PERFECTIONISM AND NEGATIVE AUTOMATIC THOUGHTS: USING MINDFULNESS TO HELP PERFECTIONISTS EFFECTIVELY RESPOND TO FAILURE

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ABSTRACT

Research links perfectionism, the tendency to hold and pursue unrealistically high standards (Hewitt, Mittelstaedt, & Wollert, 1989), to negative mental health outcomes such as eating disorders, anxiety, and depression (Egan, Wade, & Shafran, 2011). With university students reporting high rates of perfectionism (e.g., Pirbaglou et al., 2013), developing interventions for perfectionistic university students is an important area of research. Mindfulness-based interventions may be helpful for perfectionists as these interventions show promise in reducing worry and rumination, both of which mediate the relation between perfectionism and psychological distress (Short & Mazmanian, 2013). Additionally, mindfulness-based interventions show potential for increasing heart rate variability (HRV; Shearer, Hunt, Chowdhury, & Nicol, 2015), a physiological measure of the parasympathetic nervous system (PNS)’s ability to regulate stress. A study examining the effect of mindfulness meditation on HRV for university students found that HRV only increased during recovery from stress for non-perfectionists, and not for perfectionists (Azam et al., 2015). However, the mindfulness meditation in the study did not incorporate a non-judgment element, which may be a key component for individuals prone to repetitive thoughts.

In the current study, I explored whether mindfulness with a focus on non-judgment helps perfectionists effectively respond to failure, as measured by HRV levels during stress recovery. The results showed that participants in both conditions—mindfulness with and without a non-judgment component—had significantly higher HRV during the last five minutes of recovery
than at baseline or during the stressor. This indicates that overall, perfectionists showed autonomic improvement during the last five minutes of recovery.

*Keywords*: perfectionism, mindfulness, HRV, worry, rumination, college students
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INTRODUCTION

Definitions of perfectionism vary among researchers, but all highlight excessive or extreme high standards (Ashby, Slaney, Noble, Gnilka, & Rice, 2012; Cruce, Pashak, Handal, Munz, & Gfeller, 2012). With university students reporting high rates of perfectionism (Pirbaglou et al., 2013; Grzegorek, Slaney, Franze, & Rice, 2004), and research showing negative mental health outcomes of perfectionism, including eating disorders, anxiety, and depression (Egan, Wade, & Shafran, 2011), developing interventions for perfectionistic university students is an important area of research.

In order to develop effective interventions for perfectionistic students, it is important to examine the mechanisms through which perfectionism leads to psychological distress. Perfectionism is related to negative automatic thoughts, including worry and rumination, and for university students reporting low levels of mindfulness, worry and rumination mediate the relation between socially prescribed perfectionism (the belief that others expect you to be perfect) and psychological distress. However, this study only used data collected during one time point (Short & Mazmanian 2013), precluding conclusions about the temporal ordering of the variables. Because levels of worry and rumination explain part of the relation between perfectionism and psychological distress, interventions focused on reducing rumination and worry in perfectionists may protect against negative mental health outcomes.

Additionally, perfectionistic cognitions (Azam et al., 2015) and worry (Aldao, Mennin, & McLaughlin, 2013) are related to reduced heart rate variability (HRV). HRV is a physiological measure of the activity of the autonomic nervous system (ANS), specifically examining the activity of both the sympathetic nervous system (SNS) during excitatory situations, and the parasympathetic nervous system (PNS)’s ability to regulate stress by working to return the body
to cardiac resting state (Azam et al., 2015). Conclusions on the relation between rumination and HRV are mixed, but some results indicate a link between rumination and blunt HRV, which indicates autonomic inflexibility, or a reduced ability for the PNS to regulate stress (Aldao et al., 2013; Ottaviani, Shapiro, Davydov, Goldstein, & Mills, 2009).

One type of intervention that may be helpful for perfectionists is mindfulness-based intervention. Mindfulness is a state of consciousness involving enhanced attention to, and nonjudgmental awareness of, the present moment (Brown & Ryan, 2003), and interventions incorporating mindfulness techniques show promise in reducing worry and rumination, and increasing HRV. Short and Mazmanian (2013) stated that training in mindfulness might specifically target the mediating effects of worry and rumination, disrupting the relation between perfectionism and distress. Additionally, mindfulness may help increase HRV: one study found that students participating in mindfulness meditation showed significantly greater HRV during a cognitive challenge than a control group, indicating that these students showed a more adaptive response to stress (Shearer, Hunt, Chowdhury, & Nicol, 2015).

Azam et al.’s (2015) study is the only one to date that examines the effect of mindfulness meditation on HRV in perfectionistic and non-perfectionistic university students. The authors had students participate in a 10-minute mindfulness meditation after a failure task and examined HRV levels during recovery from the stressor. HRV increased during a 10-minute mindfulness meditation for individuals who reported low perfectionistic cognitions, but remained low for those who reported a higher number of perfectionistic cognitions. This seems to indicate that mindfulness does not work for perfectionists as it does for non-perfectionists. However, the mindfulness meditation in the study had participants focus on their breath, but did not focus on non-judgment of thoughts and feelings in the meditation. Evans and Segerstrom (2011) found
that in a student sample, the mindfulness facets of non-judging and acting with awareness were associated with less overall repetitive thoughts, but the observing facet of mindfulness was related to more repetitive thoughts, indicating that only observing/attending to thoughts without a non-judgment component may increase repetitive thoughts. This suggests the potential usefulness of incorporating a non-judgment component in mindfulness training for perfectionists.

In this paper, I review research in the following areas: a) the prevalence of perfectionism in university students, b) perfectionism as a construct, c) the relation between perfectionism and psychological distress, d) worry and rumination as mediators of the relation between perfectionism and psychological distress, e) the relations between three types of negative automatic thoughts (perfectionistic cognitions, worry, and rumination) and HRV, and f) mindfulness as an intervention to help perfectionists reduce negative automatic thoughts leading to psychological distress. These areas of research led me to propose the current research project, which has two aims: 1) to determine whether a mindfulness meditation with a focus on non-judgment of experiences is useful in helping undergraduate perfectionists effectively respond to failure, as measured by HRV levels, as well as reported levels of depression, anxiety, and stress during the meditation, and 2) to discover possible mechanisms that predict variation in HRV levels, specifically examining the role of condition (non-judgment mindfulness meditation versus control), perfectionistic cognitions, worry, and rumination.

The High Prevalence of Perfectionism in University Students

Flett and Hewitt (2014) discussed a need for perfectionism interventions due to a high prevalence rate among children and adolescents, suggesting the data “point to a possible epidemic of dysfunctional perfectionism among younger people.” It seems that this “epidemic” continues into young adulthood, as research shows an elevated prevalence of perfectionistic
cognitions, along with depression and anxiety symptoms, in university students (Pirbaglou et al., 2013). A study by Grzegorek et al. (2004) classified over half of a sample of 273 college students as perfectionists using cluster analysis of the Almost Perfect Scale – Revised (APS-R; Slaney, Rice, Mobley, Trippi, & Ashby, 2001), with 31% identified as “adaptive” perfectionists, 26% identified as “maladaptive” perfectionists, and 43% identified as non-perfectionists. The APS-R identifies perfectionists as those with high scores on the high standards subscale, and makes the adaptive/maladaptive distinction based on the discrepancy subscale, which measures perceived failure to meet those high standards. Adaptive perfectionists have lower discrepancy scores, indicating that they generally feel that they can meet their high standards, while maladaptive perfectionists have higher discrepancy scores, indicating that they generally do not feel that they meet their high standards.

In a larger study of 1,567 college students from two universities, the authors computed a similar cluster analysis of the APS-R. With a scale ranging from 1 (strongly disagree) to 7 (strongly agree), they found that 40.7% of students were “adaptive” perfectionists, with an average score of 2.62 (between “Disagree and Slightly Disagree”) on the discrepancy subscale and an average score of 6.45 (between “Agree and Strongly Agree”) on the high standards subscale. Additionally, 26.9% of students were “maladaptive” perfectionists, who scored an average of 4.85 (between “Neutral and Slightly Agree”) on the discrepancy subscale and an average of 6.26 (between “Agree and Strongly Agree”) on the high standards subscale. Finally, 32.4% of students were non-perfectionists, with an average score of 3.22 (between “Slightly Disagree and Neutral”) on the discrepancy subscale and 5.54 (between “Slightly Agree and Agree”) on the high standards subscale (Rice & Ashby, 2007).
Overall, while the majority of college students in these samples showed either no perfectionistic tendencies or “adaptive” perfectionistic tendencies, around 26% of students in both samples showed maladaptive perfectionistic tendencies. These studies suggest that college students may be at risk for negative mental health outcomes associated with perfectionism, and therefore, are a population that researchers should focus on when investigating interventions for perfectionism.

**Perfectionism as a Construct**

As mentioned earlier, definitions of perfectionism vary among researchers, but include the key component of imposing on oneself excessive or extremely high standards (Ashby et al., 2012; Cruce et al., 2012). The literature has three common conceptualizations of perfectionism. The first conceptualization is perfectionism as a unidimensional and maladaptive construct, described as excessive personal expectations for superior achievement (Garner, Olmstead, & Polivy, 1983). While this unidimensional conceptualization exists in older perfectionism literature, recent conceptualizations seems to agree that perfectionism is a multidimensional construct. What researchers do not agree on, however, is whether perfectionism is always maladaptive, or whether it contains both adaptive and maladaptive components. As the current literature uses both conceptualizations, a brief overview of commonly used measures is included here, along with a discussion of which conceptualization is deemed most appropriate for this study, to help the reader better understand the subsequent discussion of the perfectionism literature.

The Multidimensional Perfectionism Scale (Hewitt, Flett, Turnbull-Donovan, & Mikail, 1991) is the most commonly used measure of perfectionism as a maladaptive, multidimensional construct. This measure includes three dimensions of perfectionism: self-oriented perfectionism
(unrealistic standards and perfectionistic motivations for the self), other-oriented perfectionism (unrealistic standards and perfectionistic motivations for others), and socially prescribed perfectionism (the belief that significant others expect oneself to be perfect). While research often cites self-oriented perfectionism as an adaptive component of perfectionism, the authors of the measure maintain that it is a maladaptive construct, and cite literature showing its relation to psychological distress in both men and women (e.g., Blankstein & Lumley, 2008).

While multiple measures of perfectionism as a multidimensional construct with both adaptive and maladaptive components exist in the literature, perhaps the most commonly used measures are the Almost Perfect Scale – Revised (Slaney et al., 2001) and the Frost Multidimensional Perfectionism Scale (Frost, Marten, Lahart, & Rosenblate, 1990). For this view of perfectionism, researchers understand aspects such as high personal standards and organization as adaptive components, while they view concerns over mistakes, doubts about actions, parental expectations, and discrepancies between standards and actual performances as maladaptive components. These measures can differentiate between two types of perfectionists: adaptive perfectionists, or individuals who pursue high standards but do not experience harm to their self-esteem when unable to attain these standards, and maladaptive perfectionists, who have excessive concerns over meeting high standards and feelings of failure when unable to meet these standards (Ashby et al., 2012).

