2018

Borderline Personality and Risk-Taking: Examining the Role of Impulsivity Across Domains

Colten Karnedy
University of Massachusetts Amherst

BORDERLINE PERSONALITY AND RISK-TAKING: EXAMINING THE ROLE OF IMPULSIVITY ACROSS DOMAINS

A Thesis Presented

by

COLTEN J. KARNEDY

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
of the requirements for the degree of

MASTER OF SCIENCE

February 2018

Psychological and Brain Sciences

BORDERLINE PERSONALITY AND RISK-TAKING: EXAMINING THE ROLE OF IMPULSIVITY ACROSS DOMAINS

A Thesis Presented

by

COLTEN J. KARNEDY

Approved as to style and content by:

_____
Katherine L. Dixon-Gordon, Chair

_____
Linda M. Isbell, Member

_____
Elizabeth Harvey, Member

_____
Caren Rotello, Department Head
Psychological and Brain Science

ABSTRACT

BORDERLINE PERSONALITY AND RISK-TAKING: EXAMINING THE ROLE OF IMPULSIVITY ACROSS DOMAINS

FEBRUARY 2018

COLTEN J. KARNEDY, B.A., SKIDMORE COLLEGE

M.S., UNIVERSITY OF MASSACHUSETTS AMHERST

Directed by: Katherine L. Dixon-Gordon

Individuals with borderline personality disorder (BPD) and high levels of BPD traits have demonstrated greater rates of engagement in risky, self-destructive behaviors compared to healthy controls. Specifically, impulsivity has been theorized to underlie many of these risky behaviors. Although existing self-report literature suggests that individuals with BPD are more impulsive than controls, evidence from behavioral measures remains inconclusive. Likewise, there is scant research examining specific domains of impulsivity associated with risky behaviors in BPD, which is problematic given that impulsivity is a diagnostic criterion for BPD. Thus, the proposed research aims to bridge this gap in the literature by examining associations between BPD traits and domains of impulsivity (e.g, urgency, lack of premeditation, lack of perseverance, and sensation seeking), using behavioral measures. Findings suggest that urgency prospectively predicts risky behaviors one-month post assessment. However, contrary to our hypotheses, BPD traits were not significantly associated with any specific impulsivity domain. Additionally, results did not support the notion that impulsivity domains account for the association between BPD traits and future engagement in risky behaviors. Future directions for examining how emotion dysregulation and interpersonal difficulties in BPD relate to impulsivity and risky behaviors are discussed.

TABLE OF CONTENTS

Page

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure Page

CHAPTER 1

INTRODUCTION

Borderline Personality Disorder (BPD) is a chronic psychiatric disorder characterized by emotional lability, interpersonal difficulties, identity disturbance, and recurrent, frequently self-destructive, impulsive behaviors (American Psychiatric Association, 2013). Although prevalence estimates of BPD range from 0.7 to 5.9% in the general population (Torgersen, Kringlen, & Cramer, 2001; Sansone & Sansone, 2011a; Zanarini et al., 2011), BPD poses disproportionately high costs to society in terms of treatment utilization (Ansell, Sanislow, McGlashan, & Grilo, 2007; Zanarini, Frankenburg, Hennen, Reich, & Silk, 2004), with prevalence rates in treatment-seeking samples of 9.3% to 14.4% (Zimmerman & Mattia, 1999a; Zimmerman, Rothschild, & Chelminski, 2005). In addition, BPD is associated with severe functional impairment (Oldham et al., 2001), high rates of suicide and self-injury (Chapman, Specht, & Cellucci, 2005; Oldham, 2007), and risky behaviors (Lawrence, Allen, & Chanen, 2010; Lieb, Zanarini, Schmahl, Linehan, & Bohus, 2004). Thus, understanding specific factors that underlie the distress seen in individuals with BPD has significant clinical implications and warrants empirical attention.

1.1 Risky Behaviors in Individuals with Borderline Personality Disorder

Of particular concern, BPD is associated with a wide range of risky behaviors (American Psychiatric Association, 2013). Risky behaviors have been defined as any behavior that puts an individual at risk for negative physical, psychological, financial, or social outcomes (Weiss et al., 2015), such as substance use, binge eating, risky sexual behavior (e.g., unprotected sex or sex with multiple partners or substance users), non-suicidal self-injury (NSSI), or reckless driving (Deckman & DeWall, 2011; Hamza, Stewart, & Willoughby, 2012; Sansone, Levitt, & Sansone, 2005; Tull, Gratz, & Weiss, 2011). Past research has documented a high prevalence of these

behaviors among those with BPD, including substance abuse (10.6–14.6%; Sansone & Sansone, 2011b), disordered eating (16.9–53.8%; McGlashan et al. 2000; Zanarini et al., 2010; Zimmerman & Mattia, 1999b), unprotected sex (21%; Lavan & Johnson, 2002), and NSSI (50 - 80%; Chapman, Specht, & Cellucci, 2005, Cowdry, Pickar, & Davies, 1985; Oumaya et al., 2008). Additionally, BPD is overrepresented among individuals who engage in gambling (16–69.5%; Blaszczynski & Steel, 1998; Echeburua & Fernandez-Montalvo, 2008), "road rage" (24.8%; Sansone, Lam, & Wiederman, 2010), and casual sexual relationships that increase risk for sexually transmitted infections (46%; Hull, Clarkins, & Yoeman, 1993) – compared to rates of BPD in general epidemiological samples (~6%; Grant et al., 2008). Finally, individuals with BPD have been found to have significantly higher rates of substance-related legal charges in areas such as driving under the influence of substances (16.7–18.4%), disorderly conduct (13–14.3%), and public intoxication (16.3–16.7%; Sansone, Watts, & Wiederman, 2014), compared to individuals below the clinical cutoff for BPD symptoms.

