




2019

THE MODERATING ROLE OF MINDFULNESS SKILLS IN THE RELATIONSHIP BETWEEN BORDERLINE PERSONALITY FEATURES AND ASSOCIATED PROBLEMATIC BEHAVIORS

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Digital Object Identifier: <https://doi.org/10.13023/etd.2019.437>

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THE MODERATING ROLE OF MINDFULNESS SKILLS IN THE RELATIONSHIP
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PROBLEMATIC BEHAVIORS

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Arts and Sciences
at the University of Kentucky

By
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2019

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ABSTRACT OF DISSERTATION

THE MODERATING ROLE OF MINDFULNESS SKILLS IN THE RELATIONSHIP BETWEEN BORDERLINE PERSONALITY FEATURES AND ASSOCIATED PROBLEMATIC BEHAVIORS

Individuals with borderline personality disorder (BPD) experience intense affect and emotional dyscontrol that may lead them to engage in maladaptive coping strategies and behaviors such as substance use, alcohol use, risky sexual behavior, aggression, and emotional eating. Theory posits that mindfulness, a mental state in which one is attentive, aware, and accepting of the present moment, may lead to increased tolerance of emotional distress. The present study sought to investigate the role of dispositional mindfulness as a moderating factor in the relationship between BPD features and related problematic behaviors using structural equation modeling and regression analyses in cross-sectional and longitudinal analyses, respectively. Undergraduate students completed questionnaires assessing borderline personality symptoms, trait mindfulness, and incidence of substance use, alcohol use, risky sexual behavior, aggression, and emotional eating over the past 30 days at two time points, three months apart. Results suggested that mindfulness does not moderate the relationship between BPD features and problematic behaviors in either the cross-sectional and longitudinal samples. There was also no evidence to suggest that any one facet of mindfulness moderated the relationship above the other facets in both samples. Findings highlight the need to continue to investigate the driving force behind the incidence of problematic behaviors in individuals with BPD.

KEYWORDS: Borderline Personality Disorder, Mindfulness, Problematic Behaviors

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10/22/2019

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CHAPTER ONE: INTRODUCTION

Background

Borderline personality disorder (BPD) is characterized by a pervasive pattern of emotional, interpersonal, and behavioral problems (APA, 2013). Linehan's (1993) biosocial model posits that BPD develops through a transaction over time between a biological vulnerability to emotional experiences and an emotionally invalidating environment. Individuals with BPD are more sensitive than most people to their emotional experiences in that they experience their emotions more intensely and demonstrate a slower return to baseline affect following an emotional experience (Linehan, 1993). This biological vulnerability interacts with their emotionally invalidating environment, in which the individual is taught that their emotional experiences are wrong or inappropriate. As a result, individuals with BPD demonstrate deficits in a broad range of affect regulation skills (Glenn & Klonsky, 2009; Salsman & Linehan, 2012). The intense negative affect and emotional dyscontrol that accompanies emotional experiences for those with BPD can frequently make uncomfortable situations distressing and intolerable (Rosenthal et al., 2008).

In an effort to regulate their affective intensity, individuals with BPD engage in maladaptive coping strategies and behaviors (Hayes et al., 1996; Sanislow et al., 2002). BPD is associated with increased rates of substance use, non-suicidal self-injury, aggression, and other problematic behaviors that can be harmful to the individual or the people around them (Wupperman et al., 2013). Because these behaviors offer short-term relief from the intense distress experienced by individuals with BPD, these behaviors are reinforced and are more likely to occur in the future. Repeated occurrences of these

behaviors then make them an automatic response to potential discomfort in various situations (Wupperman et al., 2013). These problematic behaviors have widespread societal costs including chronic unemployment, auto accidents, frequent hospitalization, and increased utilization of healthcare resources (Linehan et al., 1994; Zanarini et al., 1998).

Problematic behaviors

The present study focuses on five primary problematic behaviors that are often associated with BPD: substance and alcohol use, risky sexual behavior, aggression, and dysregulated eating.

Previous research has established an association between the severity of borderline personality features and level of alcohol and substance use (Stepp et al., 2005). One study found that the prevalence of BPD among individuals seeking treatment for opioid abuse exceeded 40%, and another found that nearly 50% of individuals with BPD were likely to report a history of substance abuse (Sansone, Whitecar, & Wiederman, 2008; Sansone & Wiederman, 2009). Trull and colleagues (2010) reported that adults with BPD were six times more likely to have a co-occurring substance abuse disorder than people without a BPD diagnosis. These findings may have a strong link to age, with younger individuals being more likely to carry a dual diagnosis than older individuals with BPD (Morgan et al., 2013). The impulsivity, suicidality, and self-harm risks associated with BPD may all be exacerbated by the use of alcohol or drugs, making this a particularly problematic behavior (Lee, Cameron, & Jenner, 2015).

Individuals with BPD have demonstrated riskier sexual behaviors such as unprotected sex, sex in exchange for money or drugs, and greater number of sexual

partners in past research (Frias, Palma, Farriols, & Gonzalez, 2016). BPD pathology in youth has been associated with poor health and safety, and uncertainty in sexual identity formation (Thompson et al., 2017). Young adults with BPD have been shown to engage in sexual relationships at a younger age, with more sexual partners in the previous year, and to have had more casual relationships than individuals without BPD (Sansone, Lam, & Wiederman, 2011; Thompson et al., 2017). Moreover, compared to individuals without BPD, individuals with BPD were more likely to report having been sexually assaulted and having been coerced to have sex. A study conducted by Penner and colleagues (2019) demonstrated that adolescent girls with BPD reported riskier attitudes and norms related to sex, and in particular, reported lower self-efficacy to refuse sex, which may influence their attitudes and beliefs surrounding sex later in life, potentially leading to riskier sexual behaviors.

Aggression is defined as any behavior directed towards another individual with the intent to cause harm (Anderson & Bushman, 2002). Evidence suggests that BPD is associated with aggressive and violent behavior directed towards others (Newhill, Eack, & Mulvey, 2009; Sansone & Sansone, 2012). Research has found that 73% of individuals with BPD have engaged in aggressive behavior over the past year (Newhill, Eack, & Mulvaney, 2009), and 58% of individuals with BPD have been “occasionally or often” involved in physical fights at some point in their lives (Soloff, Meltzer, & Becker, 2003). Tikkanen and colleagues (2009) found that BPD patients with a history of childhood abuse had a greater likelihood of committing aggressive acts than those without this history. When individuals with BPD engage in aggressive behavior, research suggests that it is most frequently in conflict situations with their romantic partners or other close

relationships (Newhill et al., 2009). Dysregulated emotions during interpersonal conflict may contribute to the use of aggression in the attempt to regain control of the situation (Scott et al., 2014). Thus, aggression in BPD has been considered a consequence of emotion dysregulation (Mancke et al., 2017).

Lastly, individuals with BPD have been shown to engage in dysregulated eating behaviors, such as emotional eating to regulate or eliminate unpleasant affect (McCarthy, 1990; Sim & Zeman, 2005). BPD appears to be more strongly associated with binge-eating and/or purging behaviors rather than restricted eating behaviors (Sansone & Levitt, 2005; Marino & Zanarini, 2001). Between 53% and 62% of individuals with BPD also meet criteria for an eating disorder (Marino & Zanarini, 2001; Zanarini et al., 1998). Selby, Ward, and Joiner (2010) found that dysregulated eating behaviors in patients with BPD may arise from fluctuations in negative affect, as well as difficulty tolerating negative emotions, especially those brought about by rejection.

Mindfulness

Mindfulness is defined as a mental state in which one is attentive, aware, and accepting of the present moment, without becoming over-involved in cognitive or emotional reactions (Kabat-Zinn, 1990). It is also conceptualized as a trait-like or dispositional tendency to pay attention in these ways in daily life and as a set of skills that can be cultivated through training and practice. It is most often assessed with self-report questionnaires. Several mindfulness questionnaires with good psychometric properties are available, each assessing one or more elements of mindfulness. In an empirical synthesis of early mindfulness questionnaires, Baer and colleagues (2006; 2008) identified five facets of mindfulness: observing (attending to internal and external

experiences such as emotions, thoughts, sights, and sounds), describing (labeling observations with words), acting with awareness (attending to one's present moment activities), nonjudging of inner experience (taking a nonjudgmental stance towards thoughts and emotions), and nonreactivity to inner experience (allowing thoughts to flow, without getting caught up in them). These elements of mindfulness can be assessed with the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006).

Self-reported mindfulness has consistently been negatively associated with BPD-related symptoms, including impulsivity and negative affect (Brown & Ryan, 2003). Individuals with BPD appear to have difficulties with awareness, attention, and acceptance of internal and external experiences, as evidenced by low scores on mindfulness measures compared to other populations (Cheavens et al., 2005; Linehan, 1993). Mindfulness deficits have been shown to be implicated in the emotion dysregulation, impulsivity, and interpersonal dysfunction that are characteristic of individuals with BPD (Wupperman et al., 2008). Wupperman and colleagues (2013) suggested that individuals with low trait mindfulness may be less able to tolerate negative affect and urges even when adaptive coping is attempted. Furthermore, deficits in mindfulness and borderline features may have a reciprocal relationship whereby difficulties tolerating present-moment experiences leads to increased symptoms, and increased symptoms lead to more difficulty tolerating negative affect (Wupperman et al., 2013). This feedback loop may lead to increased problematic behaviors.

Mindfulness training is a core element in dialectical behavior therapy (DBT; Linehan, 1993), a widely used evidence-based psychological treatment for BPD. Mindfulness training in DBT is theorized to help with BPD symptoms in a variety of

ways. For example, by increasing nonjudgmental attention to emotions and encouraging participants to relate to them with acceptance rather than avoidance (Teasdale, Segal, & Williams, 1995), mindfulness training may help individuals with BPD learn to moderate the intensity or duration of their emotions, without the use of problematic behaviors such as the ones described above.

Additionally, mindfulness promotes decentering, or the ability to separate oneself from distressing thoughts, emotions, and impulses (Teasdale et al., 2002). Decentering may facilitate the interpretation of these experiences as mental events that will pass in time, rather than as necessarily accurate reflections of reality that must automatically lead to particular behaviors that cause distress (Wupperman, Neumann, & Axelrod, 2008). Decentering includes becoming aware of automatic reactions and viewing them as one way of responding, instead of the only way. As a result of practicing mindfulness, an individual with BPD may continue to experience urges to engage in problematic behaviors, but may view the urge as simply an option as opposed to an imminent behavior (Perroud et al., 2012).

Furthermore, mindfulness increases the ability to recognize early signs of escalating negative affect, thus letting the individual engage in adaptive skills while emotions and urges are more manageable (Wupperman et al., 2013). Mindfulness may then allow the individual to regulate their emotions in a healthier way, by using skills to reduce their intensity or induce different emotions, or simply observing and tolerating the emotions until they subside (Wupperman et al., 2013).