Flett and Hewitt (2006) provided a provocative argument as to why researchers should not label any form of perfectionism as “healthy” or “adaptive.” First, the authors point out that adaptive perfectionism as defined in the literature “bears a striking resemblance” to conscientiousness and achievement striving, but perhaps does not represent perfectionism. These authors insist that the term perfectionist should be reserved for individuals who hold rigidly to
their standards even when situations do not require such perfection. The authors claim that these individuals must also place an irrational importance on achieving these impossibly high standards in multiple life domains. Therefore, so-called “adaptive” perfectionism may actually become maladaptive when these individuals encounter failure. Flett and Hewitt indicated concerns that the existence of literature claiming that adaptive perfectionism exists might actually cause harm, as clinicians may attempt to transform negative perfectionism into positive perfectionism instead of removing it altogether.

Based on the argument provided by Flett and Hewitt (2006), as well as multiple studies indicating that “adaptive” components of perfectionism are in fact related to negative mental health outcomes (e.g., Cruce et al., 2012; Blankstein & Lumley, 2008; Handley, Egan, Kane, & Rees, 2014), in this paper I use the maladaptive definition of perfectionism. Thus, I consider any construct measuring “adaptive” or “healthy” perfectionism as referring to conscientiousness or high achievement striving. While I still consider literature using these measures of perfectionism in the introduction of this paper, when choosing my own method of measuring perfectionism, I restrict my search to measures that consider perfectionism a maladaptive construct.

While those measures previously mentioned identify different aspects of perfectionism, I am interested in examining negative automatic thoughts and HRV in response to a specific situation; therefore, a measure of perfectionism that examines the frequency of perfectionistic thoughts, rather than, for example, from where perfectionism originates (e.g., self-oriented vs. socially prescribed) is most appropriate for this study. For this reason, I chose the Perfectionism Cognitions Inventory (PCI; Flett, Hewitt, Blankstein, & Gray, 1998) as a measure of perfectionism for this study. The PCI measures the frequency of negative automatic thoughts with perfectionistic themes (e.g., “No matter how much I do, it’s never enough”), and
differentiates between perfectionists and non-perfectionists in the Azam et al. (2015) study. As this measure does not include any “adaptive” components of perfectionism, it aligns with my chosen definition of perfectionism, and measures perfectionism as the frequency of perfectionistic thoughts, fitting with the theme of negative automatic thoughts in this study.

**Perfectionism and Mental Health Outcomes**

After determining that perfectionism may be best understood as a maladaptive construct, it is important to examine why it is an unhealthy tendency. A review of existing literature suggests that perfectionism is both a risk and maintaining factor for eating disorders, anxiety, and depression, and predicts treatment outcomes for these disorders (Egan et al., 2011). Research also indicates that concerns over mistakes and personal standards predict pathological worry among participants with Generalized Anxiety Disorder (GAD) after controlling for gender and depression symptoms (Handley et al., 2014). Additionally, perfectionism is associated with co-morbidity in psychopathology (Egan et al., 2011).

Perfectionism is not only problematic for a clinical population, but also for the general population. Prior research examining perfectionism using the PCI with undergraduate students suggests that perfectionistic thoughts account for unique variance in psychological distress after controlling for variance explained by automatic thoughts (both positive and negative), as well as variance explained by scores on the Multidimensional Perfectionism Scale (Flett et al., 1998). Additionally, perfectionism predicts dysphoria, anxiety, worry, and anger in university students, accounting for between 16% (anger in women) and 35% (anxiety in men) of the variance in each area of distress. Specifically, socially prescribed perfectionism predicts dysphoria, anxiety, and worry, and self-oriented perfectionism predicts anxiety and worry in women, and anxiety, dysphoria, and anger in men (Blankstein & Lumley, 2008). With a clear relation to negative
mental health outcomes both in the general population and in clinical populations, perfectionism is an important area of research, specifically examining potential intervention and treatment options for populations at high risk for perfectionistic tendencies.

**Rumination and Worry as Mediators between Perfectionism and Psychological Distress**

Individuals with high levels of perfectionistic cognitions are vulnerable to depression about perceived failures to reach their high standards in the past, and anxiety about failures in the future (Flett, Hewitt, Whelan, & Martin, 2007). Repetitive negative thoughts are related to both anxiety and depression, and partially predict the maintenance of anxious symptoms (Segerstrom, Tsao, Alden, & Craske, 2000). In a sample of university students, frequent experiences of negative automatic thoughts and anxiety sensitivity mediated the relation between perfectionistic cognitions and anxiety and depressive symptoms (Pirbaglou et al., 2013). A limitation of that study was that the data were collected at a single time point, so temporal mediation could not be demonstrated.

Two types of negative automatic thoughts are rumination and worry. Smith and Alloy (2009) described rumination as an experientially avoidant emotion regulation strategy responding to perceived discrepancies between one’s current status and a target (desired) status. The authors explained that rumination might also affect one’s ability to use more adaptive emotion regulation strategies in response to a stressor. Segerstrom et al. (2000) defined worry as repetitive, uncontrollable thoughts about potential negative life events. Nolen-Hoeksema, Wisco, and Lyubomirsky (2008) suggested that worry is future-oriented and focuses on threats that have not yet occurred, while rumination predominantly involves going over past events, and has a distinct theme of “loss, whether through fate, one’s own failure, or the failure of others to live up to expectations.”
Although worry and rumination are highly correlated constructs ($r = 0.51$), they are distinct cognitive processes, based on factor analysis (Yang et al., 2014). These constructs are both repetitive thoughts focused on negative events, but they differ in that worry contributes to anxiety, while rumination contributes to depression (Segerstrom et al., 2000). In fact, worry is associated with a greater likelihood of receiving a diagnosis of GAD over Major Depressive Disorder (MDD) beyond the predictive ability of rumination, while rumination is associated with a greater likelihood of receiving a diagnosis of MDD over GAD beyond the predictive ability of worry (Yang et al., 2014).

Numerous findings indicate a relation between perfectionism and negative automatic thoughts. Short and Mazmanian (2013) found that both socially prescribed perfectionism and self-oriented perfectionism are correlated with worry and rumination in university students. Rumination mediated the relation between maladaptive perfectionism and depressive symptoms in a sample of college students (Harris, Pepper, & Maack, 2008). Rumination also mediated the relation between maladaptive perfectionism and general psychological distress in samples of both college and non-college populations (O’Connor, O’Connor, & Marshall, 2007). Finally, worry and rumination mediated the relation between socially prescribed perfectionism and psychological distress in college students after controlling for age and marital status. However, this mediation was only significant for students with low levels of mindfulness (Short & Mazmanian, 2013). All three studies above were limited in that the data were collected at a single time point, so temporal mediation could not be demonstrated.

It is necessary when examining these results to determine whether worry, rumination, and perfectionistic cognitions are unique constructs. Research suggests that despite the relation between perfectionism and rumination, perfectionism accounts for significant variance in
dysphoria beyond that accounted for by ruminative brooding, indicating that these are constructs are unique (Blankstein & Lumley, 2008). In a study by Flett, Madorsky, Hewitt, and Heisel (2002), after controlling for levels of rumination, the relation between perfectionistic cognitions and depression and anxiety remained, once again indicating that these are different constructs. Additionally, as previously mentioned, factor analysis has revealed worry and rumination to be unique variables (Yang et al., 2014). However, no study has yet examined whether perfectionistic cognitions and worry are unique constructs.

These results indicate that worry and rumination may be important targets in interventions for perfectionists. As these constructs mediate the relation between perfectionism and psychological distress, they may be mechanisms through which perfectionism causes and maintains anxious and depressive symptoms. If researchers and educators teach perfectionists techniques to manage worry and rumination, especially after experiences of failure, these perfectionistic individuals may not develop negative mental health outcomes. It is likely that interventions targeting worry and rumination would also address perfectionistic cognitions due to common themes in all three constructs. Therefore, research should examine interventions targeting negative automatic thoughts for their effectiveness in helping perfectionists effectively respond to failure.

**Perfectionistic Cognitions, Worry, Rumination, and Heart Rate Variability**

Heart rate variability (HRV), a measure of the beat-to-beat variation in heart rate, indicates the activity of the autonomic nervous system, which includes the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). SNS activity increases during stressful states, while the PNS works to lower heart rate and return the body to a normal state after stress. Typical responses to a stressful experience would include lower HRV during a
stressor, and increased HRV during the recovery period after a stressor. Lower HRV during this recovery period can show insufficient parasympathetic function, which indicates difficulty in reaching a recovered state after experiencing stressful events (Azam et al., 2015). HRV shows the activity of both the PNS and the SNS, allowing researchers to study the inhibitory and excitatory processes in emotion regulation, with greater HRV showing autonomic flexibility, and blunt HRV showing autonomic inflexibility (Appelhans & Luecken, 2006). HRV is an important outcome measure when examining individual mental health. In fact, a study of patients with Major Depressive Disorder (MDD) found that these individuals had reduced HRV, and those with a comorbid anxiety disorder had even greater reductions in HRV (Kemp, Quintana, Felmingham, Matthews, & Jelinek, 2012).

Not only is there a link between HRV and disorders such as MDD and anxiety, but research also links HRV with worry, rumination, and perfectionistic cognitions. Research shows a clear relation between worry and HRV; Aldao et al. (2013) noted that there is an extensive body of literature showing that state worry is associated with blunted HRV, and in their own study found a negative relation between worry and HRV. However, the literature is less clear regarding the relation between HRV and rumination. One study found that in individuals who report low trait rumination, state rumination was associated with high frequency HRV (HF-HRV) recovery, with those reporting rumination after a stressor showing poorer HF-HRV recovery than those who did not report rumination after the same stressor. However, there was no relation between state rumination and HF-HRV recovery in individuals reporting high trait rumination (Key, Campbell, Bacon, & Gerin, 2008). Additionally, Aldao et al. (2013) found that rumination was not associated with HRV. The authors speculated that despite the similarities between worry and rumination, it is possible worry is more of a threat state, which would
decrease flexibility in the PNS to prepare for the threat, while rumination is a reflection on past events and offers no threat.