In general, risky behaviors are associated with adverse health and social outcomes. For instance, results of a survey of adolescents and emerging adults revealed that greater alcohol use was associated with more serious injuries in need of medical attention (Albers et al., 2015). Similarly, data from the National Longitudinal Survey of Youth (1997 cohort) indicated that smoking, unsafe sex, and lack of exercise were associated with a range of negative outcomes (e.g., arrest, dropping out of school, not voting, and poor physical health) in the transition to adulthood (Hair, Park, Ling, & Moore, 2009). Furthermore, risky behaviors such as NSSI present a severe and immediate risk to an individual's life. Although NSSI, the deliberate injury of one's own tissue without intent to die (Klonsky, 2011), occurs in the absence of suicidal intent by definition, it has been implicated as one of the most robust risk factors for subsequent suicidal

behavior (Hamza, Stewart, Willoughby, 2012; Klonsky & May, 2015; Klonsky, May, & Glenn, 2013). Lastly, evidence suggests a cascade effect for risky behaviors; engaging in certain behaviors may lead to other types of risky behaviors. For example, heavy alcohol and substance use predicted greater risky sexual behaviors (Connor et al., 2013; Tull, Gratz, Weiss, 2011). Given the severe adverse consequences associated with risky behaviors, coupled with the high prevalence of these behaviors in BPD, investigating the specific mechanisms underlying risky behaviors is of particular clinical and public health interest.

1.2 Impulsivity and Risky Behaviors

Impulsivity, a core characteristic of BPD (American Psychiatric Association, 2013; Trull, Tomko, Brown, & Scheiderer, 2010), has been viewed as underlying risky behaviors in both clinical and community populations. Although many definitions have been offered for impulsivity (Evenden, 1999a,b), these definitions are often multidimensional (e.g., Jacob et al., 2010; Patton, Stanford, & Barratt, 1995; Whiteside & Lynam, 2001). Generally speaking, impulsivity has been viewed as comprising multiple facets, such as difficulties stopping a behavior with adverse consequences, difficulties persisting in an activity, a brief attention span, the tendency to prefer immediate gratification over delayed gratification, and frequent engagement in thrilling or risky behaviors without consideration of the outcomes (Perry & Carroll, 2008). One useful conceptualization of impulsivity identifies several related, but independent, factors (Whiteside & Lynam, 2001): urgency, (lack of) premeditation, (lack of) perseverance, and sensation seeking. In particular, urgency refers to the tendency to engage in rash actions when distressed. Lack of premeditation refers to difficulty thinking ahead and reflecting on the consequences associated with behaviors. A lack of perseverance refers to difficulties persisting in boring or difficult tasks, and sensation seeking refers to the tendency to

seek out novel, risky, or thrilling behaviors. This model is useful in identifying specific domains of impulsivity and has demonstrated valid associations with other measures of impulsivity (Jacob et al., 2010), as well as risky behaviors (Birthrong & Latzman, 2014; Coskunpinar, Dir, & Cyders, 2013).

In general, research supports a link between impulsivity and risky behaviors. For example, meta-analyses revealed higher self-reported impulsivity among individuals who engaged in NSSI (vs. healthy controls; Hamza, Willoughby, & Heffer, 2015), and risky sexual behavior in adolescent women (Dir, Coskunpinar, & Cyders, 2014). As well, evidence suggests that higher levels of self-reported impulsivity are associated with substance-use-related risky sexual behaviors in young adults (Charnigo et al., 2013) and general risky sexual behaviors (e.g., inconsistent use of protection and history of sex with a strangers) in college-aged men (Derefinko et al., 2014). Studies have also demonstrated associations between high levels of self-reported impulsivity and risky driving behaviors in young adult samples (Le Bas, Hughes, & Stout, 2015; Pearson, Murphy, & Doane, 2013). In particular, those with a history of risky driving (e.g., driving under the influence of alcohol) reported higher levels of impulsivity than drivers drawn from the general public (Curran, Fuertes, Alfonso, & Hennessy, 2010). Thus, self-reported trait impulsivity has been independently linked with a range of risky behaviors. Yet, given its' multidimensional nature, it is important to identify which specific facets of impulsivity are uniquely linked to risky behaviors.

Specific domains of impulsivity have demonstrated unique associations with risky behaviors. A large body of research has focused on the associations between substance misuse and domains of impulsivity. Specifically, frequency of alcohol use (i.e., most drinks on one occasion in the past month, Henges & Marczinski, 2012; heavy alcohol consumption, Magid &

Colder, 2007) was related to a behavioral measure of disinhibition, a construct conceptually similar to lack of perseverance (Henges & Marczinski, 2012; Cyders & Coskunpinar, 2011). In addition, significant links have been found between alcohol use and sensation seeking, and lack of premeditation (Magid & Colder, 2007). When examining multiple domains of impulsivity as predictors of alcohol use, only risk-taking behavior (a construct consistent with sensation seeking) predicted unique variance, whereas perseverance and delay discounting (consistent with lack of premeditation) did not add incrementally to the model (Fernie, Cole, Goudie, & Field, 2010). Likewise, a review of the literature yielded similar findings for other forms of substance abuse, suggesting that lack of perseverance and lack of premeditation play a role in both the onset and maintenance of substance abuse (Perry & Carroll, 2008). Frequency of substance use, however does not necessarily map directly onto functional impairment or psychopathology. Rather, use in the face of functional impairment is of particular clinical interest. When focusing on the problems stemming from alcohol use, only urgency and lack of perseverance showed significant associations (Magid & Colder, 2007).

Several studies also point to urgency as a domain of impulsivity implicated in risky behaviors. In one study, urgency emerged as one of only two domains of impulsivity linked to alcohol problems (Magid & Colder, 2007). Aside from substance use, urgency and sensation seeking were the best predictors of future risky sexual behaviors (e.g., sex with a stranger, sex with multiple partners or substance users, sex in exchange for money or substances, etc.; Deckman & DeWall, 2011). Urgency, lack of premeditation, and sensation seeking were also significantly associated with NSSI, with urgency demonstrating the largest effect size (Glenn & Klonksy, 2010). Meta-analytic findings further support a strong association between urgency and NSSI (Hamza et al., 2015). Given that risky behaviors, such as NSSI (Andover & Morris, 2014;

Zelkowitz, Cole, Han, & Tomarken, 2016), or many risky behaviors associated with psychopathology (i.e., PTSD; Weiss, Tull, Viana, Anestis, & Gratz, 2012) typically serve to alleviate emotional distress, consistent with the theorized emotion regulatory role of risky behaviors in BPD (Aldao & Dixon-Gordon, 2014; Linehan, 1993), urgency is likely to play a particularly important role in risky behaviors in this population.