In general, there is evidence to suggest that adopting a mindful stance toward internal experiences may lead to increased tolerance of emotional distress (Lynch et al.,

2006). Sustained awareness of distressing internal experiences in the absence of terrible consequences and without avoidance can be seen as a form nonreinforced exposure, which researchers have suggested is a mechanism of improvement in mindfulness training (Craske, Barlow, & Meadows, 2000). These ways of conceptualizing mindfulness suggest that it might be viewed as a protective factor against the problematic and harmful behaviors that are often associated with BPD features. That is, mindfulness skills may enable people with easily triggered and intense negative emotions to identify their emotions, recognize them as unpleasant but transient experiences, and choose wiser ways of responding to them.

The present study tested the role of dispositional mindfulness as a moderating factor in the relationship between BPD features and the problematic behaviors discussed earlier (substance and alcohol use, NSSI, aggression, and emotional eating) in a cross-sectional study of college students, as well as in a longitudinal study over three months in a college sample. A college sample was used for several reasons. First, in a young adult sample, the relationship between BPD features and problematic behaviors may be more flexible than in older diagnosed samples whose behavior patterns may be more entrenched. This variability may facilitate the examination of whether dispositional mindfulness serves as a protective factor against the problematic behaviors often associated with BPD features. Second, clinically significant BPD features have been shown to occur in the undergraduate population (Trull, 1995; Trull, 2001). Students with raw scores over 37 ($T=70$) on the Borderline Features Scale of the Personality Assessment Inventory (PAI-BOR; Morey, 1991) demonstrate clinically significant BPD characteristics and levels of maladjustment similar to those in clinical populations. Third,

use of a college sample instead of a clinical one allows examination of a broad range of severity of BPD features, as opposed to a more restricted range of symptomatology in a clinical sample.

Current Study

To date, no studies have investigated the protective role of specific facets of mindfulness for problematic behaviors in people with BPD features. Further, there have been no studies to investigate this relationship with longitudinal data. The aim is to test a model of BPD features, mindfulness facets, and problematic behaviors using a cross-sectional sample as well as a longitudinal one. The present study attempted to replicate previous research demonstrating that BPD features are associated with the problematic behaviors explained above. BPD features are expected to predict increased frequency of problematic behaviors. A second aim of the study was to examine the role of mindfulness in the relationship between BPD features and problematic behaviors. We predicted that trait mindfulness would moderate the relationship between BPD features and problematic behaviors, such that higher trait mindfulness would predict lower incidence of problem behaviors, and vice versa. Exploratory analyses investigated the protective roles of specific mindfulness facets in this model. Given that past research has suggested that individuals' intolerance and judgments of their inner experiences lead to problematic behaviors (Wupperman et al., 2013), we hypothesized that nonjudging of inner experience and nonreactivity to inner experience would be more protective against problem behaviors than other facets of mindfulness. These hypotheses were tested with cross-sectional as well as longitudinal data.

CHAPTER TWO: METHODS

Participants

Participants were undergraduate psychology students at the University of Kentucky, recruited and screened through the Introductory Psychology (PSY 100) subject pool in the Department of Psychology. Participants were invited to complete the measures (listed below) two times over three months. Participants received class credit for their participation. Following data screening procedures (detailed in results section), a sample of 364 participants (77.7% white, 83.0% female) completed the study at Time 1, and were included in cross-sectional data analyses. A sample of 105 (76.2% white, 87.6% female) completed the study at Time 1 and Time 2, and were included in longitudinal data analyses.

Procedures

Participants for this study were recruited from the Introduction to Psychology pool at the University of Kentucky. In a mass screening procedure early in the Spring 2019 semester, students completed the Personality Assessment Inventory – Borderline Features Scale (PAI-BOR; Morey, 1991) as part of a larger questionnaire packet. Individuals with scores of 37 or higher ($T > 70$) were considered to have high BPD features (Trull, 1995). These individuals were specifically contacted via e-mail and invited to participate in the study at Time 1, although the study was also open to the entire pool. Students who participated in the study at Time 1 were told that this was a 2-part study and that they would be re-contacted in 3 months. At Time 2, participants who participated in Time 1 were reminded to participate in the second part of the study. Students were given class credit to participate in the study. This process ensured that the

upper end of the distribution was adequately represented in the sample. 18% of participants at Time 1 and 22% of participants at Time 2 reported clinically significant BPD features, as defined by the PAI-BOR. Informed consent was obtained from all participants, and all study procedures were approved by the University of Kentucky's institutional review board.

Measures

Borderline personality features were measured using the Personality Assessment Inventory – Borderline Personality Disorder subscale (PAI-BOR; Morey, 1991). The PAI-BOR is a 24-item measure consisting of four subscales which represent borderline personality disorder (BPD) characteristics: *affective instability*, *identity problems*, *negative relationships*, and *self-harm*. Items are rated on a 4-point Likert scale (1 = *false*, 4 = *very true*), and subscales may be combined to form a total score which can be used to indicate significant subclinical BPD features, as well as clinical levels of BPD functioning (Morey, 1991). The PAI-BOR has been shown to be measurement invariant across sex and age when screening for BPD features (De Moor, Distel, Trull, & Boomsma, 2009) and has demonstrated good convergent and discriminant validity with relevant variables. Total PAI-BOR scores demonstrated good internal consistency in the present study ($\alpha = 0.75$ to 0.89).

The self-harm subscale of the PAI-BOR was not used in analyses for the present study because this subscale's items refer to impulsive behavior that could overlap with the problematic behaviors that were dependent variables in the proposed model. For example, "I sometimes do things so impulsively that I get into trouble" and "I'm too

impulsive for my own good” could be interpreted by respondents as related to substance and alcohol abuse, aggressive behavior, self-injury, or binge eating.

Trait mindfulness was assessed using the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2008). The FFMQ is a 39-item self-report questionnaire designed to assess five facets of mindfulness: observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience. Sample items include: *observing* (“I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing”); *describing* (“I’m good at finding words to describe my feelings”); *acting with awareness* (“I rush through activities without being really attentive to them” – reverse scored); *nonjudging of inner experience* (“I disapprove of myself when I have irrational ideas” – reverse scored); and *nonreactivity to inner experiences* (I perceive my feelings and emotions without having to react to them”). Participants are asked to rate the degree to which each statement applies to them on a 5-point scale (1 = *Never or very rarely true*, 5 = *Almost always or always true*). Most of the five facets have been shown to be higher in meditators than nonmeditators (Baer, Smith, Lykins, & Button, 2008). Alpha coefficients for all facets were shown to be in the adequate-to-good range in the present study (0.87 to 0.88) (Baer et al., 2008). The FFMQ has also been shown to have significant relationships in the predicted directions with a variety of constructs related to mindfulness (Baer et al., 2008).

Alcohol use was measured using the Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 1992). The AUDIT is a 10-item questionnaire designed to identify individuals with alcohol use disorders. Item responses indicate alcohol consumption, drinking behavior, adverse reactions to alcohol, and alcohol-related problems. Sample

items include: “How often do you have a drink containing alcohol?” and “How often during the last year have you had a feeling of guilt or remorse after drinking?” The items are rated on a scale of 0 to 4, with anchors varying throughout the items. Higher scores on the AUDIT reflect greater alcohol use, more adverse reactions to alcohol, and more alcohol-related problems. Scores on the AUDIT reliably predict diagnoses of alcohol use disorders (Saunders et al., 1993). In the present study, alpha reliability was shown to be high (.76 to .79).

Drug use was measured using the Drug Use Disorders Identification Test (DUDIT; Berman et al., 2005). The DUDIT is an 11-item questionnaire intended to identify non-alcoholic drug use patterns and various drug-related problems in individuals. Item responses indicate drug consumption, behaviors associated with drug use, and drug-related problems. Sample items include: “How often do you use drugs other than alcohol?” and “Have you or anyone else been hurt (mentally or physically) because you used drugs?” The first nine items are scored on a 5-point scale ranging from 0 to 4, with anchors varying throughout the items. The last two items are scored on a 3-point scale (0 = *no*, 2 = *yes, but not in the last year*, 3 = *yes, during the last year*). Alpha reliabilities were generally high in the present study (.77 to .83).

Aggression was measured using the Aggression Questionnaire (AQ; Buss & Perry, 1992). The AQ is a 29-item measure consisting of four separate aspects of aggression: *anger* (e.g., “Sometimes I feel like a powder keg ready to explode”), *hostility* (e.g., “When people are especially nice, I wonder what they want”), *verbal aggression* (e.g., “My friends say I’m somewhat argumentative”), and *physical aggression* (e.g., “Given enough provocation, I might hit another person”). Individuals indicate on a 5-point

Likert-style scale (1 = *extremely uncharacteristic of me*, 5 = *extremely characteristic of me*) the degree to which each item applies to them. Scores on the AQ reliably predict both acts of aggression and peer reports of aggression (Archer & Webb, 2006; O'Connor, Archer, & Wu, 2001) and are stable over time (Harris, 1997). Items related to anger were removed in the present study, as questions related to affect are subsumed within the PAI-BOR, and anger is not a problematic behavior. Alpha reliability was shown to be high in the present study (.88 to .90)

Risky sexual behavior was measured using frequency items pertaining to risky sex from the Risky Behaviors Questionnaire (RBQ; Weiss, Tull, Dixon-Gordon, & Gratz, 2016). The RBQ is intended to measure the frequency of clinically relevant risky behaviors. The RBQ has 6 items related to the frequency of risky sexual behaviors. Participants were asked to indicate how many times they had engaged in various risky sexual behaviors in the past thirty days. Sample items include “How many times in the past 30 days have you had a one night stand?” and “... had sex with someone you didn't know very well.” Alpha reliability was shown to be acceptable in the present study (.67 to .70)

Emotional eating was measured using the Emotional Eating Scale (EES; Arnow, Kenardy, & Agras, 1995). The EES is a 25-item measure intended to predict emotion-driven food consumption. The EES has three subscales: anger, anxiety, and depression. Participants rate the extent to which certain feelings lead to the urge to eat using a 5-point Likert scale (1 = *no desire to eat*, 5 = *an overwhelming urge to eat*). The EES demonstrated adequate reliability and validity in the present study. Coefficient alphas ranged from .91 to .93 in the present study.

Analyses and Data Transformation

The results were analyzed using SPSS 23.0, SPSS AMOS 22.0, and R 3.6.1. All data were screened for skew and kurtosis in order to test assumptions of normality (Tabachnick & Fidell, 2000). The DUDIT at Time 1 and the RBQ at Time 1 and Time 2 in the longitudinal analyses were skewed, and were corrected using log transformations. Due to the number of analyses and the sample size, results were considered significant at a p-value of less than .01.