Research examining HRV and perfectionistic cognitions is an emerging area, and therefore our knowledge of the relation between these two constructs is somewhat limited. However, Azam et al. (2015)’s study indicates that perfectionistic cognitions after failure may prevent mindfulness meditation from increasing HRV, as they found that HRV increased during the stress recovery phase after a brief 10-minute mindfulness meditation for non-perfectionists, but not for perfectionists. The authors speculated that the instructions to become aware of one’s thoughts required a self-focus that could have hindered the perfectionists’ parasympathetic ability to regulate stress. In other words, perfectionism may prevent brief mindfulness meditation interventions from helping to regulate stress. Based on this literature, it is likely that worry and perfectionistic cognitions together would account for a significant amount of variance in HRV for participants using mindfulness meditation, as these negative automatic thoughts would reduce the effectiveness of this type of intervention. It is less clear whether rumination would account for any of this variance, as the literature relating rumination and HRV is mixed.

**Mindfulness as a Method to Reduce Perfectionism, Rumination, and Worry, and increase Heart Rate Variability**

Mindfulness, much like perfectionism, has varying definitions in the literature. Brown and Ryan (2003) described mindfulness as a state of consciousness involving enhanced attention to, and nonjudgmental awareness of, the present moment. Baer, Smith, Hopkins, Krietemeyer, and Toney (2006) described five skills that mindfulness encompasses: 1) non-reactivity to inner experience, 2) attending to thoughts/feelings, 3) acting with awareness, 4) describing/labeling inner experiences with words, and 5) non-judging of experience. Other definitions do not include
the non-judgment component; for example, Marlatt and Kristellar (1999) described mindfulness as a method of bringing complete attention to the present experience on a moment-to-moment basis.

Mindfulness meditations typically involve a focus on the present moment using one’s breath as an anchor, letting intrusive thoughts pass through the mind without judgment, and bringing attention back to the present moment by focusing on one’s breath. In one study, students participating in mindfulness meditation showed significantly greater HRV during a cognitive challenge compared to participants in a control group, indicating that they showed a more adaptive response to stress (Shearer et al., 2015). Hinterman, Burns, Hopwood, and Rogers (2012) described mindfulness as a dynamic cognitive style that uses the ability to consider switching tactics in the face of failure. This psychological distancing can interrupt ruminative cycles and decrease depressive symptoms, which makes it a promising intervention for perfectionists.

Multiple studies indicate a relation between mindfulness and perfectionism. One study with a sample of inpatients in a current depressive episode found that mindful awareness mediated the relation between maladaptive perfectionism and depression severity, although this study used data collected at only one time point (Argus & Thompson, 2008). Additionally, Hinterman et al. (2012) found that trait mindfulness predicted perfectionism type: accepting without judgment and proactive coping predicted “positive” perfectionism (which the current study considers a measure of high achievement striving), while describe, act with awareness, and accept without judgment all individually predicted negative perfectionism. Finally, trait mindfulness is negatively associated with somatization, depression, anxiety, and psychological
distress (Masuda & Tully, 2012), suggesting that increasing mindfulness may be useful in reducing psychological distress experienced by perfectionists.

Existing literature also documents a relation between mindfulness and the negative automatic thoughts of worry and rumination. Short and Mazmanian (2013) stated that training in mindfulness might specifically target the mediating effects of worry and rumination, disrupting the relation between perfectionism and distress. Mindfulness helps detect patterns of negative thoughts and feelings, and allows disengagement from avoidant and ruminative thought patterns that may facilitate relapse into depression (Williams, 2008). Research found that mindfulness meditation leads to decreases in ruminative thinking, even after controlling for changes in affect and dysfunctional beliefs (Ramel, Goldin, Carmona, & McQuaid, 2004).

In a longitudinal comparison of a 1-month mindfulness meditation and a somatic relaxation training, mediation models suggested that the reduction of rumination partially mediates mindfulness meditation’s ability to reduce distress. The ability to reduce rumination was specific to the mindfulness meditation, as the somatic relaxation training was unable to produce the same effects (Jain et al., 2007). While mindfulness appears effective in reducing rumination, Short and Mazmanian (2013) explained that mindfulness might be less helpful in reducing worry before a failure occurs. However, research does not necessarily support this statement; Ietsugu et al. (2015) found that in a sample of patients with recurrent depression, both rumination and worry decreased over the course of an eight-week mindfulness-based cognitive therapy program.

As mentioned previously, definitions of mindfulness do not always include a non-judgment component; however, this specific skill may be the key for individuals prone to repetitive thoughts, such as perfectionistic cognitions, worry, and rumination. As noted earlier,
Evans and Segerstrom (2011) found that in a student sample, the mindfulness facets of non-judging and acting with awareness were associated with less overall repetitive thoughts, but the observing facet of mindfulness was related to more repetitive thoughts. This indicates that only observing/attending to thoughts without a non-judging component may increase repetitive thoughts. This may explain why Azam et al. (2015) found that mindfulness did not work for perfectionists. For this reason, the current study includes non-judgment of thoughts and experiences in mindfulness meditation.

**The Current Study**

The aim of the current study is to determine whether a mindfulness mediation with a focus on non-judgment of thoughts and experiences is useful in helping undergraduate students with high levels of perfectionistic cognitions effectively respond to failure, as measured by HRV levels and reported depression, anxiety, and stress during the meditation. First, participants completed online self-report measures of perfectionistic cognitions, worry, rumination, and conscientiousness. Students who reported high levels of perfectionistic cognitions (at or above 66 on the PCI) were asked to participate in the in-person portion of the study. I measured perfectionistic participants’ HRV as they completed a task designed to make them experience failure. Finally, participants were exposed to either a mindfulness meditation task with a focus on non-judgment of experiences or a mindfulness meditation task without the non-judgment focus. After the meditation, the students filled out measures of depression, anxiety, and stress experienced during the meditation.

This study adapted the design used in the Azam et al. (2015) study with the addition of a non-judgment component to the mindfulness meditation to address specific thoughts that perfectionists experience. The modification to the mindfulness intervention adapted the
meditation to make it more effective for individuals who experience high levels of perfectionistic cognitions. Additionally, follow-up analyses attempt to explain any variation in HRV during recovery from the stressor, specifically exploring whether levels of negative automatic thoughts (baseline levels of perfectionistic cognitions, worry, and rumination) and condition (non-judgment mindfulness versus control mindfulness) explain the variance in participant HRV levels. The hypotheses for this study are as follows:

1. Students in the non-judgment mindfulness condition will show greater HRV during the recovery phase after the failure task than those in the control (mindfulness without non-judgment) condition.

2. Students in the non-judgment mindfulness condition will report lower depression, anxiety, and stress during the meditation than students in the control condition.

3. Baseline levels of perfectionistic cognitions, worry, and rumination will predict a significant amount of the variance in HRV levels during the recovery phase, with each construct showing a negative relation with HRV during recovery. Additionally, there will be a significant interaction between each of these three variables and condition. Each variable will predict a significant amount of the variance in HRV levels during the recovery phase only within the control group, but will not predict a significant amount of variance in the non-judgment mindfulness group, as the modified meditation may help prevent these negative automatic thoughts (perfectionistic cognitions, worry, and rumination) from producing negative effects on HRV, and therefore eliminate some of the variance we see in HRV levels.
METHOD

Participants

I recruited 893 students from Bowling Green State University (BGSU) Psychology classes by offering extra credit for participation in an online survey measuring perfectionistic cognitions, rumination, worry, conscientiousness, and demographic variables. Of these students, 189 scored at or above a 66 on the PCI, making them eligible for the in-person portion of the study. The first 60 students who responded to the email invitation were asked to participate in the in-person portion of the study. The analyses for this project use this final sample of 60 perfectionistic students. These 60 students did not differ from the perfectionists in the larger sample who did not respond to the email invitation based on sex, year in school, previous mindfulness experience, diagnosis, age, perfectionism cognitions, rumination, worry, or conscientiousness. A power analysis using an a priori analysis of a repeated measure ANOVA with four measurements (within-subjects) and two groups (between-subjects) estimating a medium effect size ($f = 0.25$) indicated that at least 82 total participants would be necessary for this study. The same analysis estimating a large effect size ($f = 0.40$) indicated that at least 34 total participants would be necessary for this study (Faul, Erdfelder, Lang, & Buchner, 2007). Participants were excluded if they were not at least 18 years of age. See Table 1 for a breakdown of participant characteristics based on condition.

Measures

Participants completed an online questionnaire with the following self-report measures before being invited to participate in the in-person portion of this study.

Perfectionistic Cognitions. The Perfectionism Cognitions Inventory (PCI; Flett et al., 2007) is a 25-item, unidimensional measure of automatic thoughts with perfectionistic themes.
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and beliefs that one must attain perfection (see Appendix A). The PCI has good internal consistency (Cronbach’s $\alpha = .95$) and accounts for variance in anxiety and depressive symptoms beyond that explained by other perfectionism measures (Flett et al., 2007). In the current study, this scale had adequate internal reliability when analyzed with all 893 participants who completed the measure ($\alpha = .93$). However, when analyzed with only the 60 participants from the in-person study who are included in the final analyses, the internal reliability statistic was slightly below the desired .70 cut off ($\alpha = .64$). The PCI asks participants to indicate how frequently each thought occurred within the past week, where 0 indicates Not at All, and 4 indicates All of the Time. Total scores range from 0-100. Items include, “I can’t stand to make mistakes,” and, “No matter how much I do, it’s never enough.”

The current study defines perfectionists as those participants who score at or above 66 (average of 2.64) on the PCI, which is one standard deviation above the established mean (Arpin-Cribbie et al., 2008; Flett et al., 1998), and defines non-perfectionists as those participants who score below 66 on the PCI. Based on this cut-off, I classified 189 students as perfectionists out of the 704 participants who completed the survey. This means that approximately 27% of participants met the cut-off criteria, which was slightly lower than the 35% expected based on the Azam et al. (2015) study.

**Rumination.** The Ruminative Thought Style Questionnaire (RTS; Brinker & Dozois, 2009) is a 20-item, multidimensional measure of global rumination, including the four factors of problem-focused thoughts, counterfactual thinking, repetitive thoughts, and anticipatory thoughts (see Appendix B). Due to a conceptual overlap with the construct of worry, the two items included in the anticipatory thoughts factor will not be included in this study. The RTS has good internal consistency (coefficient $\alpha = .92$) and is correlated with other measures of rumination,
depression, anxiety, and worry. In the current study, this scale had adequate internal reliability ($\alpha = .87$). The RTS asks participants to rate each item on how well it describes them, where 1 indicates *Not at all* and 7 indicates *Very well*. Total scores range from 20-140, although for this study they will range from 18-126. Items include, “I tend to replay past events as I would have liked them to happen,” and, “I find that some thoughts come to my mind over and over throughout the day.”