1.3 Impulsivity in Individuals with BPD

Converging theoretical and empirical research suggest that impulsivity is a core characteristic of BPD (American Psychiatric Association, 2013, p. 663). Self-report findings consistently show elevated trait impulsivity among individuals with BPD versus healthy controls (Cackowski et al., 2014; Coffey, Schumacher, Baschnagel, Hawk, & Holloman, 2011; Jacob et al., 2010; Lawrence et al., 2010; Mortensen, Rasmussen, & Haberg, 2010). Similarly, in nonclinical samples, BPD symptoms were significantly associated with self-reported impulsivity (Peters, Upton, & Baer, 2013; Tragesser & Robinson, 2009). Notably, this BPD-impulsivity association is not accounted for by co-occurring disorders such substance use (Coffey et al., 2011) or attention-deficit/hyperactivity disorder (ADHD; Krause-Utz et al., 2013). As such, impulsivity is a prominent and perhaps unique feature of BPD.

Despite well-documented associations between BPD and self-reported impulsivity, findings on behavioral measures of specific impulsivity domains are mixed. For example, one study found that women diagnosed with BPD self-reported significantly higher impulsivity on two different self-report measures, but no significant group differences were found on three separate behavioral measures (Jacob et al., 2010). In addition, a meta-analysis of 28 studies indicated that self-report and behavioral measures of impulsivity are only tapping into a small amount of variance for the same construct, suggesting that the two approaches are not measuring

impulsivity in the same manner (Cyders & Coskunpinar, 2011). Rather, self-report and behavioral measures may assess separate and unique aspects of impulsivity (Cyders & Coskunpinar, 2012). As such, an examination of behaviorally-indexed impulsivity in BPD is critical in order to gain a more nuanced understanding of the impact in has on those with this disorder.

Across domains of impulsivity, BPD samples evidence impairments on these behavioral measures, although this literature remains inconclusive. Given that urgency has been characterized as engaging in rash actions in response to emotional distress (Whiteside & Lynam, 2001), behavioral tasks have assessed this construct by measuring non-adaptive behaviors (i.e., quitting an instructed task that provides compensation) to avoid or escape distress (e.g., a stressful computer task; Lejuez, Kahler, & Brown, 2003; Lejuez, Daughters, Danielson, & Ruggiero, 2006). In particular, individuals with BPD have been shown to have elevated urgency on such behavioral measures, relative to their non-BPD counterparts (e.g., Bornovalova et al., 2008; Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2006). Other studies, however, have not revealed that BPD symptoms were associated with urgency on such behavioral measures (e.g., Iverson, Follette, Pistorello, & Fruzzetti, 2012).

Lack of premeditation (difficulty in-future related and assessment of consequences associated), which is also thought to play a role in BPD, represents another domain of impulsivity that has been behaviorally assessed using delay discounting tasks. These tasks ask participants to make choices about receiving rewards of varying sizes immediately or after various delays (Barker et al., 2014). Several studies using this approach have found a significantly greater lack of premeditation among individuals diagnosed with BPD, compared to healthy controls (Barker et al., 2014; Coffey et al., 2011; Lawrence et al., 2011). Of note,

however, some research suggests that individuals with BPD only evidence these difficulties in the context of co-occurring substance use disorders (Coffey et al., 2011).

Another domain of impulsivity relevant to BPD is lack of perseverance, or the ability to continue engaging in goal-directed actions despite difficulty or boredom (Whiteside, Lynam, Miller, & Reynolds, 2005). Past research utilizing behavioral measures (i.e., Paced Auditory Serial Addition Task & the Computerize Mirror-tracing Persistence Task) to assess a similar construct of distress tolerance found that individuals diagnosed with BPD were less willing than clinical controls to tolerate distress while completing these tasks (Bornovalova et al., 2008). However, while self-report data also supports a lack of perseverance in BPD samples (Whiteside et al., 2005), further research utilizing behavioral measures is lacking.

Lastly, sensation seeking, or the pursuit of novel or thrilling activities (Whiteside & Lynam, 2001) also likely holds relevance to the relationship between impulsivity and BPD. Behavioral tasks tapping this domain have often involved some pursuit of reward in the face of risk (e.g., the Iowa Gambling Task; Bechara, Damasio, Damasio, & Anderson, 1994; Game of Dice Task; Svaldi et al., 2012), however findings from these studies are also contradictory. Specifically, some have revealed elevated sensation seeking among individuals with BPD (Haaland & Landrø, 2007; Schuermann, Kathmann, Stiglmayr, Renneberg, & Endrass, 2011; Svaldi et al., 2012), while others have found no group differences between those with BPD and those without (Cackowski et al., 2014). Reasons for these discrepant findings are remain unclear.

1.4 Gaps in Extant Research

Although the aforementioned studies highlight the role of impulsivity in risky behaviors in BPD, several limitations of this research warrant mention. First, there are fewer studies using behavioral indices of impulsivity, compared to self-report measures, and existing data remains

largely inconclusive (Cyders & Coskunpinar, 2011). Second, there is a lack of work utilizing concurrent measurement of multiple domains of impulsivity in BPD populations, limiting our ability to interpret current findings on behavioral impulsivity. Finally, there is no literature examining how specific domains of impulsivity prospectively predict risky behaviors in individuals diagnosed with BPD. Further work utilizing comprehensive behavioral assessment of impulsivity is needed to investigate whether impulsivity can prospectively predict real world risky behaviors. Such work has the potential to pinpoint precise areas for intervention to decrease risky behaviors and their deleterious consequences in BPD.

1.5 The Present Study

Despite the theoretical links between specific domains of impulsivity in BPD and risky behaviors, there is little empirical research examining the unique roles of these domains of impulsivity (relative to other domains) in accounting for the association of BPD features and risky behaviors. Thus, the current study seeks to address this gap in the literature by utilizing several behavioral measures of a range of impulsivity domains (i.e., urgency, lack of premeditation, lack of perseverance, and sensation seeking) to examine their relative and unique ability to account for the association between baseline BPD features and risky behaviors at a one-month follow-up. First, we hypothesize BPD features will be positively associated with these four domains of behaviorally-assessed impulsivity. Second, we hypothesize that impulsivity will predict risky behaviors at one month, particularly urgency. Third, we hypothesize that BPD features will be prospectively associated with risky behaviors at one-month follow-up. Fourth, we hypothesize that impulsivity, particularly urgency, will mediate the relationship between baseline levels of BPD features and risky behaviors at one-month follow-up.

CHAPTER 2

METHOD

2.1 Participants

Participants were recruited from the University of Massachusetts Amherst (UMass) undergraduate psychology subject pool and from the community of Amherst, Massachusetts. Recruitment was accomplished through emails to those who completed a psychology prescreen at UMass and fliers posted around campus and in town.