Structural equation modeling with SPSS AMOS 26.0 was used to test the model depicted in Figure 2. We hypothesized that mindfulness would moderate the relationship between BPD features and problematic behaviors. Latent variables and the fit of the model were evaluated with the standard criteria: non-significant chi-square statistic (χ^2), goodness of fit index (GFI>.95), and root-mean-square-error of approximation (RMSEA <.08) (Hu & Bentler, 1999).

CHAPTER THREE: RESULTS

Cross-Sectional Analyses

Descriptive Statistics and Intercorrelations

Table 3.1 presents descriptive statistics for the untransformed scores for all measures and intercorrelations among study measures.

Prediction of Problematic Behaviors from BPD Features

First, five separate regression models were tested predicting each problematic behavior from BPD features to establish the relationship prior to testing the moderation model. Results are summarized in Table 3.2. Consistent with the first hypothesis, BPD Features positively predicted aggression ($\beta = .71, p < .001$). The remaining four regression models were non-significant ($p > .01$).

Structural Equation Model

Structural equation modeling was chosen for this analysis because it enables the examination of multiple and interrelated relationships in a single model. Measurement models were fit for BPD features, mindfulness, aggression, and emotional eating latent variables. Chi-squared values in the following models should be interpreted cautiously, as sample sizes above 250 artificially inflate the chi-squared statistic and may lead to statistically significant chi-squared values (Hair et al., 2010). The measurement model for a single BPD features latent variable using the subscales from the PAI-BOR demonstrated good fit ($\chi^2 = 147.04, df = 72, p < .001$; RMSEA = .05, GFI = .95), with all three subscales loading significantly onto the latent variable (.84 to .87, $p < .01$). The measurement model for a mindfulness latent variable using the subscales from the FFMQ demonstrated acceptable fit to the data ($\chi^2 = 831.0, df = 422, p < .001$; RMSEA = .05,

GFI = .97), with all five subscales loading significantly onto the latent variable (.39 to .87, $p < .01$). The measurement model for an aggression latent variable using the subscales from the BP-AQ demonstrated adequate fit ($\chi^2 = 412.27$, $df = 198$, $p < .001$; RMSEA = .06, GFI = .95), with all three subscales loading significantly onto the latent variable (.70 to .82, $p < .01$). The measurement model for an emotional eating variable using the subscales from the EES demonstrated good fit to the data ($\chi^2 = 136.38$, $df = 72$, $p < .001$; RMSEA = .06, GFI = .97), with all three subscales loading significantly onto the latent variable (.79 to .95, $p < .01$). See Figure 3.1 for measurement models described above. Risky sexual behavior, alcohol use, and drug use were entered into the structural equation models as observed variables as opposed to latent variables because the scales used to measure these behaviors are not composed of factors.

Five structural models were tested to evaluate the moderating role of mindfulness in the relationship between BPD features and problematic behaviors. The structural models can be seen in Figure 3.2. The first was fit with paths from BPD features, mindfulness, and an interaction term to aggression. The interaction term was created by multiplying the indicators of the borderline features variable and the indicators of the mindfulness variable. The model did not demonstrate good fit to the data ($\chi^2 = 338.69$, $df = 49$, $p < .001$; RMSEA = .12; GFI = .85). The interaction term did not demonstrate a significant path to aggression ($b = .03$, $p > .01$). BPD features showed a significant path to aggression ($b = .51$, $p < .01$), consistent with prior regression analyses. Thus, the model indicates that moderation is not present.

The next structural model was fit with paths from BPD features, mindfulness, and the interaction term described above to emotional eating. The model did not demonstrate

good fit to the data ($\chi^2 = 251.54$, $df = 49$, $p < .001$; RMSEA = .10; GFI = .87). The interaction term did not demonstrate a significant path to emotional eating ($b = .13$, $p > .01$). BPD features did not demonstrate a significant path to emotional eating ($b = -.44$, $p > .01$), consistent with prior regression analyses. Thus, the model indicates that moderation is not present.

A structural model was fit with paths from BPD features, mindfulness, and the interaction term to risky sexual behavior. The model did not demonstrate good fit to the data ($\chi^2 = 232.11$, $df = 31$, $p < .001$; RMSEA = .13; GFI = .81). The interaction term did not demonstrate a significant path to risky sexual behavior ($b = .02$, $p > .01$). BPD features did not demonstrate a significant path to risky sexual behavior ($b = .24$, $p > .01$), consistent with prior regression analyses. Thus, the model indicates that moderation is not present.

The next structural model was fit with paths from BPD features, mindfulness, and the interaction term described above to alcohol use. The model did not demonstrate good fit to the data ($\chi^2 = 242.23$, $df = 31$, $p < .001$; RMSEA = .13; GFI = .80). The interaction term did not demonstrate a significant path to alcohol use ($b = .01$, $p > .01$). BPD features did not demonstrate a significant path to alcohol use ($b = .45$, $p > .01$), consistent with prior regression analyses. Thus, the model indicates that moderation is not present in this instance.

Lastly, a structural model was fit with paths from BPD features, mindfulness, and the interaction term described above to drug use. The model did not demonstrate good fit to the data ($\chi^2 = 233.01$, $df = 31$, $p < .001$; RMSEA = .13; GFI = .81). The interaction term did not demonstrate a significant path to drug use ($b = .00$, $p > .01$). BPD features

did not demonstrate a significant path to drug use ($b = .12, p > .01$), consistent with prior regression analyses. Thus, the model indicates that moderation is not present in this instance.

Overall, there is no evidence of mindfulness moderating the relationship between BPD features and problematic behaviors. In all cases, there was no significant main effect of mindfulness in the models ($b = -.62$ to $.40, p > .01$), and no significant main effect for the interaction term ($b = .00$ to $.13, p > .01$). See Figure 3.2 for structural equation models of the five moderation analyses above.

To test the hypothesis investigating the potential protective roles of individual mindfulness facets, exploratory models were fit with paths from each individual mindfulness facet, BPD features latent variable, and an interaction term to each problematic behavior, totaling 25 analyses. The interaction term in each analysis was computed by multiplying the indicators of the borderline features variable and the single mindfulness facet in each analysis. Interaction terms did not show significant paths to problematic behaviors in all five analyses (see Table 3.3 and Figures 3.3 through 3.7 for a summary of model fit and path models, respectively). In summary, there was no evidence that deficits in specific mindfulness facets moderate the relationship between BPD features and problematic behaviors, or that any specific mindfulness facet is more protective against problematic behaviors than any other facets.

Follow-Up Model Tests

Several authors have reported that the observing facet of the FFMQ may operate differently in samples with and without meditation experience (Baer et al., 2004; Baer et al., 2008; Gu et al, 2016). In samples with meditation experience, all five facets load on

the overarching mindfulness construct and are correlated in similar ways with other variables. In non-meditating samples, the observing facet shows mixed correlations with other constructs and does not always load significantly on the overarching mindfulness construct. In the present sample, the Observe facet was significantly and positively correlated with all three facets of the BPAQ ($r = .18 - .23, p < .001$). Accordingly, a measurement model was fit and moderation analyses were run using the FFMQ without the Observe subscale. The measurement model for the mindfulness latent variable using the FFMQ subscales without the Observe subscale demonstrated excellent fit to the data ($\chi^2 = 576.62, df = 264, p < .001$; RMSEA = .04, GFI = .97), with all four subscales loading significantly onto the latent variable (.62 to .86, $p < .01$). See Figure 3.8 for the measurement model described above.

The structural models in Figure 3.9 were fit with paths from BPD features, mindfulness without the Observe facet, and an interaction term to each problematic behavior. The interaction term was created in the same way as the previous interaction terms, using the indicators of the new mindfulness latent variable. The models did not demonstrate good fit (see Table 4 for a summary of model fit for each model) and the interaction term in each case did not demonstrate a significant path to aggression ($b = .02$ to $.16, p > .01$). Mindfulness without the Observe facet had a significant path to problematic behaviors for aggression, risky sexual behavior, and alcohol use ($b = -.35$ to $-.23, p > .01$), and a small, nonsignificant path to drug use and emotional eating ($b = .01$ to $.06, p > .01$). Overall, the models indicate that moderation is not present even when accounting for the Observe facet of the FFMQ.

Longitudinal Analyses

Descriptive Statistics and Intercorrelations

Table 3.5 presents descriptive statistics for the untransformed scores for all measures and intercorrelations among study measures in the longitudinal sample. Independent t-test analyses were conducted to test for differences in means at Time 1 between those who returned to the study at Time 2, and those who dropped out of the study after Time 1. The results of those analyses are summarized in Table 6, and were all non-significant ($p > .01$).

Prediction of Problematic Behaviors from BPD Features

Five separate regression models were tested predicting each problematic behavior at Time 2 from BPD features at Time 1, controlling for the problematic behavior at Time 1, to establish the model prior to testing the moderation model. Regression analyses for all tests are summarized in Table 3.7. Consistent with the first hypothesis, BPD Features at Time 1 positively predicted all problematic behaviors at Time 2 ($p < .001$ for all analyses).

Regression Analyses

Analyses to explore the moderating effect of mindfulness in the relationship between BPD features and problematic behaviors were conducted using the Mediation and Moderation for Repeated Measures (MEMORE) macro for SPSS by Amanda Montoya (2019). MEMORE can be used to estimate and probe interaction effects in two-instance repeated measures designs using OLS regression. Regression-based analyses were used in lieu of structural equation modeling for the longitudinal sample due to the

limited sample size (105), which would have restricted power to detect effects in a structural equation model.

Tests of moderation were non-significant ($p > .01$) for all five problematic behavior models. Results of moderation analyses are summarized in Table 8. There was no evidence to suggest that mindfulness moderates the relationship between BPD features and problematic behaviors over three months. Since all analyses were non-significant, probing analyses were not completed.

Analyses were conducted testing the moderating effect of individual mindfulness facets for each problematic behavior. Results of moderation analyses are summarized in tables for drug use (Table 3.9), risky sexual behavior (Table 3.10), aggression (Table 3.11), emotional eating (Table 3.12), and alcohol use (Table 3.13). All 25 moderation analyses conducted were non-significant, suggesting that there is no evidence for the moderating role of individual mindfulness facets in the relationship between BPD features and problematic behaviors. Probing analyses were not considered, as all analyses yielded non-significant results.

Follow-up Tests of Moderation

Additional tests of moderation were run using a mindfulness variable without the observe facet for each problematic behavior. Results of these analyses are summarized in Table 3.14. All five analyses were non-significant ($p > .01$) and probing analyses were discontinued. These results suggest that mindfulness does not have a moderating effect in this model even when considering the behavior of the Observe facet of the FFMQ in non-meditating samples.