**Worry.** The Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) is a 16-item, unidimensional measure of general trait worry (see Appendix C). This measure has good internal consistency (coefficient $\alpha = 0.93$-0.95) and test-retest reliability (2 week: $r(56) = 0.75, p < .001$, 4 week: $r(53) = 0.74, p < .001$, 8-10 week: $r(45) = 0.92, p < .001$). In the current study, this scale had adequate internal reliability ($\alpha = .91$). The PSWQ asks participants to indicate how typical each item is of themselves, where 1 indicates *Not at all Typical* and 5 indicates *Very Typical*. Total scores range from 16-80. Items include, “My worries overwhelm me,” and “I am always worrying about something.”

**Conscientiousness.** The Big Five Questionnaire (BFQ; John, Donahue, & Kentle, 1991) is a 44-item scale measuring five factors of personality: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience. This study uses the 9-item Conscientiousness subscale (see Appendix D) to assess the relation between conscientiousness and perfectionistic cognitions. The contentiousness subscale has good internal reliability (coefficient $\alpha = 0.81$) and test-retest reliability (coefficient $\alpha = 0.84$; Caprara, Barbaranelli, Borgogni, & Perugini, 1993). In the current study, this scale had adequate internal reliability ($\alpha = .72$). The BFQ asks participants to indicate the extent to which they agree or disagree with each statement, where 1 indicates *Disagree Strongly* and 5 indicates *Agree Strongly*. Total scores
range from 9-45. Items include, I see Myself as Someone Who…“Does a thorough job,” and “Is a reliable worker.”

**Demographic variables.** Demographic information collected includes age, biological sex, race, year in school, previous mindfulness training experience, and any current diagnoses of anxiety or mood disorders by a medical doctor or mental health professional (see Appendix E).

Researchers recorded the following physiological measure for each participant:

**HRV.** Heart rate variability (HRV) is an indicator of stress response as a measure of the control of the autonomic nervous system (ANS). To measure HRV, I used a Biopac encoder unit and software with a sampling rate of 1,000 samples per second. To analyze HRV, I used Kubios software (Tarvainen, Niskanen, Lipponen, Ranta-Aho, & Karjalainen, 2014), which analyzes the beat-to-beat RR intervals (the intervals from one heart rate peak to the next) of the continuously recorded electrocardiogram (ECG) wave. This software converts the beat-to-beat RR intervals into milliseconds for each interval, and then converts each of these numbers to the number of cycles per second, measured in hertz (Hz). The software factors these frequencies into very low frequency (VLF; 0-0.04), low frequency (LF; 0.04-0.15), and high frequency (HF; 0.15-0.4). This study focuses specifically on high frequency HRV (HF-HRV), which is a frequency between .15-.4 Hz (Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology, 1996), as HF-HRV is indicative of parasympathetic nervous system (PNS) functioning.

Next, the Kubios software provides HF power, which corresponds to the HF by total power (calculated by integrating the spectrum estimates over the whole spectrum) to provide a percentage for HF for each timeframe (T1-T4). For the regression analysis, I analyzed the final
recovery time point (T4) to determine the ability to predict final recovery levels of HF-HRV. The procedure for HRV collection throughout the experimental design is described below.

Students completed the following self-report measure after completing the meditation:

**Distress.** The short form of the Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995) is a 21-item scale measuring the negative emotional states of depression, anxiety, and tension/stress (see Appendix F). The three subscales have good internal consistency (Depression: coefficient alpha = .88-.94; Anxiety: coefficient alpha = .80-.87; Stress: coefficient alpha = .84-.91), and the overall scale shows good concurrent validity, as it correlates with measures of mental health and self-esteem (Sinclair et al., 2012). In the current study, the Stress scale had adequate internal reliability ($\alpha = .81$), while the Depression scale ($\alpha = .67$) and Anxiety scale ($\alpha = .62$) internal reliability statistics were slightly below the desired .70 cut off. The DASS-21 asks participants to indicate how much the statement applied to them during the indicated timeframe, with 0 indicating *Did not apply to be at all – NEVER* and 3 indicating *Applied to me very much, or most of the time – ALMOST ALWAYS*. Possible scores in each subscale range from 0-21. Items include, “I find it hard to wind down” (stress), “I was aware of dryness of my mouth” (anxiety), and “I couldn’t seem to experience any positive feeling at all” (depression). For this study, the timeframe was changed to refer to the meditation, and the wording throughout the measure was adjusted accordingly.

**Procedures**

After obtaining informed consent, participants completed an online questionnaire containing the self-report measures. Those students who scored at or above 66 on the PCI were invited to participate in the in-person portion of the study. When the perfectionistic students arrived, researchers obtained additional informed consent, and then attached the necessary HRV
equipment to the participants. Participants then sat in a relaxed manner with their eyes closed for five minutes to obtain baseline HF-HRV.

**Failure Task.** After five minutes of collecting baseline HRV, participants completed a cognitive task that “assesses their capacity for abstract problem solving.” This task was adapted from the Azam et al. (2015) study. Participants studied four alphanumeric characters shown at the top of a computer screen for nine seconds, in order to determine a pattern. After nine seconds, a fifth character appeared on the screen. The computer then prompted participants to determine as quickly as possible whether this was the next character in the series by selecting “True” or “False.” None of the character sets had a pattern, so the items were unsolvable. At the end of the task, the computer informed participants that they scored within the 30th percentile, which meant that if 100 individuals completed the same task, 70 would perform better than they did. This percentile was chosen because it is low enough to induce feelings of failure (Dittes, 1961), but is not so low that it is unbelievable. This phase measures HF-HRV during reactivity to a stressor. As a manipulation check, participants were asked to rate their performance on the cognitive task (see Appendix G). Thirty-seven participants (62%) indicated that their performance was “poor,” 18 participants (30%) selected “below average,” four participants (7%) selected “average,” and one participant (2%) selected “above average.” Based on these percentages, it appears that most participants (92%) believed they performed below average or poorly on the task, which indicates that the manipulation worked to induce feelings of failure.

**Non-Judgment Mindfulness Meditation Condition.** Next, participants were randomly assigned to partake in either a brief 10-minute non-judgment mindfulness meditation or a 10-minute control mindfulness meditation session, with 30 participants in each condition. This phase measured HF-HRV as participants recovered from the stressor. The non-judgment
mindfulness meditation (adapted from Watford & Stafford, 2015; Eifert & Forsyth, 2005; see Appendix H) focused specifically on the following (from Delgado, Guerra, Perakakis, Vera, del Paso, & Vila, 2010): a) Awareness and acceptance of bodily sensations, and b) Awareness and acceptance of mental and emotional states. For the second component, participants directed their attention toward awareness of present mental and emotional states, accepting the value of their experiences regardless of the perceived value (positive, negative, or neutral). When participants noticed their attention wandering to past- or future-focused thoughts, they returned their attention to the present by focusing on their breath.

**Control Mindfulness Meditation Condition.** The control mindfulness meditation (see Appendix I) used the same meditation as the experimental condition without the added non-judgment component.

**HRV Measurement.** HRV measurements began after participants completed the survey and continued throughout the experiment. The first five minutes (T1) were a baseline measure of HF-HRV to control for differences in resting HF-HRV among participants. The next five minutes (T2) consisted of the failure task, and measured reactivity to the stressor. The next ten minutes (T3-T4) measured post-failure HF-HRV, which indicated recovery after the stressor during either the non-judgment mindfulness or the control mindfulness condition. This section was broken up into two equal components of five minutes each to measure any differences relative to the amount of time involved in each meditation.
RESULTS

Preliminary Analyses

Before examining condition differences in HRV, skewness was examined for each of the main predictor study variables (rumination, worry, and perfectionistic cognitions) as well as the main study outcome variables (HF-HRV at baseline, stressor, recovery one, and recovery two; depression, anxiety, and stress during recovery) by dividing each statistic by its standard error. Based on these analyses, rumination, worry, perfectionistic cognitions, and depression during recovery all had significant skewness. Therefore, I transformed these variables by taking the square root of each variable. Because the variable of perfectionistic cognitions includes zeros, I added one to each participant’s score before taking the square root. After the transformation, rumination and depression during recovery were no longer significantly skewed. However, worry and perfectionistic cognitions were still significantly skewed; therefore, the original variables were transformed by taking the log of each mean. After this transformation, worry was no longer skewed, and perfectionistic cognitions had improved skewness.

After correcting for skewness, I examined each variable for significant outliers by searching for scores that fell outside of \(+/-3\ SD\) from the mean. Baseline HF-HRV had one outlier, and there were no other outliers in the main study variables. The outlier was included in all analyses because there was no indication that this participant was an outlier due to protocol or equipment error, nor due the participant’s lack of engagement in the study.

Next, I examined demographic differences between the non-judgment mindfulness and control group using independent samples \(t\)-tests (for continuous demographic variables) and chi square analyses (for dichotomous demographic variables). There were no significant differences
between the conditions on the following demographic variables: age, sex, year in school, previous mindfulness training, diagnoses, and race ($p$s > .05; see Table 1).

Next, I examined pre-intervention condition differences for the main study variables of worry, rumination, perfectionistic cognitions, and baseline HF-HRV using independent samples $t$-tests. There were no significant differences between the conditions on the study variables of worry and baseline HF-HRV ($p$s > .05; see Table 2). However, there were condition differences based on pre-intervention rumination and perfectionistic cognitions. Specifically, there were significantly higher levels of rumination in the non-judgment mindfulness group ($M = 1.60, SD = 0.30$) than the control mindfulness group ($M = 1.46, SD = 0.22; t(58) = 3.48, p = .039$). Additionally, there were significantly higher levels of perfectionistic cognitions in the control mindfulness group ($M = 0.49, SD = 0.05$) than the non-judgment mindfulness group ($M = 0.46, SD = 0.03; t(58) = 13.76, p = .013$). It is important to note that these means and standard deviations are based on the transformed rumination and perfectionistic cognitions variables. To control for condition differences in these variables, rumination and perfectionistic cognitions were included as covariates in the major analyses.

Finally, I examined correlations among the study variables to assess whether the magnitudes of the correlations indicate that they are unique constructs ($r$s < .70; Hinkle, Wiersma, & Jurs, 2003). These analyses indicated no correlations at .70 or above (see Table 3); therefore, I did not combine any variables for data reduction purposes.

**Primary Analyses**

**Hypothesis One.** To test the first hypothesis, that students in the non-judgment mindfulness condition would show greater HF-HRV during the recovery phase (T3-T4) after the failure task than those in the control (mindfulness without non-judgment) condition, I computed
a 2 x 4 mixed-subject ANOVA examining condition (between-subjects: non-judgment vs. control) by time (within-subjects: baseline (T1), failure (T2), 1-5 minutes post-failure (T3), 6-10 minutes post-failure (T4)) effects on HF-HRV. Perfectionism cognitions and rumination were entered as covariates. This hypothesis was not supported; there was no significant condition by time effect ($F(3, 171) = 0.14, p = .933$; see Figure 1). However, there was a significant time effect ($F(3, 171) = 4.49, p = .005$). Post-hoc analyses examining this significant main effect indicate that HF-HRV during the last five minutes of recovery (T4; $M = 280.65, SE = 19.88$) was significantly higher than at baseline (T1; $M = 231.94, SE = 19.70; p = .020$) and at stressor (T2; $M = 225.07, SE = 15.70; p = .021$) regardless of condition (see Figure 2). This indicates that, although there were no significant differences based on mindfulness condition, overall students showed improved HF-HRV during the last five minutes of recovery.