As part of a larger study, 33 participants were recruited from the UMass undergraduate student body (n = 25) and from the community (n = 7). Participants ranged from 18 to 38 years of age (M = 21.65, SD = 3.58). The majority of participants identified their sex as female (81.8%), while 15.2% reported their sex male; no participants identified as intersex. Participants identified as White (48.5%), Asian/Southeast Asian (27.3%), Multiracial (12.1%), Black (6.1%), and other (i.e. Middle Eastern; 3.0%). Participants also reported their sexual orientation: straight (84.8%), lesbian or gay (6.1%), bisexual (3.0%), and asexual (3.0%). The majority of participants in the current sample reported having completed some college (66.7%), further education, such as a college degree (9.1%), some graduate school (12.1%), or a graduate or professional degree (6.1%). The remaining participants reported having completed their high school education (3.0%). A minority of participants reported currently taking psychiatric medication (12.1%). Additionally, a minority of participants reported currently undergoing psychological treatment for a psychiatric disorder (18.2%). Due to procedural issues, demographic data are missing for one participant. See Table 1 for further demographic characteristics.

Of note, there were no significant differences between the students and community members in this sample. In particular, the subsamples were comparable in terms of age ($t(30) = 1.81$, $p = .080$, $d = 0.56$), sex ($\chi^2(1) = 1.40$, $p = .286$, $\phi = -0.19$), racial/ethnic background ($\chi^2(4) = 3.11$, $p = .540$, $\phi = 0.31$), and education ($\chi^2(4) = 4.56$, $p = .335$, $\phi = 0.39$).

2.2 Procedure

Undergraduate participants were recruited using the SONA system's psychology prescreen questionnaires, which included an assessment of BPD features. Participants who completed this prescreen were invited to participate in the remainder of the study, based on scores on this measure, In particular, we prioritized scheduling of participants with high levels of BPD features to ensure adequate representation of those with high BPD features. Community members were recruited via posted flyers and postings on online message boards. Those interested in participating completed a phone screen, where they received additional information about the study and were asked to answer several questions assessing their eligibility based on inclusion criteria and reported BPD features. All participants provided verbal consent at the beginning of phone screens. Informed consent was also obtained at the beginning of the first in-person appointment for the study. To be eligible to participate in the current study, participants were required to be (a) 18 to 55 years of age (to account for age-related decrements in learning; Rönnlund et al., 2005), (b) able to read and complete online questionnaires, and (c) fluent English speakers.

Participants completed the study in two phases. First, during an in-person baseline interview session, participants ($n = 46$) completed diagnostic interviews to assess inclusion and exclusion criteria. Additionally, participants ($n = 44$) completed four behavioral impulsivity tasks and a series of preliminary questionnaires. Second, participants were asked to complete a one-

month follow-up electronically (n = 33). The final sample consisted only of eligible participants who completed the interview, laboratory session, and follow-up. Participants were provided with a link to an online survey via email and were asked to complete several measures related to risky behaviors, impulsivity, and emotion regulation. To appropriately assess and manage participant risk of distress or urges for self-injury, we administered the University of Washington Risk Assessment Protocol (UWRAP, Linehan, unpublished) at the beginning and end of each in-person session, which has been used in a number of studies to date (Linehan, Comtois, & Ward-Ciesielski, 2012; Reynolds, Lindenboim, Comtois, Murray, & Linehan, 2006). This tool assessed participants' emotional state and urges for self-injury (with a scale ranging from 1 *no distress* to 7 *high distress*). Participants who reported urges for self-injury greater than or equal to 4, or an increase in distress of >2 points, were guided through a mood improvement protocol involving skills from an empirically-supported treatment (Linehan, 1993). This protocol has been demonstrated to effectively reduce distress (Reynolds et al., 2006).

2.3 Measures

See Table 2 for a full description of measures used in the present study.

2.3.1 Prescreening and Diagnostic Interviews

Participants were screened for their level of BPD features using the Personality Assessment Inventory – Borderline Scale *(*PAI-BOR; Morey, 1991), a 29-item measure asking participants to rate the accuracy of various statements on a 4-point Likert Scale ranging from *none* (0) to *very true* (4). Research has demonstrated that the PAI-BOR (Morey, 1991) exhibits strong reliability (α = .93) and strong convergent validity with other measure of BPD (Gardner & Qualter, 2009). The PAI-BOR was administered either as part of the SONA system prescreen assessment, or prior to the initial session. Previous findings suggest that high scores (i.e., ≥ 38,

Jacobo, Blais, Baity, & Harley, 2007) are consistent with a probable BPD diagnosis. Additionally, individuals high in BPD features were contacted by email and prioritized in scheduling to ensure an adequate distribution for this variable. The PAI-BOR demonstrated strong internal consistency ($\alpha = .93$) in the present sample.

Additionally, participants completed semi-structured diagnostic interviews conducted by trained graduate-level assessors. Researchers administered the M.I.N.I. International Neuropsychiatric Interview (MINI 7.02; Sheehan et al., 2016) to collect a range of diagnostic data. The MINI has demonstrated good inter-rater reliability and moderate to good validity across the different psychiatric diagnoses. Data for several early participants ($n = 8$) was collected using an earlier version of the MINI (MINI 6.0; Sheehan et al., 1998) and were re-coded by two separate graduate-level diagnostic interviewers to match 7.02 codes who followed a standardized set of guidelines developed for use in the current study. Additionally, researchers administered the Structured Clinical Interview for DSM-IV Personality Disorders – BPD portion (SCID-II; First, Spitzer, Gibbon, Williams, & Benjamin, 1996), a measure assessing the diagnostic criteria for BPD. The SCID-II has demonstrated strong inter-rater reliability (Lobbestael, Leurgans, & Arntz, 2011) and acceptable diagnostic accuracy (the ratio of all true results to the total number of results measured; .85; Skodol, Rosnick, Kellman, Oldham, & Hyler, 1988).

Assessors achieved reliability on a set of three training videos to ensure agreement. They subsequently met monthly and reviewed codes to reduce rater drift.

2.3.2 Demographics

Participant demographic information was collected using a study-specific set of items to assess age, sex, gender, race/ethnicity, and education level. Demographic items addressing

whether and how often individuals identifying as gay, lesbian, bisexual, pansexual, or asexual have discussed their sexual orientation with various peers was adopted from previous work (Mohr & Fessinger, 2000).