Table 3. 1

Intercorrelations, Means, and Standard Deviations (untransformed) for Study Variables in Cross-Sectional Analyses (N=364)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Mean	SD
1. BOR AI	-																	1.01	.60
2. BOR ID	.65**	-																1.31	.61
3. BOR NR	.58**	.60**	-															1.25	.58
4. FFMQ NR	-	-	-	-														2.96	.58
5. FFMQ OB	.34**	.28**	.29**		-													3.08	.67
6. FFMQ AA	.17**	.14**	.15**	.32**														3.27	.71
7. FFMQ DE	-	-	-	.11*	-	-												3.36	.70
8. FFMQ NJ	.40**	.50**	.32**	.40**	.16**	.35**	-											3.34	.82
9. EES ANG	-	-	-	.13*	-	.51**	.34**	-										2.02	.76
10. EES ANX	.52**	.63**	.41**		.35**													2.06	.66
11. EES DEP	.03	.03	.10	-.09	-.07	-.13*	-.10	-.08	-									2.65	.81
12. AUDIT	.05	.08	.10	-.11*	-.05	-	-.12*	-.12*	.81**	-								3.99	3.45
13. DUDIT	.04	.15*	.11*	-.06	.00	-	-.08	-.13*	.65**	.64**	-							1.19	2.80
14. BPAQ PH	.01	.11*	.04	.01	-	-.07	.01	.01	.10	.10	.06	-						19.26	6.98
15. BPAQ VE	.10	.08	.01	.06	.02	-.07	.01	-.03	-.02	-.05	-.07	.36**	-					15.04	6.06
16. BPAQ HO	.20**	.03	.15**	-.02	.21**	-.04	-.04	-	.09	.09	.05	-.01	.04	-				22.08	9.79
17. RBQ	.22**	.05	.17**	.06	.23**	-.11*	-.10*	-.13*	-.03	-.01	.00	-.01	.07	.37**	-			.72	1.93

Note. * $p < .05$, ** $p < .01$. BOR AI = Affective Instability; BOR ID = Identity Disturbances; BOR NR = Negative Relationships; FFMQ NR = Nonreactivity to Inner Experience; FFMQ OB = Observe; FFMQ AA = Acting with Awareness; FFMQ DE = Describe; FFMQ NJ = Nonjudgmental of Inner Experience; EES ANG = Anger; EES ANX = Anxiety; EES DEP = Depression; BPAQ PH = Physical Aggression; BPAQ VE = Verbal Aggression; BPAQ HO = Hostility.

Table 3. 2

Summary of Regression Analyses for Predicting Problematic Behaviors from BPD

Features – Cross-Sectional Analyses

	β	$F(df)$	R^2	d
1. Emotional	.01	5.01 (1, 350)	.01	.00
Eating				
2. Alcohol Use	.04	6.51 (1, 347)	.02	.01
3. Drug Use	.03	3.75 (1, 351)	.01	.01
4. Aggression	.71	88.12 (1, 354)	.20**	.14
5. Risky Sex	.00	2.61 (1, 349)	.01	.00

Note. N=364. * $p < .01$. ** $p < .001$.

Table 3. 3

Summary of SEM Model Fit in Individual Mindfulness Facet Moderation Analyses

	χ^2 (df)	RMSEA	GFI
Aggression			
1. FFMQ NR	91.37 (16)*	.11	.93
2. FFMQ OB	96.07 (16)*	.12	.93
3. FFMQ AA	88.76 (16)*	.11	.93
4. FFMQ DE	110.15 (16)*	.13	.92
5. FFMQ NJ	109.68 (16)*	.13	.92
Emotional Eating			
1. FFMQ NR	29.56 (16)*	.08	.92
2. FFMQ OB	27.12 (16)*	.10	.88
3. FFMQ AA	30.38 (16)*	.09	.90
4. FFMQ DE	36.92 (16)*	.11	.86
5. FFMQ NJ	43.50 (16)*	.12	.93
Risky Sex			
1. FFMQ NR	8.21 (6)*	.09	.87
2. FFMQ OB	10.85 (6)*	.10	.90
3. FFMQ AA	13.14 (6)*	.12	.90
4. FFMQ DE	19.28 (6)*	.08	.93
5. FFMQ NJ	27.51 (6)*	.10	.82
Alcohol Use			
1. FFMQ NR	12.80 (6)*	.10	.95
2. FFMQ OB	9.20 (6)*	.11	.93
3. FFMQ AA	14.22 (6)*	.06	.94
4. FFMQ DE	22.38 (6)*	.09	.91
5. FFMQ NJ	30.52 (6)*	.11	.82
Drug Use			
1. FFMQ NR	10.63 (6)*	.14	.88
2. FFMQ OB	7.71 (6)*	.10	.79
3. FFMQ AA	12.04 (6)*	.05	.90
4. FFMQ DE	20.54 (6)*	.08	.93
5. FFMQ NJ	28.34 (6)*	.10	.89

Note. * $p < .01$.

Table 3. 4

Summary of SEM Model Fit in FFMQ without Observe Moderation Analyses for each Problematic Behavior

	χ^2 (df)	RMSEA	GFI
Aggression	252.86 (39)*	.12	.89
Emotional Eating	158.71 (39)*	.09	.94
Risky Sexual Behavior	133.59 (23)*	.12	.93
Alcohol Use	142.88 (23)*	.12	.93
Drug Use	144.24 (23)*	.13	.92

Note. * $p < .01$.

Table 3. 5

Intercorrelations, Means, and Standard Deviations (untransformed) for Study Variables in Longitudinal Analyses (N=105)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Mean	SD
1. BOR AI	-																	1.12	.62
2. BOR ID	.69**	-																1.12	.69
3. BOR NR	.75**		-															1.34	.61
4. FFMQ NR	.61**	.54**		-														1.47	.66
5. FFMQ OB	.74**	.63**			-													1.30	.58
6. FFMQ AA	-.37**	-.42**	-.31**															2.94	.58
7. FFMQ DE	-.45**	-.45**	-.35**															2.94	.60
8. FFMQ NJ	.10	.01	.12	.36**	-													3.17	.71
9. EES ANG	.11	.11	.13	.18														3.28	.66
10. EES ANX	-.40**	-.51**	-.28**	.18	-.08	-												3.19	.74
11. EES DEP	-.35**	-.39**	-.34**	.32**	-.16													3.06	.79
12. AUDIT	-.29**	-.38**	-.13	.32**	.21**	.48**	-											3.46	.70
13. DUDIT	-.40**	-.42**	-.27**	.41**	.32**	.25**												3.35	.78
14. BPAQ PH	-.49**	-.58**	-.31**	.18	-.26**	.46**	.29**	-										3.26	.80
15. BPAQ VE	-.64**	-.65**	-.53**	.25*	-.25*	.43**	.19											3.13	.93
16. BPAQ HO	.15	.15	.15	-.10	-.17	-.14	-.18	-										1.93	.69
17. RBQ	.17	.15	.18	-.05	-.11	-.04	-.09	-.21*										1.93	.75
Mean	.09	.13	.10	-.05	-.12	-.18	-.15	-.18	.76**	-								2.01	.57
SD	.10	.14	.19	.05	-.17	-.02	-.10	-.13	.77**									1.98	.61
	-.05	.17	.06	-.06	-.25*	-.08	-.04	-.10	.60**	.59**	-							2.64	.83
	.07	.12	.21*	.04	-.16	-.08	-.02	-.10	.65**	.62**								2.56	.84
	.01	.11	.04	-.05	-.26**	-.05	-.05	.06	.05	.03	.19	-						4.51	3.68
	.06	.08	.01	-.06	-.22*	-.16	-.17	.03	.02	.07	.19							4.62	3.87
	.14	.08	-.01	-.01	.05	-.10	.05	.03	-.03	-.08	-.08	.37**	-					1.39	2.48
	.30**	.25*	.10	-.25*	-.04	-.18	-.28**	-.04	-.16	-.14	-.11	.36**						1.58	2.57
	.31**	.05	.19	-.07	.07	-.04	-.04	-.13	.15	.16	-.03	-.07	.14	-				19.95	8.05
	.36**	.21*	.23*	-.23*	.03	-.04	-.03	-.10	.34**	.24*	.16	.01	.01					19.53	8.99
	.26**	-.07	.25*	.15	.22**	-.05	.21*	-.11	-.07	-.07	-.11	.02	.09	.46**	-			16.27	6.76
	.30**	.12	.24*	-.13	.16	-.10	.08	-.15	.13	-.01	.00	.05	-.06	.57**				15.94	7.10
	.57**	.51**	.54**	-.24*	.05	-.06	-.24**	-.42**	.23*	.17	.07	-.01	-.03	.35**	.34**	-		23.76	10.68
	.66**	.52**	.61**	-.32**	.14	-.34**	-.20	-.56**	.39**	.25*	.15	.04	-.03	.57**	.55**			23.06	12.29
	-.03	.07	.06	-.13	-.28**	.12	.05	.11	.05	.07	.13	.38**	.25**	.05	-.03	.01	-	.43	1.29
	-.05	-.03	.11	-.12	-.07	.02	-.03	.07	-.05	-.02	-.05	.19	.14	-.04	.01	-.04		.68	1.99

Note. * $p < .05$, ** $p < .01$. Top values reflect Time 1 estimates, bottom values are Time 2 estimates. BOR AI = Affective Instability; BOR ID = Identity Disturbances; BOR NR = Negative Relationships; FFMQ NR = Nonreactivity to Inner Experience; FFMQ OB = Observe; FFMQ AA = Acting with Awareness; FFMQ DE = Describe; FFMQ NJ = Nonjudgmental of Inner Experience; EES ANG = Anger; EES ANX = Anxiety; EES DEP = Depression; BPAQ PH = Physical Aggression; BPAQ VE = Verbal Aggression; BPAQ HO = Hostility.

Table 3. 6

Summary of independent samples *t*-test analyses comparing cross-sectional and longitudinal sample responses at Time 1.

Variable	<i>t</i>	df	<i>p</i>
Mindfulness	.99	357	.33
BPD Features	-2.42	359	.02
Emotional Eating	.25	361	.80
Alcohol Use	-.67	358	.51
Drug Use	-1.46	360	.15
Aggression	1.24	359	.22
Risky Sex	-.92	358	.36

Note. N=362. **p* < .01. ***p* < .001.

Table 3. 7

Summary of regression analyses for predicting problematic behaviors at time 2 from BPD features controlling for time 1.

	β	$F(df)$	R^2	d
1. Emotional	.65	27.61 (2, 104)	.63**	.30
Eating				
2. Alcohol Use	.85	83.71 (2, 100)	.66**	.40
3. Drug Use	5.05	32.69 (2, 102)	.65**	.35
4. Aggression	.83	73.127 (2, 103)	.61**	.29
5. Risky Sex	.40	6.98 (2, 100)	.13*	.10

Note. N=105. * $p < .01$. ** $p < .001$.

Table 3. 8

Summary of moderation analyses of mindfulness on the relationship between BPD features at time 1 and each problematic behavior at time 2.