**Hypothesis Two.** To test the second hypothesis, that students in the non-judgment condition would report lower depression, anxiety, and stress during the meditation than students in the control condition, I conducted a MANOVA with condition (2 levels: non-judgment condition and control condition) as the independent variable and depression, anxiety, and stress as the dependent variables. Perfectionism cognitions and rumination were entered as covariates. This hypothesis was not supported; there was no significant condition effect on the dependent variables ($F(3, 54) = 0.37, p = .263$; see Figure 3).

**Hypothesis Three.** To test the third hypothesis, that condition (nonjudgment versus control), perfectionistic cognitions, worry, and rumination would predict a significant amount of the variance in HF-HRV levels, I conducted a hierarchical moderated regression analysis predicting HF-HRV during the second recovery period (T4). The first step of this analysis controlled for variance in HF-HRV during the stress period (T2). HF-HRV during stress did not
significantly predict HF-HRV during the second recovery period \((F(1, 57) = 1.95, p = .168)\). The second step of this analysis examined the main effects, or whether these four variables uniquely predict HF-HRV at T4. This hypothesis was not supported; perfectionistic cognitions, rumination, worry, and condition did not predict HF-HRV at T4 \((F(5, 53) = 1.17, p = .336)\). The third step of this analysis examined interactions of each of the continuous variables (perfectionistic cognitions, worry, and rumination) with condition (non-judgment versus control) to examine whether the relations of perfectionistic cognitions, worry, and rumination to HF-HRV at T4 vary by condition. This hypothesis was also not supported; the interactions among perfectionistic cognitions, rumination, worry, and condition did not predict HF-HRV at T4 \((F(8, 50) = 0.94, p = .492; \text{ see Table 4})\). I did not conduct follow-up analyses due to the lack of significant interaction effects.

**Supplemental Exploratory Analyses.** Although not included in the original hypotheses, I expected that within the group of perfectionists included in this study, those who reported higher levels of perfectionistic cognitions would benefit more from the non-judgment mindfulness meditation. Specifically, I predicted that those with high levels of perfectionistic cognitions in the control group would have very little HF-HRV recovery, while those in the non-judgment mindfulness group would show equal recovery to those with lower perfectionistic cognitions. This hypothesis is based on the research by Evans and Segerstrom (2011) showing that the mindfulness facets of non-judging and acting with awareness are associated with less overall repetitive thoughts, while the observing facet of mindfulness is related to more repetitive thoughts. This research suggests that those who experience more repetitive thoughts may especially benefit from doing mindfulness that focuses on non-judgment of thoughts and emotions. Specifically, those who experience more repetitive thoughts and simply observe them
may feel added discomfort in noticing the thought (e.g., I am a failure) without the additional non-judgment instructions. The non-judgment component might remind these individuals to observe their thoughts without judgment, as this could eliminate the added discomfort and help these participants recover from their experienced failure.

To assess whether condition effects on HF-HRV varied based on perfectionistic cognitions levels, I divided perfectionists into two groups: “Perfectionists” who averaged below a “3 – Often” on the PCI \( (n = 34) \), and “Super Perfectionists” who averaged 3 or above on the PCI \( (n = 26) \). This division allowed me to examine time effects based on four groupings: super perfectionists in the non-judgment mindfulness condition, super perfectionists in the control mindfulness condition, perfectionists in the non-judgment mindfulness condition, and perfectionists in the control mindfulness condition.

To examine group by time effects, I conducted a 4 x 4 mixed-subject ANOVA examining group (between-subjects: treatment super perfectionists, control super perfectionists, treatment perfectionists, and control perfectionists) by time (within-subjects: baseline (T1), failure (T2), 1-5 minutes post-failure (T3), 6-10 minutes post-failure (T4)) effects on HF-HRV. There were no significant group by time effects \( (F(3, 165) = 0.57, p = .818) \). However, graphically it appears that there may be differences in the recovery patterns based on group (see Figure 4). For example, super perfectionists in the non-judgment mindfulness condition did not show improvements in HF-HRV during the first five minutes of recovery, but have a sharp incline in recovery during the last five minutes. On the other hand, super perfectionists in the control mindfulness condition had relatively consistent HF-HRV across time points and did not seem to have HF-HRV recovery. Finally, both perfectionist groups (non-judgment and control mindfulness) showed improved HF-HRV during both recovery time points (T3 and T4). Future
research should examine whether these differences become significant with more participants in each group, as group numbers in the present study for this analysis ranged from eleven in the treatment “super perfectionists” group to eighteen in the treatment perfectionists group, making the analysis clearly underpowered.
DISCUSSION

In the present study, I examined whether a mindfulness mediation with a focus on non-judgment of thoughts and experiences is useful for helping undergraduate students with high levels of perfectionistic cognitions effectively respond to failure, as measured by HF-HRV levels and reported depression, anxiety, and stress during the meditation. I also explored whether levels of negative automatic thoughts (baseline levels of perfectionistic cognitions, worry, and rumination) and condition (non-judgment mindfulness versus control mindfulness) explained any variance in participant HF-HRV levels during the second recovery period. For exploratory purposes, I assessed whether condition effects on HF-HRV varied based on perfectionistic cognitions levels. For each of the hypotheses and exploratory analyses, I will 1) discuss the findings, 2) compare the findings to related findings in the literature, and 3) discuss the implications of these findings. Finally, I will discuss the limitations of this study, as well as the implications for interventions and future research.

Hypothesis One

For the first hypothesis, I predicted that there would be a main effect of condition: students in the non-judgment mindfulness condition would show greater HF-HRV during the recovery phase after the failure task than those in the control (mindfulness without non-judgment) condition. This hypothesis was not supported. However, there was a significant time effect, indicating that HF-HRV during the last five minutes of recovery was significantly higher than during the baseline resting state and during the stressor, regardless of condition. This indicates that, although there were no significant differences based on mindfulness condition, overall, students showed improved HF-HRV during the last five minutes of recovery. In other
words, perfectionistic students showed autonomic recovery from a failure task during a 10-minute mindfulness meditation.

This finding contradicts Azam et al. (2015)’s study, which found that HF-HRV increased during the recovery phase after a brief 10-minute mindfulness meditation for non-perfectionists, but not for perfectionists. Specifically, the study showed that non-perfectionists’ HF-HRV increased beyond the baseline levels during recovery, while perfectionists’ HF-HRV stayed around baseline levels, showing little autonomic recovery from the stressor. The authors concluded that perfectionism might prevent brief mindfulness meditation interventions from helping to regulate stress. The authors speculated that the instructions to become aware of one’s thoughts required a self-focus that could have hindered the perfectionists’ parasympathetic ability to regulate stress. However, results of the current study show that perfectionists in both mindfulness conditions improved HF-HRV during recovery. Both studies used mindfulness meditations that instructed participants to focus on their breath and to return their focus back to the breath when thoughts, emotions, or bodily sensations occur. However, the meditations used in this study often reminded participants to “gently” return their focus to the breath, and that they should not try to control their thoughts, feelings, or bodily sensations as they come up, or to try to make them go away. It could be that these instructions are critical for perfectionists, who cling to control in order to achieve “perfection.” The instructions to not only notice thoughts and emotions, but also to let them remain as they are, could be getting at the non-judgment aspect of mindfulness, even without the direct instructions to observe without judgment. The discrepancy between the findings in these two studies indicates a need for more research exploring mindfulness effects on HF-HRV during recovery from a stressor in perfectionistic samples. It would be especially important to determine which components of mindfulness are most helpful
for perfectionists recovering from failure, as well as whether specific characteristics of certain perfectionistic students prevent the positive effects of mindfulness on recovery (e.g., levels of worry, rumination, or perfectionistic cognitions).

**Hypothesis Two**

For the second hypothesis, I predicted that students in the non-judgment condition would report lower depression, anxiety, and stress during the meditation than students in the control condition. This hypothesis was not supported. It is important to note that this does not suggest that mindfulness does not reduce feelings of depression, anxiety, and stress after a stressor; rather, it suggests that the added non-judgment component does not significantly improve these effects. It would be critical for future studies to use a non-mindfulness control condition to examine whether mindfulness in general is helpful in these areas, especially given research showing that trait mindfulness is negatively associated with depression, anxiety, and psychological distress (Masuda & Tully, 2012).

The DASS-21, which measures depression, anxiety, and stress, originally instructs participants to indicate how often each statement applied to him or her over the past week, but was changed for the current study to represent feelings of depression, anxiety, and stress during the 10-minute mindfulness meditation. It is possible that mindfulness with a non-judgment focus could improve depression, anxiety, and stress with use over time, but that it does not show greater improvements than typical mindfulness during a 10-minute meditation. Finally, the means of all three variables were below a “1 = Applied to me to some degree, or some of the time,” which indicates that generally, participants were feeling low depression, anxiety, and stress during both meditations. This could indicate that, while one mindfulness meditation did not appear superior to the other, it generally resulted in low levels of distress. Future research
should measure these variables before and after the meditation to determine whether mindfulness is reducing levels of distress in the moment.

**Hypothesis Three**

For the third hypothesis, I predicted that condition (nonjudgment versus control), perfectionistic cognitions, worry, and rumination would predict a significant amount of the variance in HF-HRV levels during the second recovery period. This hypothesis was not supported. This finding differs from previous research showing that HRV is related to worry (Aldao et al., 2013), although it supports research showing no relation between state rumination and HF-HRV recovery in individuals reporting high trait rumination (Key et al., 2008).

It is important to note that, while perfectionistic cognitions were not related to HF-HRV during recovery in this study, those who reported higher levels of perfectionistic cognitions did also demonstrate higher HF-HRV during baseline and the stressor. It is possible that students with higher levels of perfectionism cognitions are working to regulate stress due to their own high expectations and perceived criticism from others even during rest. Specifically, highly perfectionistic students may be experiencing sympathetic arousal any time they are in a situation in which they feel they must perform in a certain way. Given the laboratory setting for this study, these students may have felt that pressure to be perfect while being observed by the researchers, while at the same time attempting to reassure themselves that it was not supposed to be a stressful situation. This could account for the increased activity in the parasympathetic nervous system, attempting to regulate the perceived stress. Additionally, this increased activity could continue into the stressor situation, where these students are experiencing stress and trying to regulate their response. Future research should examine this relation further, especially given the lack of research on perfectionism and HRV. Additionally, it would also be important to study
these variables in a sample that also includes non-perfectionistic students, as this would likely provide a larger range of levels of perfectionistic cognitions, worry, and rumination.