2.3.3 Psychopathology

Participants completed the Depression, Anxiety, and Stress scales (DASS-21; Lovibond & Lovibond, 1995) at baseline to gather additional diagnostic data to characterize the sample. The DASS-21 has high levels of internal consistency for its depression scale (α = .88), anxiety scale (α = .82), stress scale (α = .90), and its total scale (α = .93), as well as acceptable convergent and divergent validity (Henry & Crawford, 2005). At baseline, the current sample demonstrated strong internal consistency on the stress (α = .87), and total scales (α = .89). The depression (α = .69) and anxiety scales (α = .73) were adequate. At follow-up, all four scales demonstrated strong internal consistency: depression scale (α = .86), anxiety scale (α = .81), stress scale (α = .84), and its total scale (α = .93)

2.3.4 Risky and Impulsive Behaviors

Measures of risky and impulsive behaviors were administered at baseline, during the laboratory session, and at the one-month follow-up.

2.3.4.1 The UPPS Impulsive Behavior Scale (UPPS)

This 45-item measure was used to assess four domains of impulsivity, each of which has demonstrated strong internal consistency: urgency (α = .89), (lack of) premeditation (α = .87), (lack of) perseverance (α = .83), and sensation seeking (α = .85; UPPS; Whiteside & Lynam, 2001; Whiteside, et al., 2005). The UPPS has been shown to demonstrate strong construct validity. Participants are asked to endorse the degree to which they agree with several statements on a 4-point Likert scale, with ratings from *agree strongly* (1) to *disagree strongly* (4). At

baseline, the measure demonstrated comparably strong internal consistency in the current sample for the urgency (α = .88), (lack of) premeditation (α = .90), (lack of) perseverance (α = .89), and sensation seeking (α = .91) subscales. The same was true for data collected at one-month follow-up: urgency (α = .89), (lack of) premeditation (α = .85), (lack of) perseverance (α = .87), and sensation seeking (α = .83) subscales.

2.3.4.2 Risky Behaviors Questionnaire (RBQ)

Participants were asked to complete the Risky Behaviors Questionnaire (RBQ; Weiss et al., 2016) at baseline and one month later. The RBQ is comprised of three 29-item scales assessing the frequency of different risky behaviors, as well as their use in response to positive and negative emotion. All questions are rated on a 5-point Likert scale ranging from *almost never (0-10%)* (1) to *almost always (91 – 100%)* (5). The RBQ has demonstrated strong internal consistency on its negative (α = .91) and positive (α = .92) scales, with relatively low internal consistency on its frequency scale (α = .52). Internal consistency was adequate on the frequency (α = .77), negative (α = .80), and positive scales (α = .79) for the current sample. At follow-up, the frequency scale items were instead rated as either "yes" or "no." The negative and positive scales were not administered at this time point. At follow-up, the frequency scale demonstrated strong internal consistency (α = .82).

2.3.4.3 Measures of Self-Injurious and Suicidal Behaviors

Several measures were administered to assess the presence and characteristics of self-injurious and suicidal behaviors, for use in characterizing the sample. The Deliberate Self-Harm Inventory (DSHI; strong internal consistency α = .83 and adequate validity, Gratz, 2001), gathers information on the presence, frequency, and timing of various self-injurious behaviors. The DSHI demonstrated strong internal consistency in the present sample at baseline (α = .81), but

was relatively low at one month (α = .45). The Suicidal Behaviors Questionnaire revised was administered as a brief four-item history of suicidal thoughts and behaviors (SBQ-r; strong internal consistency α = .97 and acceptable discriminant validity, Osman et al., 2001). Internal consistency on the SBQ-r was lower in the current sample (α = .88), but still within acceptable limits. Furthermore, participants were asked to complete a measure of Acquired Capability for Suicide scale (ACSS; Van Orden, Witte, Gordon, Bender, & Joiner, 2008), rating the degree to which twenty different statements applied to them on a 5-point Likert scale, from *not at all like me* (0) to *very much like me* (4). The ACSS has demonstrated strong internal consistency (α = .81-.88), adequate convergent and divergent validity (Ribeiro et al., 2014). Internal consistency was relatively low for the ACSS in the current sample (α = .57).

2.3.4.4 Measures of Substance Use

Participants were also asked to self-report on their substance and alcohol consumption to further characterize the sample. The AUDIT (alcohol use disorders identification test; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) asked participants to respond to ten multiple-choice questions related to the frequency, consequences and timing of their alcohol use. The AUDIT has demonstrated moderate to high internal consistency (α = .59-.76; Ivis, Adlaf, & Rehm, 2000) and adequate validity (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). The measure exhibited high internal consistency in the current study (α = .82). The DUDIT (Drug Use Disorders Identification Test; Berman, Bergman, Palmstierna, & Schlyter, 2005) consists of 11 multiple-choice questions related to the frequency, consequences, and timing of substance use. The DUDIT has demonstrated high internal consistency (α = .80) and acceptable levels of sensitivity (90%) and specificity (78%; Berman, Bergman, Palmstierna, & Schlyter, 2005). The DUDIT also demonstrated high internal consistency in the current study. (α = .93).

2.3.5 Behavioral Measures of Impulsivity

Participants were asked to complete a number of behavioral tasks measuring impulsivity as part of both the baseline and the laboratory procedures.

2.3.5.1 Paced Auditory Serial Addition Task - Computer Version (PASAT-C)

Consistent with previous research, the current study utilized the PASAT-C (Bornovalova et al., 2008; Lejuez, Kahler, & Brown, 2003; Sauer & Baer, 2012) as a measure of urgency (determined by participants' quit time on the final trial; Winward et al., 2014). This task sequentially presented participants with a series of numbers. Participants were told to add the two most recent numbers to appear on screen and to click on the appropriate answer on screen. If the participant successfully clicked the correct answer, they earned a point. If the participant failed to click the correct answer or selected an incorrect answer, an unpleasant sound played. The task consisted of three blocks of trials; participants were allowed a brief break between each block. The latency in number presentation was three seconds for the first block, two seconds on the second block, and one second during the final block. In the final block, participants were told they are allowed to exit the task by clicking an on-screen "quit" button. This task lasted approximately 7-13 minutes depending on when (or if) participants chose to terminate the task. Consistent with previous research, distress tolerance was measured via participant's persistence on the final block of trials (Winward et al., 2014). Participant's total score was displayed to them throughout the trials and was collected to control for skill when assessing participant's level of distress tolerance. Given that the target construct, urgency, was closely related to distress, early termination on the final PASAT-C block was viewed as engaging in a regrettable action (sacrificing points) in response to negative emotion, consistent with the current view of urgency.