	Mindfulness <i>b</i>	<i>F</i> (df)	<i>R</i> ²
1. Emotional Eating	-.17	1.67 (1, 104)	.02
2. Alcohol Use	.60	1.10 (1, 100)	.01
3. Drug Use	1.15	4.01 (1, 102)	.04
4. Aggression	5.35	2.14 (1, 103)	.02
5. Risky Sex	.01	.05 (1, 100)	.00

Note. N=105. **p* < .01. ***p* < .001.

Table 3. 9

Summary of moderation analyses of individual mindfulness facets on the relationship between BPD features at time 1 and drug use at time 2.

Mindfulness Facet	Facet <i>b</i>	<i>F</i> (df)	<i>R</i> ²
1. Nonreact	.60	1.92 (1, 100)	.02
2. Observe	.03	.01 (1, 101)	.00
3. Actaware	.42	1.61 (1, 103)	.01
4. Describe	.60	2.86 (1, 103)	.03
5. Nonjudge	.50	2.68 (1, 100)	.03

Note. N=105. **p* < .01. ***p* < .001.

Table 3. 10

Summary of moderation analyses of individual mindfulness facets on the relationship between BPD features at time 1 and risky sexual behavior at time 2.

Mindfulness Facet	Facet <i>b</i>	<i>F</i> (df)	<i>R</i> ²
1. Nonreact	.02	.11 (1, 101)	.00
2. Observe	-.03	.45 (1, 100)	.00
3. Actaware	.02	.28 (1, 100)	.00
4. Describe	.03	.69 (1, 103)	.01
5. Nonjudge	-.01	.06 (1, 100)	.00

Note. N=105. **p* < .01. ***p* < .001.

Table 3. 11

Summary of moderation analyses of individual mindfulness facets on the relationship between BPD features at time 1 and aggression at time 2.

Mindfulness Facet	Facet <i>b</i>	<i>F</i> (df)	<i>R</i> ²
1. Nonreact	.66	.06 (1, 103)	.00
2. Observe	1.42	.42 (1, 104)	.00
3. Actaware	.88	.17 (1, 104)	.00
4. Describe	.97	.19 (1, 104)	.00
5. Nonjudge	4.53	5.73 (1, 104)	.06

Note. N=105. **p* < .01. ***p* < .001.

Table 3. 12

Summary of moderation analyses of individual mindfulness facets on the relationship between BPD features at time 1 and emotional eating at time 2.

Mindfulness Facet	Facet <i>b</i>	<i>F</i> (df)	<i>R</i> ²
1. Nonreact	-.09	.77 (1, 100)	.01
2. Observe	-.02	.06 (1, 100)	.00
3. Actaware	-.10	1.44 (1, 100)	.02
4. Describe	-.08	.93 (1, 101)	.01
5. Nonjudge	-.06	.63 (1, 100)	.01

Note. N=105. **p* < .01. ***p* < .001.

Table 3. 13

Summary of moderation analyses of individual mindfulness facets on the relationship between BPD features at time 1 and alcohol use at time 2.

Mindfulness Facet	Facet <i>b</i>	<i>F</i> (df)	<i>R</i> ²
1. Nonreact	.25	.36 (1, 100)	.00
2. Observe	.28	.65 (1, 102)	.01
3. Actaware	.07	.05 (1, 102)	.00
4. Describe	.37	1.10 (1, 101)	.01
5. Nonjudge	.15	.24 (1, 101)	.00

Note. N=105. **p* < .01. ***p* < .001.

Table 3. 14

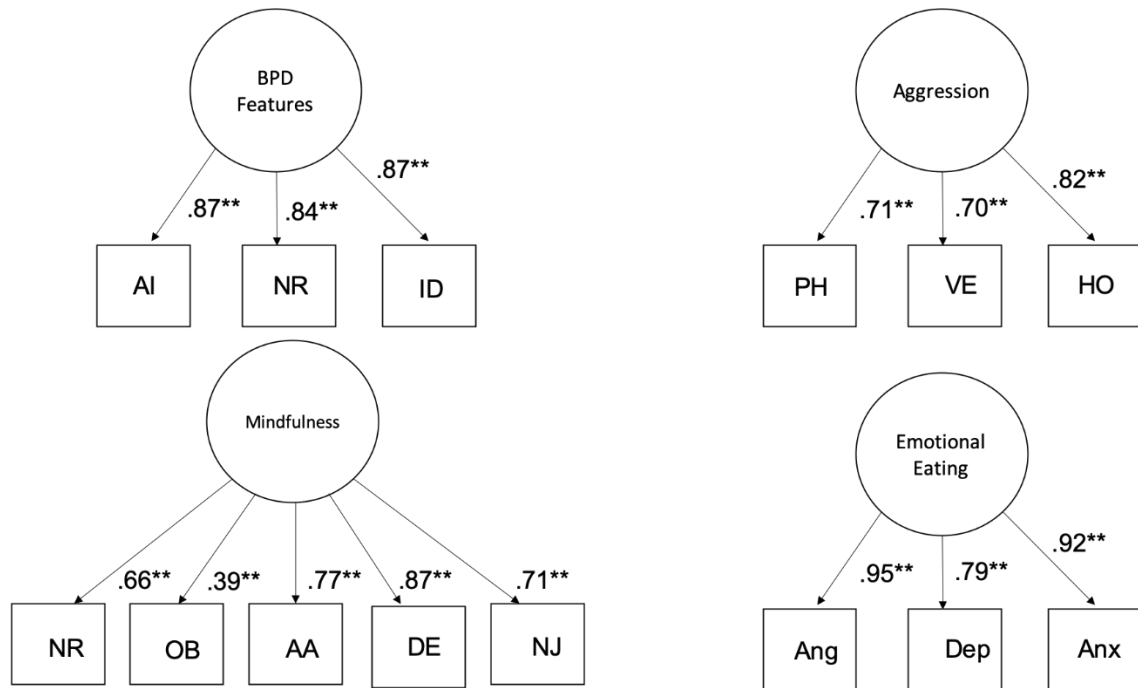
Summary of moderation analyses of mindfulness (without FFMQ Observe facet) on the relationship between BPD features at time 1 and each problematic behavior at time 2.

	Mindfulness <i>b</i>	<i>F</i> (df)	<i>R</i> ²
1. Emotional Eating	-.16	1.82 (1, 104)	.02
2. Alcohol Use	.42	.69 (1, 100)	.01
3. Drug Use	1.06	4.54 (1, 102)	.05
4. Aggression	4.28	1.81 (1, 103)	.02
5. Risky Sex	.03	.24 (1, 100)	.00

Note. N=105. **p* < .01. ***p* < .001.

Figure 3. 1

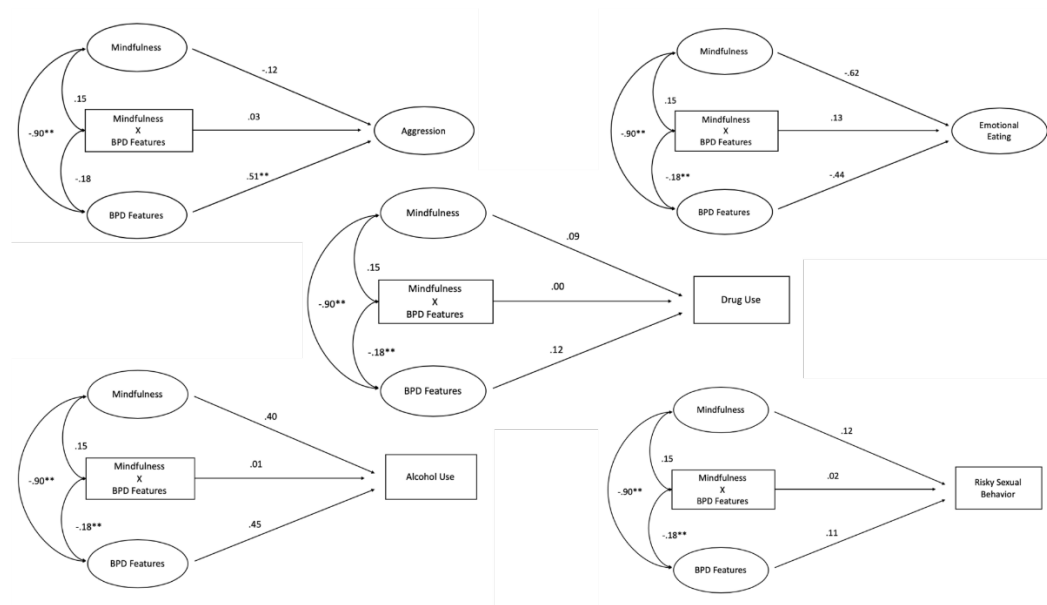
Measurement models for BPD Features, Mindfulness, Aggression, and Emotional Eating latent variables used in structural model (N=364).



Note. ** $p < .001$. AI = Affective instability; NR = Negative Relationships; ID = Identity disturbance; PH = Physical aggression; VE = Verbal aggression; HO = Hostility; NR = Nonreactivity to inner experience; OB = Observe; AA = Acting with awareness; DE = Describe; NJ = Nonjudgmental to inner experience; Ang = Anger; Dep = Depression; Anx = Anxiety.

Figure 3. 2

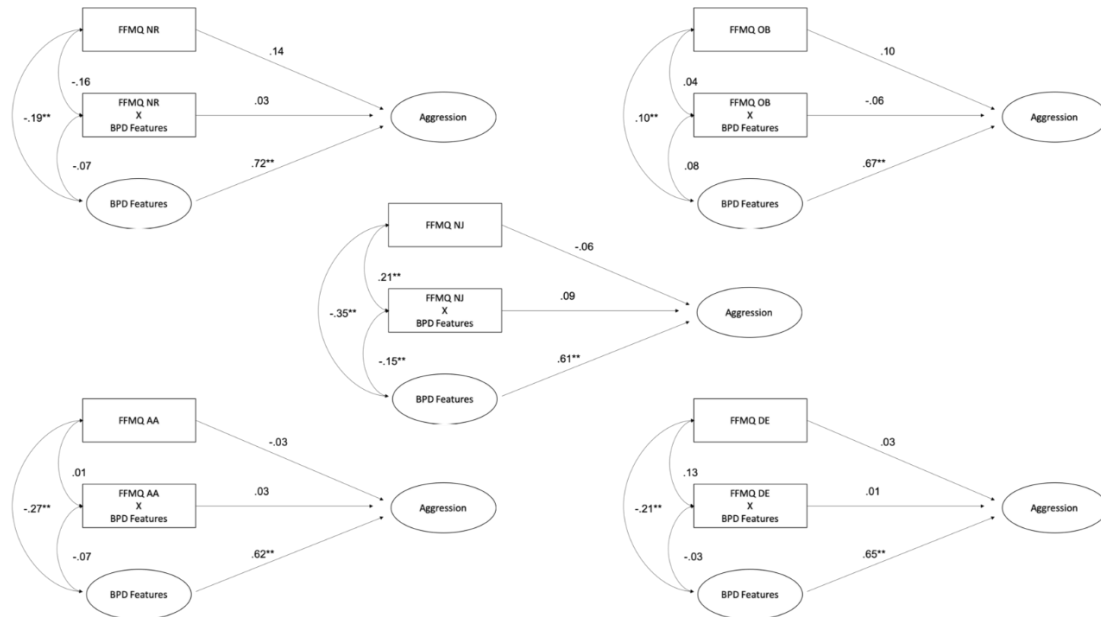
Structural models testing the moderating effect of mindfulness on the relationship between BPD features and problematic behaviors.