**Supplemental Exploratory Analyses**

Although not included in the original hypotheses, I expected that within the group of perfectionists included in this study, those who reported higher levels of perfectionistic cognitions would benefit more from the non-judgment mindfulness meditation. Specifically, I predicted that those with high levels of perfectionistic cognitions in the control group would have very little HF-HRV recovery, while those in the non-judgment mindfulness group would show equal recovery to those with lower perfectionistic cognitions. This hypothesis was not supported; however, graphically it appears that there may be differences in the recovery patterns based on group (but the analysis was underpowered by small cell sizes). Specifically, the “super perfectionists” in the non-judgment mindfulness condition showed sharp improvements in HF-HRV during the last five minutes of recovery, while the “super perfectionists” in the control mindfulness condition did not appear to have HF-HRV recovery. Additionally, both “perfectionist” groups showed improved HF-HRV during both recovery time points. These differences, if significant, would indicate that mindfulness with a non-judgment component helps “super perfectionists” recover from failure, while typical mindfulness without the non-judgment focus does not. Further, they would indicate that for perfectionists who do not report the highest levels of perfectionism cognitions, mindfulness in general is helpful for recovery from a stressor, and it is less important that the mediations include the non-judgment component.

More participants are needed to determine whether these are significant differences, as group numbers ranged from eleven to eighteen per group; however, if these differences remain with a larger sample, the findings would support research suggesting that the mindfulness facet
of non-judging is associated with less overall repetitive thoughts, while the observing facet of mindfulness is related to more repetitive thoughts (Evans & Segerstrom, 2011). Further, it would suggest that those who experience more repetitive thoughts might especially benefit from doing mindfulness that focuses on non-judgment of thoughts and emotions. Those who experience more repetitive thoughts and simply observe them may feel added discomfort in noticing the thought (e.g., I am a failure) without the additional non-judgment instructions. The non-judgment component might remind these individuals to observe their thoughts without judgment, as this could eliminate the added discomfort and help these participants recover from their experienced failure.

**Limitations**

One limitation of this study is that it did not include a non-mindfulness control group. The purpose of this study was to use a stringent control group to determine whether the non-judgment aspect of mindfulness helps perfectionists recover from failure. However, this study was designed based on the assumption that typical mindfulness meditation does not help perfectionists recover from failure, as seen in the Azam et al. (2015) study. The results of the current study show that perfectionists can indeed recover from failure using a mindfulness task; however, the results did not show that it is the mindfulness meditation in particular that is helping perfectionists recover. Future research should replicate this study using a non-mindfulness control group (e.g., muscle relaxation, rest) to determine whether mindfulness is the key ingredient in recovery for perfectionists. The results of such a study would have large implications for the development of treatments and interventions for perfectionists, as it would support mindfulness as an easy and cost-effective way to combat some of the negative effects that perfectionism has on one’s ability to regulate emotions in the moment. This type of
An intervention could be incorporated into many different settings (e.g., grade schools, universities, work places, nursing homes, therapy) with little to no cost for implementation.

Another limitation of this study is the generalizability to diverse populations. This sample consisted of college students, a majority of whom identified as Caucasian. Future research should replicate these findings in other age groups (e.g., children, adolescents, adults, and elderly) to determine whether they hold true across the lifespan. Additionally, future research should examine whether these findings hold true in more racially diverse samples. These findings would be critical in determining whether mindfulness is an effective intervention for failure recovery across the lifespan and racial identification. This would also be important to study given unique stressors that these different populations experience. For example, while doing poorly on a cognitive task may be especially stressful for college students, perfectionism may be more salient when it comes to impressing friends and parents in childhood, or parenting and workplace success for the adult population. In order to develop effective interventions across all ages, genders, and races, it would be important to include a more diverse sample and to study additional stressors for intervention development.

A final limitation of this study was the small sample size. While 60 participants were sufficient to examine condition differences for medium to large effects, I did not have enough power for the supplementary analyses exploring group differences in HF-HRV based on condition and level of perfectionism cognitions. Future researchers should collect data on a larger sample when replicating this study. Power analyses using an a priori analysis of a repeated measure ANOVA with four measurements (within-subjects) and four groups (between-subjects; two perfectionist groups and two conditions) estimating a medium effect size indicated that at least 112 total participants would be necessary for this study (Faul et al., 2007). It would also be
beneficial to include non-perfectionists in the study to have a larger range of levels of perfectionistic cognitions, worry, and rumination when predicting HF-HRV during recovery.

**Implications for Research and Intervention**

Despite a lack of condition differences in HF-HRV recovery, this study contradicts previous findings that mindfulness does not help perfectionists recover from failure. The significant time effects found in this study show that perfectionists are able to recover from failure during a 10-minute mindfulness meditation. What is less clear is the critical elements to recovery. Future research should continue to explore HF-HRV in perfectionists in an attempt to determine whether mindfulness is a necessary element to recovery, or whether other interventions (e.g., muscle relaxation) are equally beneficial. Further, future studies could explore other stressors (e.g., criticism from others) in order to determine in which contexts mindfulness, along with other beneficial interventions, is especially useful. These studies could aid in the development of quick and cost-effective treatments and interventions for perfectionism in grade schools, universities, work places, nursing homes, and therapy.
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APPENDIX A

THE PERFECTIONISM COGNITIONS INVENTORY (PCI)

Flett, Hewitt, Whelan, & Martin (2007)

Listed below are a variety of thoughts about perfectionism that sometimes pop into people’s heads. Please read each thought and indicate how frequently, if at all, the thoughts occurred to you over the last week. Please read each item carefully and select the appropriate number, using the scale below.

0 = Not at All
1 = Sometimes
2 = Moderately Often
3 = Often
4 = All of the Time

1. Why can’t I be perfect
2. I need to do better
3. I should be perfect
4. I should never make the same mistake twice
5. I’ve got to keep working on my goals
6. I have to be the best
7. I should be doing more
8. I can’t stand to make mistakes
9. I have to work hard all the time
10. No matter how much I do, it’s never enough
11. People expect me to be perfect
12. I must be efficient at all times
13. My goals are very high
14. I can always do better, even if things are almost perfect
15. I expect to be perfect
16. Why can’t things be perfect?
17. My work has to be superior
18. It would be great if everything in my life was perfect
19. My work should be flawless
20. Things are seldom ideal
21. How well am I doing?
22. I can’t do this perfectly
23. I certainly have high standards
24. Maybe I should lower my goals
25. I am too much of a perfectionist
APPENDIX B

THE RUMINATIVE THOUGHT STYLE QUESTIONNAIRE (RTS)

Brinker & Dozois (2009)

*removed Anticipatory Thought items (2) from original measure

For each of the items below, please rate how well the item describes you.

1 = Not At All

2

3

4

5

6

7 = Very Well

1. I find that my mind often goes over things again and again

2. When I have a problem, it will gnaw on my mind for a long time

3. I find that some thoughts come to mind over and over throughout the day

4. I can’t stop thinking about some things

5. When I am anticipating an interaction, I will imagine every possible scenario and conversation

6. I tend to replay past events as I would have liked them to happen

7. I find myself daydreaming about things I wish I had done.

8. When I feel I have had a bad interaction with someone, I tend to imagine various scenarios where I would have acted differently.

9. When trying to solve a complicated problem, I find that I just keep coming back to the beginning without ever finding a solution
10. If there is an important event coming up, I think about it so much that I work myself up

11. I have never been able to distract myself from unwanted thoughts

12. Even if I think about a problem for hours, I still have a hard time coming to a clear understanding

13. It is very difficult for me to come to a clear conclusion about some problems, no matter how much I think about it

14. Sometimes I realize I have been sitting and thinking about something for hours

15. When I am trying to work out a problem, it is like I have a long debate in my mind where I keep going over different points

16. I like to sit and reminisce about pleasant events from the past

17. Sometimes even during a conversation, I find unrelated thoughts popping into my head

18. When I have an important conversation coming up, I tend to go over it in my mind again and again
APPENDIX C

THE PENN STATE WORRY QUESTIONNAIRE (PSWQ)

Meyer, Miller, Metzger, & Borkovec (1990)

Rate each of the following statements on a scale of 1 ("not at all typical of me") to 5 ("very typical of me"). Please do not leave any items blank.

1 = Not At All Typical Of Me

2

3

4

5 = Very Typical Of Me

1. If I do not have enough time to do everything, I do not worry about it (R)

2. My worries overwhelm me

3. I do not tend to worry about things (R)

4. Many situations make me worry

5. I know I should not worry about things, but I just cannot help it

6. When I am under pressure I worry a lot

7. I am always worrying about something

8. I find it easy to dismiss worrisome thoughts (R)

9. As soon as I finish one task, I start to worry about everything else I have to do

10. I never worry about anything (R)

11. When there is nothing more I can do about a concern, I do not worry about it any more (R)

12. I have been a worrier all my life

13. I notice that I have been worrying about things
14. Once I start worrying, I cannot stop

15. I worry all the time

16. I worry about projects until they are all done
APPENDIX D

THE BIG FIVE INVENTORY (BFI) – CONSCIENTIOUSNESS SUBSCALE

John, Donahue, & Kentle (1991)

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

1 = Disagree strongly
2 = Disagree a little
3 = Neither agree nor disagree
4 = Agree a little
5 = Agree Strongly

I see Myself as Someone Who...

1. Does a thorough job
2. Can be somewhat careless (R)
3. Is a reliable worker
4. Tends to be disorganized (R)
5. Tends to be lazy (R)
6. Perseveres until the task is finished
7. Does things efficiently
8. Makes plans and follows through with them
9. Is easily distracted (R)
APPENDIX E

DEMOGRAPHIC QUESTIONNAIRE

1. What is your age?
   - ___ years

2. What is your biological sex?
   - Male
   - Female

3. What is your race/ethnicity?
   - African American
   - Caucasian
   - American Indian/Native American or Pacific Islander
   - Asian
   - Hispanic or Latino/a
   - Bi-Racial
   - Other (please write in)

4. What is your year in school?
   - Freshman
   - Sophomore
   - Junior
   - Senior
   - Other: _________

5. Have you ever participated in mindfulness training, either at a workshop or with an experienced instructor?
6. Do you currently have a diagnosis of anxiety or depression, given to you by a medical doctor or mental health professional?