2.3.5.2 Delay Discounting Task (DDT)

Previous work has used a delay discounting paradigm to capture premeditation (Barker et al., 2012). This task involved a forced choice between receiving an immediate monetary reward of a variable amount and waiting to receive a large monetary reward after a varied delay. Multiple trials were administered to determine the indifference point, the point at which a participant viewed the immediate reward and the delayed reward as equivalent. Previous research suggests that a lower indifference point is associated with higher impulsivity (Barker et al., 2012). This is consistent with the definition of premeditation, as a lower indifference point would suggest a lack of future-oriented thinking in regards to the consequences (lost rewards) associated with their choice. Outcomes scores on the DDT were calculated by computing the area under the curve (AUC) for a line plotted through the indifference points calculated for each time delay in the task, consistent with past work (Martínez-Loredo et al., 2015). A lower AUC, the result of a steeper slope, indicated greater variability across indifference points, in turn indicating a greater lack of premeditation.

2.3.5.3 Anagram Persistence Task (APT)

The APT (Quinn, Brandon, & Copeland, 1996) has been used in smoking research to demonstrate that smokers, another population known for impulsivity (Mitchell, 1999), exhibit lower levels of perseverance that nonsmokers. In this task participants were asked to solve a list of 8 anagrams. Two of the anagrams (anagrams 1 & 6) were of low difficulty; the remaining six were difficult to solve (e.g., “LXYIK” solves to “KYLIX”). The relative length of the anagrams served to make the task difficult. Participants were given the option to skip the current anagram or quit the task at any time. Participants were given a maximum of 3 minutes on each anagram

before being instructed to skip to the next one. Perseverance was conceptualized as the mean time spent on all unsolved anagrams.

2.3.5.4 Balloon Analogue Risk Task (BART)

The BART (Lejuez et al., 2002) presented the participant with a virtual balloon and balloon pump. Each time the participant pumped the balloon, a small monetary reward was added to a "temporary bank." Each successive pump increased the likelihood the balloon would burst. When the balloon burst, the money accumulated in the "temporary bank" was lost. At any time, the participant could choose to move their earnings from the "temporary bank" to a "permanent bank." Doing so permanently secured the reward from that trial and also reset the balloon, starting a new trial. Lejuez et al. (2002) recommended utilizing the average number of pumps before a balloon burst as the outcome for this measure (i.e. mean adjusted pump count), with a higher mean indicating greater impulsivity or risk taking-behavior. Higher scores on the BART were consistent with sensation seeking in the UPPS model; a greater number of pumps indicated a willingness to continue to engage in behaviors with the potential for a reward, despite negative consequences.

2.4 Data Analytic Plan

All analyses were conducted in SPSS, and alpha (two-tailed) was set at .05. In terms of preliminary analyses, we first characterized the present sample in terms of demographic characteristics and diagnostic status. We then examined whether the distributions of primary variables were approximately normal (e.g., skew -2.0 to 2.0, Curran, West, & Finch, 1996; kurtosis -2.0 to 2.0, Cohen, Cohen, West, & Aiken, 2003). We considered transformations for any variables that exhibited departures from this normal distribution. The means and correlations among primary study variables were calculated to characterize the sample. In terms of covariates,

consistent with Miller & Chapman (2001), we examined associations between demographic characteristics (i.e., age, sex, minority racial/ethnic status) with the dependent variables (i.e., behavioral tasks PASAT-C, DDT, APT, BART, and risky behaviors on the RBQ). Variables with significant associations were included as covariates in relevant analyses.

In terms of primary analyses, to examine differences in behaviorally-assessed impulsivity domains (i.e., PASAT-C, DDT, APT, BART) based on probable BPD status, we examined BPD as an independent variable in a series of linear regressions. Second, to examine the associations between impulsivity domains and risky behaviors at one month, we entered the domains of impulsivity (mean-centered) simultaneously in a multiple regression predicting risky behaviors. Third, to examine the association between BPD features and one-month risky behaviors on the RBQ, we included BPD as an independent variable in a linear regression, examining the total effect of BPD on risky behaviors. Fourth, to examine whether urgency accounted for the association of BPD and risky behaviors at one-month, we entered urgency, premeditation, perseverance, and sensation seeking into the model as mediators. Consistent with guidelines from Preacher and Hayes (2008), mediation was examined by testing the significance of the indirect effect of the independent variable (BPD) on the dependent variable (risky behaviors) through the proposed mediator (urgency), calculated as the product of the effects of BPD on the mediator urgency (*a*) and urgency on risky behaviors (*b*). A bootstrapping approach was used to estimate the indirect effect (*a* x *b*), based on a mean derived from 1000 samples with replacement from a data set (Preacher & Hayes, 2008). Bias corrected 99% confidence intervals (CI) were calculated, with the indirect effect estimate interpreted as significant when the CI did not contain zero.

CHAPTER 3

RESULTS

3.1 Preliminary Analyses

3.1.1 Missing Data

In the present sample, we had several sources of missing data. For instance, although we obtained probable BPD status on the PAI-BOR at baseline, due to procedural issues, the item-level data were missing for a subset of participants (n = 12). In these instances, PAI-BOR data collect at one-month was used. Findings from an independent samples t-test indicate no significant difference between PAI-BOR scores at the two time points ($t(31) = -0.55$, $p = .587$, $d = 0.20$). Additionally, internal consistency was comparable both at baseline ($\alpha = .93$) and follow-up ($\alpha = .94$). Demographic data were missing for one participant. Furthermore, participants were not included in the current sample if they did not complete the one-month follow-up.

3.1.2 Descriptive Data

See Table 3 for descriptive statistics and interrelations of primary study variables. In terms of probable BPD status based on the PAI-BOR, 24.2% of the current sample exhibited high levels of BPD features ($M = 28.67$, $SD = 13.71$, range = 9 – 59), and scores were normally distributed (skew = 0.59, $SE = 0.41$; kurtosis = -0.35, $SE = 0.80$).

Two linear regression were conducted with risky behaviors regressed PAI-BOR scores, to provide descriptive data on risky behaviors at different levels of BPD features. PAI scores were centered at one standard deviation above and below the mean respectively. Both regressions yielded significant relationships between BPD features at baseline and risky behaviors at one month ($p = .027$), such that PAI scores one standard deviation above the mean were associated

with 4.43 risky behaviors at one month. Likewise, PAI scores one standard deviation below the mean were associated with 1.89 risky behaviors at one month

See Table 4 for further descriptive data beyond primary study variables.