Note. ** $p < .01$.

Figure 3. 3

Exploratory models testing moderating effects of individual mindfulness facets on the relationship between BPD features and aggression.

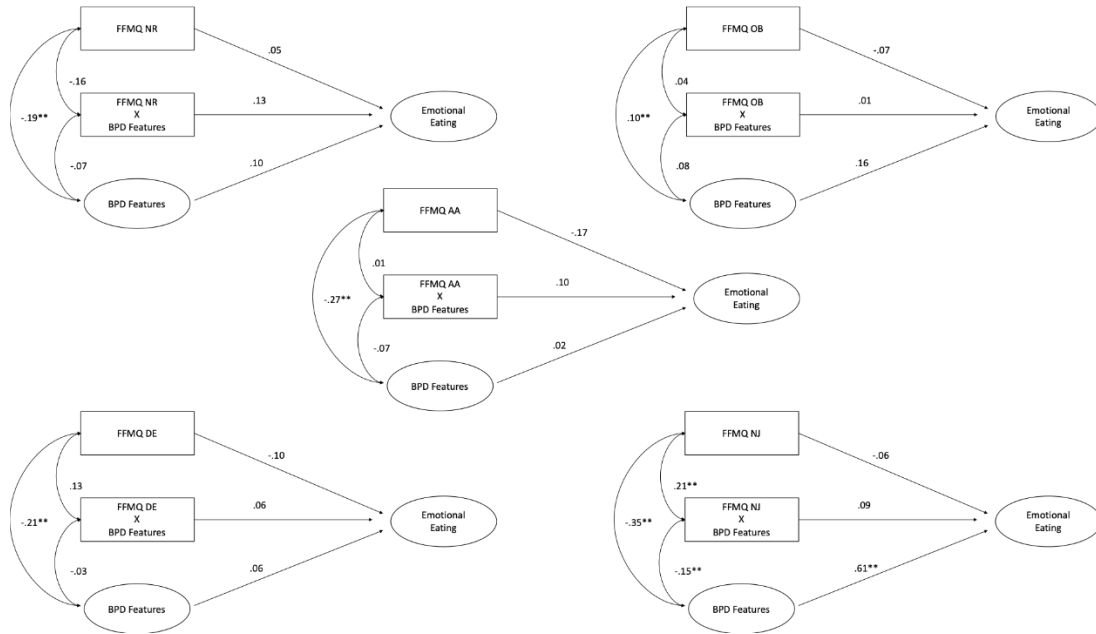


Note. ** $p < .01$. FFMQ NR = Nonreactivity to inner experience; FFMQ OB = Observe; FFMQ NJ = Nonjudgmental of inner experience; FFMQ AA = Acting with Awareness; FFMQ DE = Describe.

This figure illustrates the tests of a structural model in which each individual mindfulness facet was entered into the model and was used to create an interaction variable to test for the moderating effect of the mindfulness facet.

Figure 3. 4

Exploratory models testing moderating effects of individual mindfulness facets on the relationship between BPD features and emotional eating.

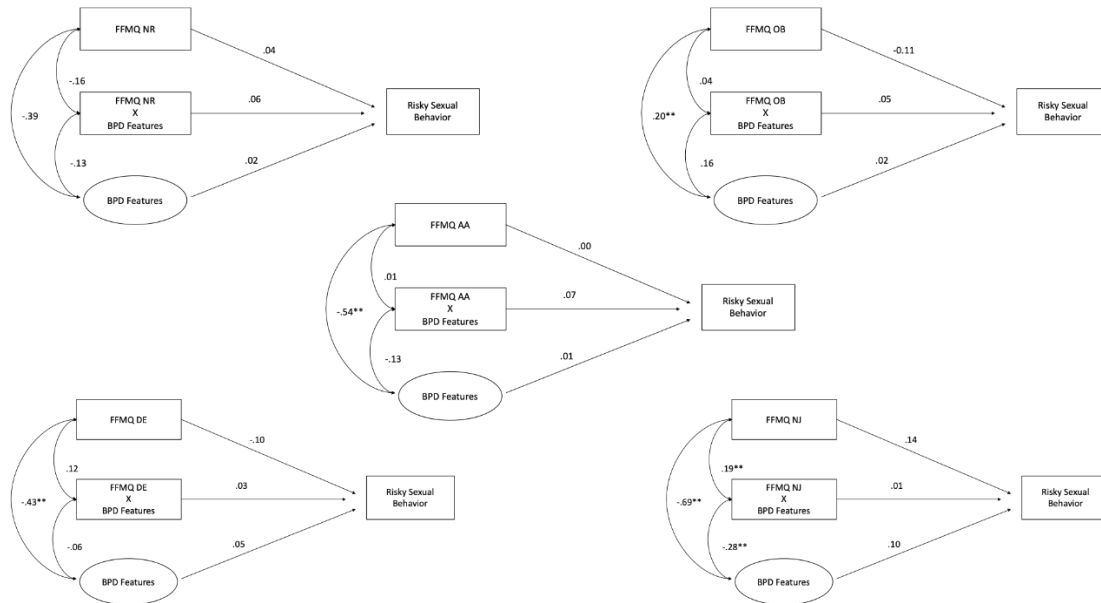


Note. ** $p < .01$. FFMQ NR = Nonreactivity to inner experience; FFMQ OB = Observe; FFMQ NJ = Nonjudgmental of inner experience; FFMQ AA = Acting with Awareness; FFMQ DE = Describe.

This figure illustrates the tests of a structural model in which each individual mindfulness facet was entered into the model and was used to create an interaction variable to test for the moderating effect of the mindfulness facet.

Figure 3. 5

Exploratory models testing moderating effects of individual mindfulness facets on the relationship between BPD features and risky sexual behavior.

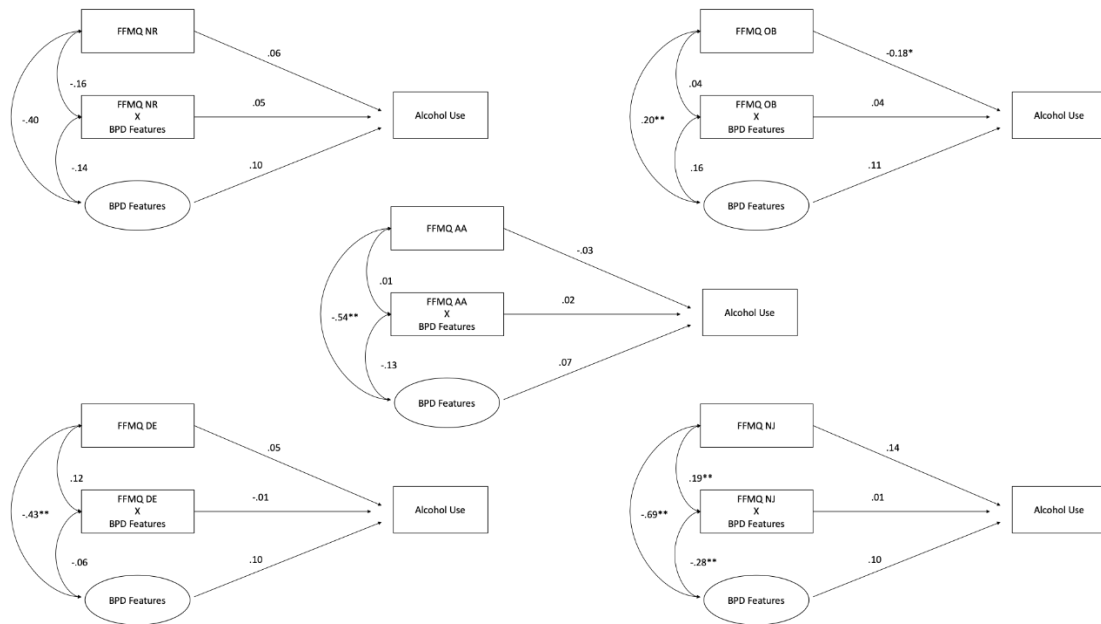


Note. ** $p < .01$. FFMQ NR = Nonreactivity to inner experience; FFMQ OB = Observe; FFMQ NJ = Nonjudgmental of inner experience; FFMQ AA = Acting with Awareness; FFMQ DE = Describe.

This figure illustrates the tests of a structural model in which each individual mindfulness facet was entered into the model and was used to create an interaction variable to test for the moderating effect of the mindfulness facet.

Figure 3. 6

Exploratory models testing moderating effects of individual mindfulness facets on the relationship between BPD features and alcohol use.

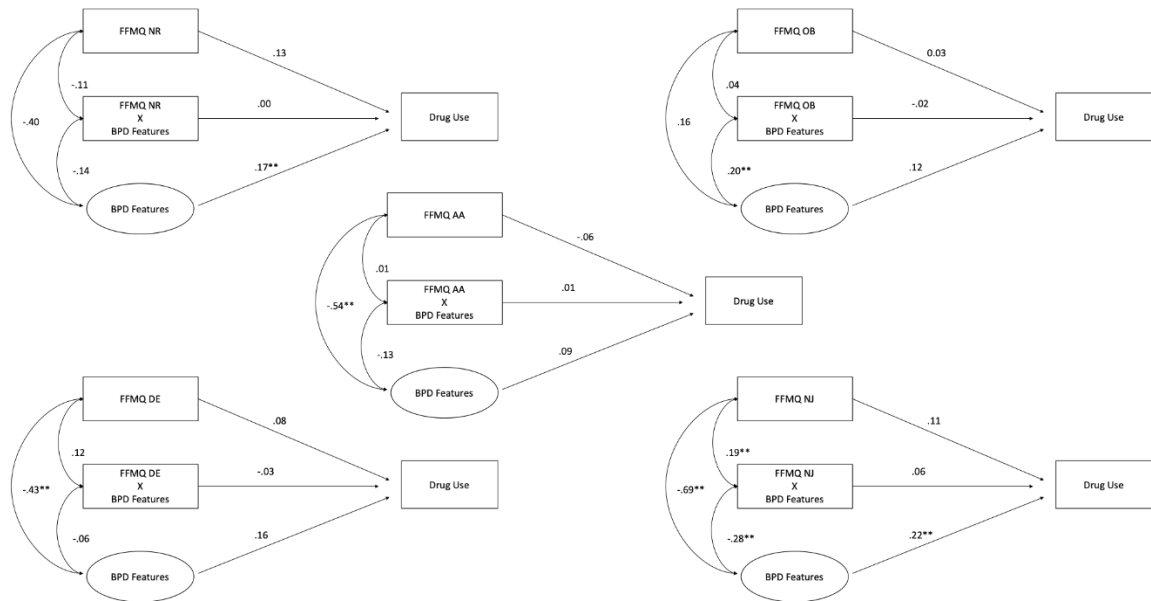


Note. ** $p < .01$. FFMQ NR = Nonreactivity to inner experience; FFMQ OB = Observe; FFMQ NJ = Nonjudgmental of inner experience; FFMQ AA = Acting with Awareness; FFMQ DE = Describe.