- Yes
- No
- Prefer not to answer
APPENDIX F

DEPRESSION ANXIETY STRESS SCALES (DASS-21)

Lovibond & Lovibond (1995)

Note: Bold text indicates changes from the original scale

Please read each statement and circle a number 0, 1, 2 or 3 that indicates how much the statement applied to you during the meditation. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 = Did not apply to me at all
1 = Applied to me to some degree, or some of the time
2 = Applied to me to a considerable degree, or a good part of time
3 = Applied to me very much, or most of the time

1. I found myself getting upset by quite trivial things
2. I was aware of dryness of my mouth
3. I couldn't seem to experience any positive feeling at all
4. I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)
5. I just couldn't seem to get going
6. I tended to over-react to experiences (e.g. thoughts, emotions, sensations)
7. I had a feeling of shakiness (e.g., legs going to give way)
8. I found it difficult to relax
9. I found myself so anxious I was most relieved when it ended
10. I felt that I had nothing to look forward to

11. I found myself getting upset rather easily

12. I felt that I was using a lot of nervous energy

13. I felt sad and depressed

14. I found myself getting impatient

15. I had a feeling of faintness

16. I felt that I had lost interest in just about everything

17. I felt I wasn't worth much as a person

18. I felt that I was rather touchy

19. I perspired noticeably (e.g., hands sweaty) in the absence of high temperatures or physical exertion

20. I felt scared without any good reason

21. I felt that life wasn't worthwhile

Depression: 3, 5, 10, 13, 16, 17, 21

Anxiety: 2, 4, 7, 9, 15, 19, 20

Stress: 1, 6, 8, 11, 12, 14, 18
APPENDIX G

MANIPULATION CHECK

(from Azam et al., 2015)

Please rate your performance on the cognitive task you just completed.

1 = Poor

2 = Below Average

3 = Average

4 = Above Average

5 = Excellent
APPENDIX H

NON-JUDGMENT MINDFULNESS MEDITATION SCRIPT

(Intro adapted from Watford & Stafford, 2015; Meditation adapted from Eifert & Forsyth, 2005)

Note: Bold text indicates non-judgment components of the meditation

For the next several minutes, I’m going to ask you to think about, and try, a particular kind of awareness, called mindfulness. The term mindfulness comes from Eastern spiritual and religious traditions, but psychology has begun to find that mindfulness (without the spiritual and religious context) can be helpful for people in many ways. Today, I’m just going to tell you a little bit about this way of paying attention, and have you try it out, to see what it’s like for you.

Mindfulness is paying attention in the present moment, with openness and curiosity, instead of judgment. We often focus on things other than what is happening in the moment—worrying about the future, thinking about the past, focusing on what is coming next rather than what is right in front of us. And it is useful that we can do a number of things without paying attention to them. However, sometimes it is helpful to bring our attention, particularly a curious and kind attention, to what we are doing in the moment.

Sometimes we do pay close attention to what we are thinking and feeling and we become very critical of our thoughts and feelings and we try to either change them or distract ourselves because this critical awareness can be very painful. Being mindful falls between these two extremes—we pay attention to what is happening inside and around us, we see events and experiences as what they are, and we allow things we can’t control to be as they are while we focus our attention on the task at hand. This part of mindfulness, holding our judgments loosely and not trying to change our thoughts or feelings can be especially hard. In fact, often being mindful involves practicing not judging our tendency to have judgments!
Mindfulness is a process: We do not reach a final and total state of mindfulness. It is a way of being in one moment that comes and goes. Mindfulness is losing our focus 100 times and returning to it 101 times.

Go ahead and get in a comfortable position in your chair. Sit upright with your feet flat on the floor, your arms and legs uncrossed, and your hands resting in your lap. Allow your eyes to close gently (pause 10 seconds).

Take a few moments to get in touch with the movement of your breath and the sensations in the body (pause 10 seconds). Bring your awareness to the physical sensations in your body, especially to the sensations of touch or pressure, where your body makes contact with the chair or floor (pause 10 seconds).

Now, slowly bring your attention to the gentle rising and falling of your breath in your chest and belly. Like ocean waves coming in and out, your breath is always there. Notice its rhythm in your body (pause 10 seconds). Notice each breath. Focus on each inhale...and exhale (pause 10 seconds). Notice the changing patterns of sensations in your belly as you breathe in, and as you breathe out (pause 10 seconds). Take a few moments to feel the physical sensations as you breathe in and as you breathe out (pause 10 seconds).

There is no need to try to control your breathing in any way – simply let the breath breathe itself (pause 10 seconds). As best you can, also bring this attitude of generous allowing and gentle acceptance to the rest of your experience. There is nothing to be fixed, no particular state to be achieved. As best as you can, simply allow your experience to be your experience, without needing it to be other than what it is (pause 15 seconds).

Sooner or later, your mind will wander away from the breath to other concerns, thoughts, worries, images, bodily sensations, planning, or daydreams, or it may just drift along. This is
what minds do much of the time. When you notice that your mind has wandered, gently congratulate yourself – you have come back and are once more aware of your experience! You may want to acknowledge briefly where your mind has been (Ah, there’s thinking, or there’s feeling). Then, gently escort your attention back to the sensation of the breath coming in and going out (*pause 10 seconds*). **As best you can, bring a quality of kindness and compassion to your awareness, perhaps seeing the repeated wanderings of your mind as opportunities to bring patience and gentle curiosity to your experience** (*pause 15 seconds*).

When you become aware of bodily sensations and feelings, tension, or other intense sensations in a particular part of your body, just notice them, **acknowledge their presence, and see if you can make space for them** (*pause 10 seconds*). Do not try to hold on to them or make them go away (*pause 10 seconds*). **See if you can open your heart and make some room for the discomfort, for the tension, for the anxiety, just allowing them to be there** (*pause 10 seconds*). **Is there enough space in you to welcome in all of your experience?** (*Pause 15 seconds*)

Watch the sensations change from moment to moment. Sometimes they grow stronger (*pause 10 seconds*), sometimes they stay the same (*pause 10 seconds*), and sometimes they grow weaker – it does not matter (*pause 10 seconds*). Breathe calmly in to and out from the sensations of discomfort, imagining the breath moving in to and out from that region of the body (*pause 10 seconds*). Remember, your intention is not to make you feel better, but to get better at feeling (*pause 15 seconds*).

If you ever notice that you are unable to focus on your breathing because of intense physical sensations or discomfort in your body, let go of your focus on the breath and shift your focus to the place of discomfort. Gently direct your attention on and into the discomfort and stay
with it, no matter how bad it seems (pause 10 seconds). Take a look at it. What does it really feel like? (pause 10 seconds) Again, see if you can make room for the discomfort and allow it to be there (pause 10 seconds). Are you willing to be with whatever you have? (pause 15 seconds)

Along with physical sensations in your body, you may also notice thoughts about the sensations and thoughts about the thoughts (pause 10 seconds). You may notice your mind coming up with evaluative labels such as “dangerous” or “getting worse.” If that happens, you can thank your mind for the label (pause) and return to the present experience as it is, not as your mind says it is, noticing thoughts as thoughts, physical sensations as physical sensations, feelings as feelings, nothing more, nothing less (pause 15 seconds).

To help you experience the difference between yourself and your thoughts and feelings, you can name thoughts and feelings as you notice them. For instance, if you notice you are worrying, silently say to yourself, “Worry…there is worry” just observing worry and not judging yourself for having these thoughts and feelings (pause 10 seconds). If you find yourself judging, just notice that and call it “Judging…there is judging” and observe that with a quality of kindness and compassion (pause 10 seconds). You can do the same with other thoughts and feelings and just name them as planning, reminiscing, longing, or whatever you experience. Label the thought or emotion and move on (pause 10 seconds). Thoughts and feelings come and go in your mind and body. You are not what those thoughts and feelings say, no matter how persistent or intense they may be (pause 15 seconds).

As this time for formal practice comes to an end, gradually widen your attention to take in the sounds around you…notice your surroundings (pause) and slowly open your eyes with the
intention to bring this awareness to the present moment and into the upcoming moments of the day.
APPENDIX I

CONTROL MINDFULNESS MEDITATION SCRIPT

(Intro adapted from Watford & Stafford, 2015; Meditation adapted from Eifert & Forsyth, 2005)

Note: Bold text indicates components of the meditation that differ from the non-judgment mindfulness meditation

For the next several minutes, I’m going to ask you to think about, and try, a particular kind of awareness, called mindfulness. The term mindfulness comes from Eastern spiritual and religious traditions, but psychology has begun to find that mindfulness (without the spiritual and religious context) can be helpful for people in many ways. Today, I’m just going to tell you a little bit about this way of paying attention, and have you try it out, to see what it’s like for you.

Mindfulness is paying attention in the present moment. We often focus on things other than what is happening in the moment—worrying about the future, thinking about the past, focusing on what is coming next rather than what is right in front of us. And it is useful that we can do a number of things without paying attention to them. However, sometimes it is helpful to bring our attention to what we are doing in the moment.

Sometimes we do pay close attention to what we are thinking and we try to either change them or distract ourselves because this critical awareness can be very painful. Being mindful falls between these two extremes—we pay attention to what is happening inside and around us, we see events and experiences as what they are. This part of mindfulness can be especially hard.

Mindfulness is a process: We do not reach a final and total state of mindfulness. It is a way of being in one moment that comes and goes. Mindfulness is losing our focus 100 times and returning to it 101 times.
Go ahead and get in a comfortable position in your chair. Sit upright with your feet flat on the floor, your arms and legs uncrossed, and your hands resting in your lap. Allow your eyes to close gently (pause 10 seconds).

Take a few moments to get in touch with the movement of your breath and the sensations in the body (pause 10 seconds). Bring your awareness to the physical sensations in your body, especially to the sensations of touch or pressure, where your body makes contact with the chair or floor (pause 10 seconds).

Now, slowly bring your attention to the gentle rising and falling of your breath in our chest and belly. Like ocean waves coming in and out, your breath is always there. Notice its rhythm in your body (pause 10 seconds). Notice each breath. Focus on each inhale...and exhale (pause 10 seconds). Notice the changing patterns of sensations in your belly as you breathe in, and as you breathe out (pause 10 seconds). Take a few moments to feel the physical sensations as you breathe in and as you breathe out (pause 10 seconds).

There is no need to try to control your breathing in any way – simply let the breath breathe itself (pause 10 seconds). There is nothing to be fixed, no particular state to be achieved. As best as you can, simply allow the breath to breathe itself (pause 15 seconds).

Sooner or later, your mind will wander away from the breath to other concerns, thoughts, worries, images, bodily sensations, planning, or daydreams, or it may just drift along. This is what minds do much of the time. When you notice that your mind has wandered, gently congratulate yourself – you have come back and are once more aware of your experience! You may want to acknowledge briefly where your mind has been (Ah, there’s thinking, or there’s feeling). Then, gently escort your attention back to the sensation of the breath coming in and
going out *(pause 10 seconds)*. **As best you can, notice the repeated wanderings of your mind as opportunities to bring your attention back to your breath** *(pause 15 seconds)*.