3.1.3 Assumption Checking

As described in Table 3, all primary study variables exhibited acceptable skew and kurtosis, with one exception. The PASAT-C variable exhibited some kurtosis (skew = -0.30, *SE* = 0.41, kurtosis = -1.73, *SE* = 0.80). Histograms and Q-Q plots of BPD and behavioral measures of impulsivity (PASAT-C, DDT, APT, BART) revealed adequate linearity and homoscedasticity, with one exception. Of note, initial visual inspection of histograms and Q-Q plot indicated a non-normal distribution of the residuals in the association between the PASAT-C and BPD features. As a result, the PASAT-C variable was logarithmically (base 10) transformed prior to all analyses.

3.2 Primary Analyses

3.2.1 Association Between BPD and Behaviorally-Assessed Impulsivity

Across the series of four linear regressions, no significant associations between BPD and impulsivity domains (a path) were detected. In particular, there was no significant relationship between BPD features and urgency on the PASAT-C (β = -.01, $F(1,31) = 0.30$, b = -0.004, SE = 0.008, p = .591) Likewise, there was no significant relationship between BPD features and lack of premeditation on the DDT (β = .04, $F(1,31) = 0.05$, b = 0.04 , SE = 0.19, p = .821). In addition, there was no significant relationship between BPD features and lack of perseverance on the APT (β = -.06, $F(1,31) = 0.11$, b =-0.17 , SE = 0.49, p = .741). Similarly, there was no significant relationship between BPD features and sensation seeking on the BART (β = .08, $F(1,31) = 0.19$, b = 0.74, SE = 0.17, p = .665).

3.2.2 Association Between Impulsivity and Risky Behaviors

The multiple regression model with the four behavioral measures of impulsivity simultaneously entered as predictors of risky behaviors at one month (b path) was significant, accounting for 32.1% of the variability (β = .38, $F(4,28) = 3.31$, $p = .024$). Of note, consistent with our expectations, only one measure of impulsivity was significant in this model: urgency (β = -.55, $b = -3.08$, $SE = 0.92$, $p = .002$; see Table 5).

3.2.3 Association Between BPD and Risky Behaviors

In a linear regression, the total effect model with BPD as a predictor of one-month risky behaviors (c path) was significant (β = .38, $F(1,31) = 5.36$, $b = 0.09$, $SE = 0.04$, $p = .028$). In particular, BPD significantly predicted risky behaviors at one month, such that at a one unit change in BPD features was associated with a 0.09 unit change in risky behaviors ($p = .028$).

3.2.4 Impulsivity as a Mediator of the BPD-Risky Behavior Association

The presence of a significant association of BPD and risky behaviors permitted an investigation of whether impulsivity domains mediated this association. Therefore, we entered urgency, premeditation, perseverance, and sensation seeking into the model. With BPD and behavioral impulsivity variables in the multiple regression model predicting risky behaviors, there remained a significant association of BPD and risky behaviors. Namely, in this direct effects model (c' path), BPD was a significant predictor of frequency of risky behaviors *(*b = 0.08, $SE = 0.04$, p =.049). In contrast, the impulsivity domains were not associated with risky behaviors, and the confidence intervals contained zero (a x b path; see Table 6). These data suggest that none of the four behavioral impulsivity constructs mediated the association of BPD and risky behaviors at one-month follow-up.

3.3 Secondary Analyses

While the current study was not a treatment study, secondary analyses were conducted, controlling for risky behaviors at baseline. When controlling for baseline risky behaviors, neither the direct effects model (c' path; b = 0.02, SE = 0.03, p =.467), nor the a x b path (PASAT-C, b = -0.003, SE = 0.009, 99% CI = -0.04 – 0.02; DDT, b = -0.001, SE = 0.008, 99% CI = -0.03 – 0.02; APT, b = -0.001, SE = 0.007, 99% CI = -0.01 – 0.06; BART, b = 0.00, SE = 0.01, 99% CI = -0.04 – 0.03) predicted risky behaviors at follow-up.

In light of null findings for the current study, a post-hoc power analysis was conducted. Multiple regression analyses were conducted to examine the role of the four domains of impulsivity in predicting risky behaviors traits. These analyses were conducted with 33 participants, with power (1- β = .97) adequate to detected a large effect (f^2 = .47). For the multiple regression conducted to test the mediation, the same four predictors were entered into the equation and had the same power to detect a large effect.

CHAPTER 4

DISCUSSION

The overarching aim of this study was to further elucidate the relationship between BPD and risky behaviors by identifying specific domains of impulsivity that may underlie this association. As such, this study aimed to extend existing research in several ways. First, this study sought to clarify the limited and mixed nature of extant BPD-impulsivity research by using behavioral measures of impulsivity. This study expanded upon previous findings by utilizing behavioral measures of several different domains of impulsivity (i.e., urgency, lack of premeditation, lack of perseverance, and sensation seeking). We hypothesized that BPD would be associated with elevated impulsivity across these domains. Finally, the current study investigated whether impulsivity prospectively predicted real world risky behaviors, and whether impulsivity might account for the hypothesized link between BPD and risky behaviors. The data provided only partial support for these hypotheses.

As expected, BPD was associated with risky behaviors. Consistent with other research (Chapman et al., 2005, Cowdry et al., 1985, Lavan & Johnson, 2002, McGlashan et al. 2000; Oumaya et al., 2008, Sansone & Sansone, 2011b; Zanarini et al., 2010; Zimmerman & Mattia, 1999b), individuals with higher levels of BPD features demonstrated a greater number of risky behaviors one month later. These behaviors included alcohol misuse, use of prescription medication, and illicit substance abuse, as well as unsafe sexual behavior, driving under the influence, physical altercations, and self-injury.

Although BPD demonstrated a link with risky behaviors, BPD was not associated with elevations on the behaviorally-assessed impulsivity domains. Such findings are inconsistent with previous research comparing individuals with BPD and healthy controls on self-report measures

of impulsivity (Cackowski et al., 2014; Coffey et al., 2011; Jacob et al., 2010; Lawrence et al., 2010; Mortensen, Rasmussen, & Haberg, 2010). Although previous findings are not in line with results from the present study, current evidence suggests that behavioral and self-report measures purporting to assess the same construct may not actually be doing so (Cyders & Coskunpinar, 2011). This suggests that comparison with previous behavioral findings is more appropriate; however, the current study's findings are also inconsistent with previous research utilizing similar behavioral measures.