This figure illustrates the tests of a structural model in which each individual mindfulness facet was entered into the model and was used to create an interaction variable to test for the moderating effect of the mindfulness facet.

Figure 3. 7

Exploratory models testing moderating effects of individual mindfulness facets on the relationship between BPD features and drug use.

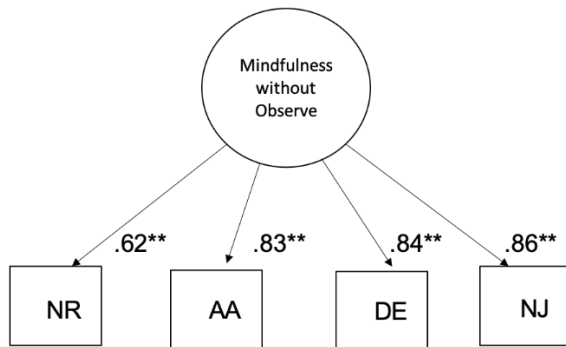


Note. ** $p < .01$. FFMQ NR = Nonreactivity to inner experience; FFMQ OB = Observe; FFMQ NJ = Nonjudgmental of inner experience; FFMQ AA = Acting with Awareness; FFMQ DE = Describe.

This figure illustrates the tests of a structural model in which each individual mindfulness facet was entered into the model and was used to create an interaction variable to test for the moderating effect of the mindfulness facet.

Figure 3. 8

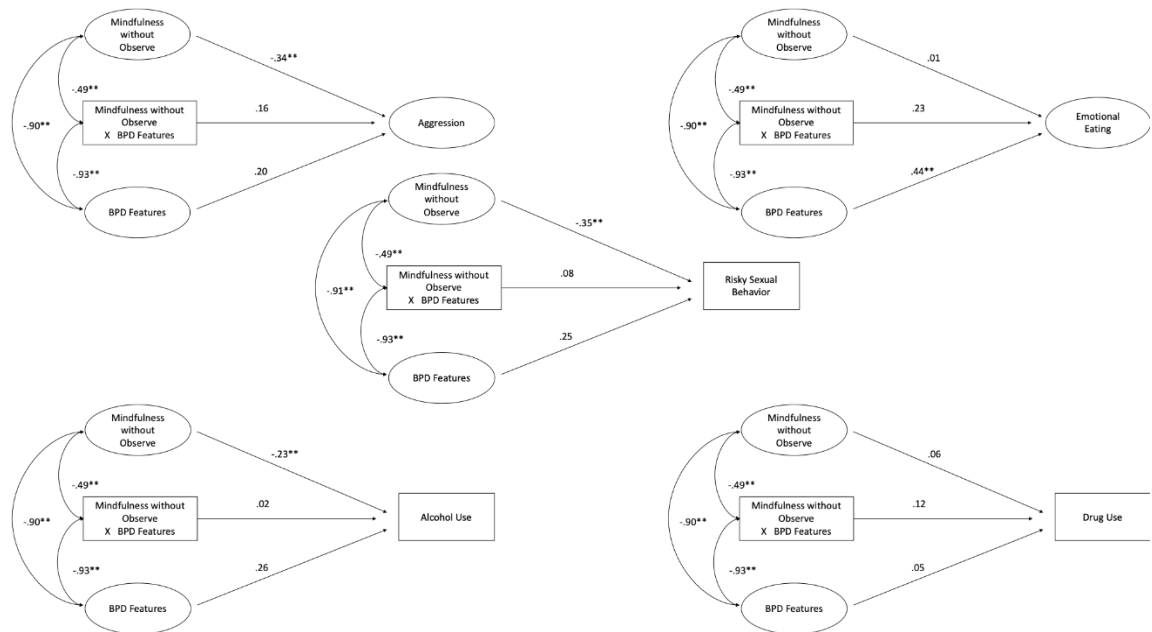
Measurement model for mindfulness latent variable without the Observe facet



Note. ** $p < .001$. NR = Nonreactivity to inner experience; AA = Acting with awareness; DE = Describe; NJ = Nonjudgmental to inner experience.

Figure 3. 9

Structural model testing the moderating effect of mindfulness (without observe facet) on the relationship between BPD features and problematic behaviors.



Note. ** $p < .01$.

CHAPTER FOUR: DISCUSSION

Past research has shown that individuals with BPD engage in maladaptive coping strategies and behaviors including alcohol and substance use (Stepp et al., 2005), risky sexual behavior (Frias et al., 2016), aggression (Newhill, Eack, & Mulvey, 2009), and emotional eating (McCarthy, 1990). Additional studies have provided evidence to suggest that these same individuals also report lower dispositional mindfulness compared to their peers (Cheavens et al., 2005), which may contribute to their difficulties with emotional dysregulation, impulsivity, and interpersonal dysfunction (Wupperman et al., 2008). The present study aimed to better understand the role of mindfulness in the relationship between BPD features and associated problematic behaviors. The current study used cross-sectional and longitudinal moderation models to determine if mindfulness moderated the relationship between BPD features and problematic behaviors.

We hypothesized that BPD features would predict increased frequency of problematic behaviors. Although we found limited support for this model using cross-sectional analyses, longitudinal analyses did demonstrate a positive relationship between the two variables. Students with more BPD features were more likely to engage in aggressive behavior in the cross-sectional sample, and all of the problematic behaviors assessed in this study in the longitudinal sample. The reason for the discrepancy between samples may lie in the timing of the study throughout the academic semester. Given that individuals with BPD are more likely to engage in problematic behaviors when they are emotionally dysregulated, it follows that they would be more likely to report problematic behaviors at the end of the semester (Time 2), when they may be facing stress and anxiety about final exams, than they would be at the beginning of the semester (Time 1)

when they are starting classes and coming back to campus after winter break. The results found in longitudinal analyses are in accordance with previous research linking BPD features and problematic behaviors.

We also hypothesized that trait mindfulness would moderate the relationship between BPD features and problematic behaviors, such that trait mindfulness would predict lower incidence of problem behaviors, and vice versa. We found no evidence in cross-sectional or longitudinal analyses to support this model. Individuals who reported more BPD features and lower levels of mindfulness were equally as likely to engage in problematic behaviors as individuals with more BPD features and higher levels of mindfulness. This pattern continued to hold even after we accounted for the positive relationship between the Observe facet of the FFMQ and various problematic behaviors by removing that facet from the model.

Lastly, we hypothesized that the individual mindfulness facets of nonjudging of inner experience and nonreactivity to inner experience would be more protective against problem behaviors than other facets of mindfulness. We did not find any evidence to support this hypothesis. All tests of moderation including specific mindfulness facets produced non-significant results. There was no evidence to suggest that a specific facet moderated the relationship between BPD features and problematic behaviors, or that any one facet moderated the relationship over and above the others.

Results of the present study are in contrast with past studies that have posited that mindfulness mitigates the need to use unhealthy coping strategies through sustained awareness without avoidance, decentering, and recognizing negative affect early (Craske, Barlow, & Meadows, 2000; Lynch et al., 2006; Wupperman et al., 2013). The results

found in the current study suggest that deficits in mindfulness may not be the most important factor when considering why individuals with BPD features engage in problematic behaviors. Other factors such as an individuals' social environment, knowledge of coping skills in general, current level of distress, or motivation to cope healthily may be more important in explaining this relationship. Use of a college student sample may have also led to discordant results, as past research in this area has generally been conducted with clinical samples. More research is needed to determine the factors that interact with mindfulness, BPD features, and problematic behaviors to produce a more comprehensive model.

If the results of the current study are to be taken at face value and mindfulness is not protective against this array of harmful behaviors, this would imply that the weight placed on mindfulness in current intervention approaches such as DBT for individuals with BPD is misplaced. Interventions that rely heavily on mindfulness skills for behavior change would then do well to modify and test protocols that emphasize other therapeutic variables and techniques. Given the literature surrounding mindfulness and mindfulness-informed therapy, however, it appears unlikely that this is the case.

The results of the current study should be taken in context of its limitations. Firstly, our sample was a convenience sample of college students drawn from a subject pool at a single university, and therefore may not be representative of individuals who are of different ages, education levels, cultures, or backgrounds. Further, females and Caucasian adults represented a large percentage of our sample. Therefore, one should interpret and generalize the results of our study with caution.

Secondly, there was significant attrition between Time 1 and Time 2 of our study. It is possible that the participants in the cross-sectional and longitudinal parts of our study are qualitatively different in some way not assessed for in this study. Further, as a result of the attrition between the two timepoints, we were unable to continue using structural equation modeling in the longitudinal analysis section of the study. It is possible that with a larger sample size and with different statistical techniques, we may have found significant results.

Additionally, our reliance on self-report measures for various constructs which can be thought of as “negative” may have led to underreporting on measures asking about risky sexual behavior, drug and alcohol use, and aggression. Respondents who may have wanted to portray themselves in a good light may have under-reported their BPD features or their engagement with problematic behavior. Social desirability bias may therefore have suppressed some effects in our study.

In summary, mindfulness and mindfulness facets did not appear to moderate the relationship between BPD features and problematic behaviors. Although we did not find evidence to support our proposed models, future research may focus on identifying other constructs which, when added to the model, may continue to elucidate the role of mindfulness in this relationship. These findings emphasize the need to continue to investigate the driving force behind the incidence of problematic behaviors in individuals with BPD.

APPENDIX - Measures

Personality Assessment Inventory - Borderline Features

This form consists of numbered statements. Please read each statement and decide if it is an accurate statement about you. Mark your answer on the line provided beside each statement using the scoring guide below. Give your own opinion of yourself. Be sure to answer every statement.

False, Not At All True	Slightly True	Mainly True	Very True
0	1	2	3

- _____ 1. My mood can shift quite suddenly.
- _____ 2. My attitude about myself changes a lot.
- _____ 3. My relationships have been stormy.
- _____ 4. My moods get quite intense.
- _____ 5. Sometimes I feel terribly empty inside.
- _____ 6. I want to let certain people know how much they've hurt me.
- _____ 7. I spend money too easily.
- _____ 8. I worry a lot about other people leaving me.
- _____ 9. People once close to me have let me down.
- _____ 10. I have little control over my anger.
- _____ 11. I often wonder what I should do with my life.
- _____ 12. I rarely feel very lonely.
- _____ 13. I sometimes do things so impulsively that I get into trouble.
- _____ 14. I've always been a pretty happy person.
- _____ 15. I can't handle separation from those close to me very well.
- _____ 16. I've made some real mistakes in the people I've picked as friends.
- _____ 18. I've had times when I was so mad I couldn't do enough to express all my anger.
- _____ 19. I don't get bored very easily.
- _____ 20. Once someone is my friend, we stay friends.
- _____ 21. I'm too impulsive for my own good.
- _____ 22. My mood is very steady.
- _____ 23. I'm a reckless person.
- _____ 24. I'm careful about how I spend my money.