When you become aware of bodily sensations and feelings, tension, or other intense sensations in a particular part of your body, just notice them, and **bring your attention back to your breath** *(pause 10 seconds)*. Do not try to hold on to them or make them go away *(pause 10 seconds)*. **If you notice any discomfort, tension, or anxiety, simply return your focus back to your breath** *(pause 10 seconds)*. *See if you can notice the rise and fall of your chest (Pause 15 seconds)*

Watch the sensations change from moment to moment. Sometimes they grow stronger *(pause 10 seconds)*, sometimes they stay the same *(pause 10 seconds)*, and sometimes they grow weaker – it does not matter *(pause 10 seconds)*. Breathe calmly in *to* and out *from* the sensations of discomfort, imagining the breath moving in *to* and out *from* that region of the body *(pause 15 seconds)*. Remember, your intention is not to make you feel better, but to get better at feeling *(pause 15 seconds)*.

If you ever notice that you are unable to focus on your breathing because of intense physical sensations or discomfort in your body, let go of your focus on the breath and shift your focus to the place of discomfort. Gently direct your attention *on* and *into* the discomfort and stay with it, no matter how bad it seems *(pause 15 seconds)*. Take a look at it. *What does it really feel like? (pause 15 seconds) Again, just notice the discomfort, and when you can, return your focus to your breath (pause 10 seconds).*

**Now, slowly bring your attention to the gentle rising and falling of your breath in our chest and belly. Like ocean waves coming in and out, your breath is always there. Notice its rhythm in your body (pause 10 seconds).** Notice each breath. **Focus on each**
inhale…and exhale (pause 10 seconds). Notice the changing patterns of sensations in your belly as you breathe in, and as you breathe out (pause 10 seconds). Take a few moments to feel the physical sensations as you breathe in and as you breathe out (pause 10 seconds).

Sooner or later, your mind will wander away from the breath to other concerns, thoughts, worries, images, bodily sensations, planning, or daydreams, or it may just drift along. This is what minds do much of the time. When you notice that your mind has wandered, gently congratulate yourself – you have come back and are once more aware of your experience! You may want to acknowledge briefly where your mind has been (Ah, there’s thinking, or there’s feeling). Then, gently escort your attention back to the sensation of the breath coming in and going out (pause 15 seconds). As best you can, notice the repeated wanderings of your mind as opportunities to bring your attention back to your breath (pause 15 seconds).

As this time for formal practice comes to an end, gradually widen your attention to take in the sounds around you…notice your surroundings (pause) and slowly open your eyes with the intention to bring this awareness to the present moment and into the upcoming moments of the day.
DATE: August 3, 2017

TO: Hannah Geis, B.A.
FROM: Bowling Green State University Institutional Review Board

PROJECT TITLE: [941174-6] Perfectionism and Negative Automatic Thoughts: Using Mindfulness to Help Perfectionists Effectively Respond to Failure
SUBMISSION TYPE: Continuing Review/Progress Report

ACTION: APPROVED
APPROVAL DATE: August 2, 2017
EXPIRATION DATE: August 1, 2018
REVIEW TYPE: Full Committee Review

Thank you for your submission of Continuing Review/Progress Report materials for this project. The Bowling Green State University Institutional Review Board has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

The final approved version of the consent document(s) is available as a published Board Document in the Review Details page. You must use the approved version of the consent document when obtaining consent from participants. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note your consent document(s) have been administratively updated to reflect the new name of the Institutional Review Board (previously Human Subjects Review Board) along with the update of the new email address (orc@bgsu.edu).

Please note that you are responsible to conduct the study as approved by the IRB. If you seek to make any changes in your project activities or procedures, those modifications must be approved by this committee prior to initiation. Please use the modification request form for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. All NON-COMPLIANCE issues or COMPLAINTS regarding this project must also be reported promptly to this office.

This approval expires on August 1, 2018. You will receive a continuing review notice before your project expires. If you wish to continue your work after the expiration date, your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date.

Good luck with your work. If you have any questions, please contact the Office of Research Compliance at 419-372-7716 or orc@bgsu.edu. Please include your project title and reference number in all correspondence regarding this project.
This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Bowling Green State University Institutional Review Board's records.
### Table 1

Demographic Characteristics by Condition

<table>
<thead>
<tr>
<th></th>
<th>Control Mindfulness ($n = 30$)</th>
<th>Non-Judgment Mindfulness ($n = 30$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n$ (%)</td>
<td>$n$ (%)</td>
</tr>
<tr>
<td>Sex: Female</td>
<td>23 (76.7%)</td>
<td>20 (66.7%)</td>
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<tr>
<td>Year in School</td>
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<tr>
<td>Freshman</td>
<td>19 (63.3%)</td>
<td>16 (53.3%)</td>
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<tr>
<td>Sophomore</td>
<td>6 (20%)</td>
<td>5 (16.7%)</td>
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<tr>
<td>Junior</td>
<td>3 (10%)</td>
<td>6 (20%)</td>
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<tr>
<td>Senior</td>
<td>2 (6.7%)</td>
<td>3 (10%)</td>
</tr>
<tr>
<td>No Previous Mindfulness</td>
<td>27 (90%)</td>
<td>24 (80%)</td>
</tr>
<tr>
<td>Previous Diagnosis</td>
<td>13 (43.3%)</td>
<td>7 (23.3%)</td>
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<tr>
<td>Race</td>
<td></td>
<td></td>
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<tr>
<td>Caucasian</td>
<td>23 (85.2%)</td>
<td>23 (82.1%)</td>
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<tr>
<td>African-American</td>
<td>2 (7.4%)</td>
<td>2 (7.1%)</td>
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<td>Hispanic/Latino/a</td>
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<td>1 (3.6%)</td>
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<tr>
<td>Bi-Racial</td>
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<td>1 (3.6%)</td>
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<tr>
<td>Asian</td>
<td>0 (0%)</td>
<td>1 (3.6%)</td>
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<tr>
<td>Age</td>
<td>$M (SD)$</td>
<td>$M (SD)$</td>
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<tr>
<td></td>
<td>19.30 (1.86)</td>
<td>19.87 (2.50)</td>
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Table 2

*Study Variables by Condition*

<table>
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<th></th>
<th>Control Mindfulness ($n = 30$)</th>
<th>Non-Judgment Mindfulness ($n = 30$)</th>
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<tr>
<td></td>
<td>$M$ ($SD$)</td>
<td>$M$ ($SD$)</td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rumination$^b$</td>
<td>1.46 (0.22)</td>
<td>1.60 (0.30)</td>
</tr>
<tr>
<td>Worry$^a$</td>
<td>0.20 (0.14)</td>
<td>0.26 (0.16)</td>
</tr>
<tr>
<td>Perfectionistic Cognitions$^a$</td>
<td>0.49 (0.05)</td>
<td>0.46 (0.03)</td>
</tr>
<tr>
<td>Baseline HF-HRV</td>
<td>219.35 (133.18)</td>
<td>250.35 (169.14)</td>
</tr>
</tbody>
</table>

$^a$These variables were transformed using the log 10 function. $^b$This variable was transformed using the square root function.
Table 3

*Correlations among the Study Variables*

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<th></th>
<th>R</th>
<th>W</th>
<th>PC</th>
<th>B</th>
<th>S</th>
<th>R1</th>
<th>R2</th>
<th>D</th>
<th>A</th>
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<tbody>
<tr>
<td><strong>Worry</strong></td>
<td>.44**</td>
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<td></td>
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<tr>
<td><strong>PC</strong></td>
<td>-.13</td>
<td>-.05</td>
<td>--</td>
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<tr>
<td><strong>Baseline</strong></td>
<td>.06</td>
<td>-.03</td>
<td>.27*</td>
<td>--</td>
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<tr>
<td><strong>Stress HRV</strong></td>
<td>.15</td>
<td>.12</td>
<td>.27*</td>
<td>.66**</td>
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<tr>
<td><strong>R1</strong></td>
<td>.06</td>
<td>.12</td>
<td>.17</td>
<td>.60**</td>
<td>.51**</td>
<td>--</td>
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<tr>
<td><strong>R2</strong></td>
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<td>-.01</td>
<td>.18</td>
<td>.68**</td>
<td>.49**</td>
<td>.66**</td>
<td>--</td>
<td></td>
<td></td>
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<tr>
<td><strong>Depression</strong></td>
<td>-.22</td>
<td>-.26*</td>
<td>.08</td>
<td>-.08</td>
<td>-.14</td>
<td>-.10</td>
<td>-.06</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td><strong>Anxiety</strong></td>
<td>-.18</td>
<td>-.18</td>
<td>-.10</td>
<td>-.25</td>
<td>-.29*</td>
<td>-.22</td>
<td>-.07</td>
<td>.46**</td>
<td>--</td>
</tr>
<tr>
<td><strong>Stress</strong></td>
<td>-.15</td>
<td>-.26</td>
<td>-.02</td>
<td>-.14</td>
<td>-.17</td>
<td>-.07</td>
<td>-.03</td>
<td>.65**</td>
<td>.52**</td>
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</tbody>
</table>

*Note.* R = Rumination, W = Worry, PC = Perfectionistic Cognitions, Baseline/B = Baseline HF-HRV, Stress HRV/S = Stress HF-HRV, R1 = Recovery 1 HF-HRV, R2 = Recovery 2 HF-HRV, D = Depression, A = Anxiety.

* p < .05, ** p < .01.
Table 4

*Predicting HF-HRV at Recovery Two (T4) with Perfectionistic Cognitions, Rumination, Worry, and Condition after Controlling for HF-HRV at Stress*

<table>
<thead>
<tr>
<th>Predictors</th>
<th>ΔR²</th>
<th>β</th>
<th>df</th>
<th>F</th>
<th>p</th>
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<tr>
<td><strong>Step 1</strong></td>
<td>.03</td>
<td></td>
<td>1, 57</td>
<td>1.95</td>
<td>.168</td>
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<tr>
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<td></td>
<td>.168</td>
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<td></td>
<td>5, 53</td>
<td>1.17</td>
<td>.336</td>
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<td>-0.04</td>
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<td></td>
<td>.797</td>
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<tr>
<td>Worry</td>
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<td>0.02</td>
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<td>.891</td>
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<td></td>
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<td>Condition</td>
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<td>2.26</td>
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*Note.* Predictor variables were centered to reduce collinearity.
Figure 1. Non-significant differences in mean HF-HRV variation over time based on condition (control versus treatment).
Figure 2. Significant time effect on HF-HRV.
Figure 3. Non-significant differences in self-reported stress, anxiety, and depression during recovery based on condition (control versus treatment).
Figure 4. Non-significant differences in mean HF-HRV variation over time based on condition (control versus treatment) and perfectionism group (perfectionists versus “super perfectionists”).