persist through adverse situations, potentially mitigating suicide risk. Second, the findings from the current studies, coupled with those from Kleiman et al. (2017), stress the importance of consistently tracking suicidal ideation and risk factors in order to appropriately identify high-risk periods. Swift changes in persistence and suicidal ideation can occur, indicating the need for consistent monitoring systems to identify high-risk episodes at an early stage to prevent suicidal behaviours. Limited assessment of suicide risk in a clinical setting may incorrectly identify some individuals as low risk, and miss heightened periods of suicide risk. Even if a suicide attempt is not successful, it may increase the likelihood that an individual further habituate to pain and a fear of dying, potentially making a future attempt more likely (Joiner, 2005).

Limitations and Directions for Future Studies

There are also notable limitations of the manipulation utilized in both studies. Firstly, the change in interpersonal circumstances was quite sudden. Although this may emulate the vulnerability of interpersonal environments to abrupt changes, it also may have heightened suspicion of the computerized nature of the participants' teammates. Some participants noted that they were surprised and confused by the sudden change in the supportiveness of their teammates. Despite its sudden nature, most participants reported being convinced and affected by the change in interpersonal feedback. Future studies could aim to use more subtle manipulations of interpersonal circumstances.

Future studies should look to assess at-risk individuals within a naturalistic setting for interpersonal variables and associated effects on suicide. Kleiman et al. (2017) have provided the first indication of the importance of consistent measurement of suicide and associated factors. While they tracked suicidal ideation and burdensomeness concurrently over short-term but intensive periods, it may prove beneficial to assess how belongingness and burdensomeness interact to affect suicidal thoughts and behaviours for several reasons. First, such research would indicate the ability of both factors in predicting suicide. Second, it addresses whether an absence of perceived burdensomeness could act as a protective factor during heightened periods of thwarted belongingness, and vice versa. Whether one factor could offset another provides targets for clinical intervention in minimizing a suicidal episode, particularly when the malleability of either factor is identified. Third, the theoretical position that heightened levels of both factors concurrently act as a particularly pertinent condition for the development of suicidal ideation can be tested within a naturalistic setting in a fluid manner.

In conclusion, the current study is the first to assess the dynamic nature of interpersonal factors and experimentally assess the effects changes in these factors have on persistence. Results suggested rapid changes in persistence as a result of a single change in

interpersonal circumstances. More adverse interpersonal conditions resulted in a significantly greater desire to drop out of the task. The malleability of both interpersonal factors and the associated changes in persistence suggest they may be appropriate areas for clinical intervention. The dynamic nature of persistence suggests the need for continuous assessment of suicide risk factors within a clinical setting to minimize suicidal thoughts and behaviours. Dynamic measurement of suicide and interpersonal risk factors is in its early stages, and future research in this domain would assist in increasing our understanding of this complex phenomenon.

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