Five Facet Mindfulness Questionnaire

Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is generally true for you.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Often true	Very often or always true

- ____ 1. When I'm walking, I deliberately notice the sensations of my body moving.
- ____ 2. I'm good at finding words to describe my feelings
- ____ 3. I criticize myself for having irrational or inappropriate reactions
- ____ 4. I perceive my feelings and emotions without having to react to them
- ____ 5. When I do things, my mind wanders off and I'm easily distracted
- ____ 6. When I take a shower or bath, I stay alert to the sensations of water on my body
- ____ 7. I can easily put my beliefs, opinions, and expectations into words
- ____ 8. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.
- ____ 9. I watch my feelings without getting lost in them
- ____ 10. I tell myself I shouldn't be feeling the way I'm feeling
- ____ 11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.
- ____ 12. It's hard for me to find the words to describe what I'm thinking
- ____ 13. I am easily distracted
- ____ 14. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.
- ____ 15. I pay attention to sensations, such as the wind in my hair or the sun on my face
- ____ 16. I have trouble thinking of the right words to express how I feel about things.
- ____ 17. I make judgments about whether my thoughts are good or bad
- ____ 18. I find it difficult to stay focused on what's happening in the present.
- ____ 19. When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Often true	Very often or always true

_____ 20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.

_____ 21. In difficult situations, I can pause without immediately reacting

_____ 22. When I have a sensation in my body, it's difficult for me to describe it because
I can't find the right words

_____ 23. It seems I am "running on automatic" without much awareness of what I'm doing.

_____ 24. When I have distressing thoughts or images, I feel calm soon after.

_____ 25. I tell myself that I shouldn't be thinking the way I'm thinking.

_____ 26. I notice the smells and aromas of things.

_____ 27. Even when I'm feeling terribly upset, I can find a way to put it into words.

_____ 28. I rush through activities without being really attentive to them.

_____ 29. When I have distressing thoughts or images I am able just to notice them without reacting.

_____ 30. I think some of my emotions are bad or inappropriate and I shouldn't feel them.

_____ 31. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.

_____ 32. My natural tendency is to put my experiences into words.

_____ 33. When I have distressing thoughts or images, I just notice them and let them go.

_____ 34. I do jobs or tasks automatically without being aware of what I'm doing.

_____ 35. When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about.

_____ 36. I pay attention to how my emotions affect my thoughts and behavior.

_____ 37. I can usually describe how I feel at the moment in considerable detail.

_____ 38. I find myself doing things without paying attention to them.

_____ 39. I disapprove of myself when I have irrational ideas.

Emotional Eating Scale

We all respond to different emotions in different ways. Some types of feelings lead people to experience an urge to eat. Please indicate the extent to which the following feelings lead you to feel an urge to eat by writing the appropriate number in the blank.

No desire to eat	A small desire to eat	A moderate desire to eat	A strong urge to eat	An overwhelming urge to eat
1	2	3	4	5

_____ 1. Resentful

_____ 2. Discouraged

_____ 3. Shaky

_____ 4. Worn out

_____ 5. Inadequate

_____ 6. Excited

_____ 7. Rebellious

_____ 8. Blue

_____ 9. Jittery

_____ 10. Sad

_____ 11. Uneasy

_____ 12. Irritated

_____ 13. Jealous

_____ 14. Worried

_____ 15. Frustrated

_____ 16. Lonely

_____ 17. Furious

_____ 18. On edge

_____ 19. Confused

_____ 20. Nervous

_____ 21. Angry

_____ 22. Guilty

_____ 23. Bored

_____ 24. Helpless

_____ 25. Upset

Alcohol Use Disorders Identification Test: Self-Report Version

1. How often do you have a drink containing alcohol?
 Never
 Monthly or less
 2-4 times a month
 2-3 times a week
 4 or more times a week

2. How many drinks containing alcohol do you have on a typical day when you are drinking?
 1 or 2
 3 or 4
 5 or 6
 7 to 9
 10 or more

3. How often do you have six or more drinks on one occasion?
 never
 less than monthly
 monthly
 weekly
 daily or almost daily

4. How often during the last year have you found that you were not able to stop drinking once you had started?
 never
 less than monthly
 monthly
 weekly
 daily or almost daily

5. How often during the last year have you failed to do what was normally expected of you because of drinking?
 never
 less than monthly
 monthly
 weekly
 daily or almost daily

6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?
 never
 less than monthly
 monthly
 weekly

_____ daily or almost daily

7. How often during the last year have you had a feeling of guilt or remorse after drinking?

- _____ never
- _____ less than monthly
- _____ monthly
- _____ weekly
- _____ daily or almost daily

8. How often during the last year have you been unable to remember what happened the night before because of your drinking?

- _____ never
- _____ less than monthly
- _____ monthly
- _____ weekly
- _____ daily or almost daily

9. Have you or someone else been injured because of your drinking?

- _____ no
- _____ yes, but not in the last year
- _____ yes, during the last year

10. Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?

- _____ no
- _____ yes, but not in the last year
- _____ yes, during the last year

Drug Use Disorders Identification Test: Self-Report Version

1. How often do you use drugs other than alcohol?

- Never
- Monthly or less
- 2-4 times a month
- 2-3 times a week
- 4 or more times a week

2. Do you use more than one type of drug on the same occasion?

- Never
- Monthly or less
- 2-4 times a month
- 2-3 times a week
- 4 or more times a week

3. How many times do you take drugs on a typical day when you use drugs?

- 0
- 1 -2
- 3 - 4
- 5 - 6
- 7 or more

4. How often are you influenced heavily by drugs?

- never
- less than monthly
- monthly
- weekly
- daily or almost daily

5. Over the past year, have you felt that your longing for drugs was so strong that you could not resist it?

- never
- less than monthly
- monthly
- weekly
- daily or almost daily

6. Has it happened, over the past year, that you have not been able to stop taking drugs once you started?

- never
- less than monthly
- monthly
- weekly
- daily or almost daily

7. How often over the past year have you taken drugs and then neglected to do something you should have done?

- never
- less than monthly
- monthly
- weekly
- daily or almost daily

8. How often over the past year have you needed to take a drug the morning after heavy drug use the day before?

- never
- less than monthly
- monthly
- weekly
- daily or almost daily

9. How often over the past year have you had guilt feelings or a bad conscience because you used drugs?

- never
- less than monthly
- monthly
- weekly
- daily or almost daily

10. Have you or anyone else been hurt (mentally or physically) because you used drugs?

- no
- yes, but not in the last year
- yes, during the last year

11. Has a relative or a friend, a doctor or a nurse, or anyone else, been worried about your drug use or said to you that you should stop using drugs?

- no
- yes, but not in the last year
- yes, during the last year

The Aggression Questionnaire

Please rate each of the following items in terms of how characteristic they are of you. Use the following scale for answering these items.

1	2	3	4	5	6	7
extremely uncharacteristic of me						extremely characteristic of me

- ___ 1) Once in a while I can't control the urge to strike another person.
- ___ 2) Given enough provocation, I may hit another person.
- ___ 3) If somebody hits me, I hit back.
- ___ 4) I get into fights a little more than the average person.
- ___ 5) If I have to resort to violence to protect my rights, I will.
- ___ 6) There are people who pushed me so far that we came to blows.
- ___ 7) I can think of no good reason for ever hitting a person.
- ___ 8) I have threatened people I know.
- ___ 9) I have become so mad that I have broken things.
- ___ 10) I tell my friends openly when I disagree with them.
- ___ 11) I often find myself disagreeing with people.
- ___ 12) When people annoy me, I may tell them what I think of them.
- ___ 13) I can't help getting into arguments when people disagree with me.
- ___ 14) My friends say that I'm somewhat argumentative.
- ___ 15) I flare up quickly but get over it quickly.
- ___ 16) When frustrated, I let my irritation show.
- ___ 17) I sometimes feel like a powder keg ready to explode.

Inventory of Statements about Self-Injury (ISAS)

1. Please estimate the number of times in your life you have intentionally (i.e., on purpose) performed each type of non-suicidal self-harm (e.g., 0, 10, 100, 500):

Cutting _____

Biting _____

Burning _____

Carving _____

Surface _____

Pinching _____

Pulling Hair _____

Other _____

Severe Scratching _____

Banging or Hitting Self _____

Interfering with Wound Healing _____

Rubbing Skin Against Rough _____

Sticking Self with Needles _____

Swallowing Dangerous Substances _____

If you have performed one or more of the behaviors listed above, please complete the final part of this questionnaire. If you have not performed any of the behaviors listed above, you are done with this particular questionnaire and should continue to the next.

2. If you feel that you have a main form of self-harm, please indicate what that is.

3. At what age did you:

First harm yourself _____

Most recently harm yourself? _____

4. Do you experience physical pain during self-harm?

Yes _____ Sometimes _____ No _____

5. When you self-harm, are you alone?

Yes _____ Sometimes _____ No _____

6. Typically, how much time elapses from the time you have the urge to self-harm until you act on the urge?

<1 hour _____ 1 – 3 hours _____ 3 – 6 hours _____ 6 – 12 hours _____

12 – 24 hours _____ > 1 day _____

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- Caldera, C.A.**, Peters, J.R., Braun, S., Baer, R. (2018). *Comparing the effects of mindfulness meditation and relaxation in a brief laboratory induction*. Manuscript in preparation.
- Baer, R., **Caldera, C. A.**, & Nagy, L. M. (2017). Mindfulness. In V. Zeigler-Hill and T.K. Shakleford (Eds.), *Encyclopedia of Personality and Individual Differences* (1st ed.). Springer International Publishing.
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TEACHING EXPERIENCE

- Guest Lecturer* October 10, 2017
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Abnormal Psychology
- Graduate Teaching Assistant* August 2014 – December 2015
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HONORS AND AWARDS

- Kentucky Psychological Association Board December 2018
Graduate Student Representative
- University of Kentucky
Lyman T. Johnson
Fellowship Award August 2014 – May 2017
Department of Psychology Graduate Student Travel Award 2014 – 2017
- University of North Carolina at Chapel Hill
Honors in the Major Program in Psychology May 2013 – May 2014
Dean's List January 2012 – May 2014
Carolina Covenant Scholarship August 2010 – May 2014
Psi Chi Honor Society August 2013 – present