In order to make sense of these discrepant findings, it is worth discussion of how the behavioral assessment of impulsivity in the present study differs from other methods. For instance, the present study assessed urgency through the use of the PASAT-C task (Lejuez et al., 2003). Although the PASAT-C has been used in other studies, in many cases the task has been implemented with differing latencies across trials, number of total blocks, and time limits on the final block (Bornovalova et al., 2008, Gratz et al., 2006). Of most interest to the current study is the discrepancy in latency in the presentation of numbers. Specifically, the current study had three-, two-, and one-second latencies across the three blocks, respectively. One other study utilized these same latencies across four blocks, with the third and fourth blocks both displaying numbers at one-second intervals (Gratz et al., 2006). A different version of the PASAT-C started with a latency of five second on the first block, with the second block using the average response time from the first block (Bornovalova et al., 2008). The two remaining blocks used half of the average response time for the first block. It is possible that in both of these four-block versions of the task the additional block of low-latency trials could have lead participants in these the studies to experience a greater amount of distress or fatigue with the task, before starting the final block.

This increased level of distress could in turn leading to earlier quit times in those with functional impairment in their ability to inhibit behavior in response to distress.

Although the absence of an association between BPD and PASAT-C as seen in the present study diverged from some extant work, they are not without support in the literature. For instance, one such study utilized behavioral measures to investigate the relationship between BPD and urgency (Iverson et al., 2012). In particular, this study used the PASAT-C to assess urgency in a treatment-seeking college-aged sample with threshold or subthreshold BPD symptoms, and found no relationship between quit time on the PASAT-C and BPD symptoms. The sample was characteristically similar to both the current study and past studies that found group differences using the PASAT-C. However, researchers included individuals with subthreshold symptomatology (3 or more symptoms; SCID-II) in the clinical group, potentially lessening clinical severity to the point of reducing urgency within the clinical group. Thus, as in the present study, only small or non-detectable effects may be found with subthreshold BPD. These findings suggest that further exploration of the research questions in the current study, recruiting from populations with greater psychopathology may bring further clarity to the currently mixed literature.

Likewise, the nonclinical nature of the present sample may have influenced findings related to the delay discounting task. A version of the delay discounting task (DDT; Barker et al., 2012) was used in the current study as a behavioral measure of premeditation. Although previous research has found significant differences between clinical and non-clinical groups using this same task (Barker et al., 2014, Coffey et al., 2011; Lawrence et al., 2011), these studies largely recruited patients from treatment settings (outpatient, Barker et al., 2014; inpatient, Coffey et al., 2011; early intervention program, Lawrence et al., 2011), and often used a diagnostic tool to

assess BPD (Barker et al., 2014, Coffey et al., 2011), in contrast to the current study, which recruited participants from university and community settings. Thus, the absence of significant group differences may stem from the less severe nature of the present sample. Also of note, the absence of findings may be influenced by the relatively small incentives used in the current version of the DDT. Several studies used notably larger ranges of monetary values (i.e. $1 - 1000; Coffey et al., 2011; Lawrence et al., 2011) compared to the current study ($1 – 10). As a result, other studies have a greater potential for loss due to impulsive responding on the task. Therefore, these versions of the task may have captured greater variability in premeditation, allowing them to detect an association.

As previously discussed, behavioral data measuring perseverance is limited in the current literature. The use of the anagram persistence task may have altered findings of perseverance associated with BPD features, in part because this task is less distressing than many others that measure a similar construct. For instance, the limited research in this area has used tasks such as the Computerized Mirror-tracing Persistence Task (MTPT-C; Bornovalova et al., 2008), in which participants are asked to move a dot along the outline of a star. The participant does so using a mouse programmed to move the dot in the opposite direction the mouse is moved. Moving the dot off of the line or keeping it still for more than two second resulted in an error tone and the dot resetting to its original position. The MTPT-C was used to measure distress tolerance, a construct conceptually linked to perseverance (Whiteside et al., 2005), by looking at participant's time to quit the task. Consistent with the current study's operationalization of perseverance, the MTPT-C requires participants to engage in goal-directed action despite difficulty or boredom. However, similar to the PASAT-C, the error tone is in the MTPT-C is designed to evoke negative emotions. While the anagram persistence task used by the current

study also requires goal-direct activity despite a boring and difficult task, it is not designed to evoke negative emotion in the same manner. The task used in the current study may be targeting a different construct than the MTPT-C. Given the similarities between the PASAT- C and the MTPT-C, in terms of quit time as an outcome measure and use of an error tone to elicit distress, the MTPT-C may measure urgency in addition to perseverance. This is supported by findings on both the MTPT-C and the PASAT-C, which indicated significantly lower quit times in the BPD group compare to healthy controls (Bornovalova et al., 2008). Further research is needed to investigate whether the anagram persistence task is an appropriate measure of perseverance, and such future studies should utilize a wider range of self-report and behavioral measures to assess for convergent and divergent validity of this task with its target construct.

The choice of the BART (Lejuez et al., 2002) as a measure of sensation seeking may also influence the absence of an association between BPD and performance on this task. In the present study, sensation seeking was assessed as the number of pumps on balloons that did not explode. Despite the strong theoretical rationale for using this task, including its established associations with relevant constructs such as risk-taking (Lejuez et al., 2002; Fernie et al., 2010), it is has not historically been viewed as an index of sensation seeking. While the present study conceptualized sensation seeking as the pursuit of novel or thrilling activity despite clear risks (Whiteside & Lynam, 2001), research developing the BART identifies its target construct to be broader than sensation seeking (Lejuez et al., 2002). Both theory and empirical evidence from this work suggests that the BART measures risk-taking, a construct touching on venturesomeness, impulsivity, and behavioral inhibition, in addition to sensation seeking. As such, the use of the BART in the current task may unintentionally introduce variability unrelated to sensation seeking into the analyses. Studies looking to behaviorally measure sensation seeking

have utilized a number of different behavioral measures to assess the construct (including tasks that assess willingness to take on risk to seek reward, such as the Iowa Gambling Task, Haaland & Landrø, 2007; Game of Dice Task; Svaldi et al., 2012). Some studies using other behavioral measures of sensation seeking also did not yield significant associations with psychopathology (Cackowski et al., 2014). For instance, a residential psychiatric sample did not yield significant differences from healthy controls using the Iowa Gambling Task. Notably, this study used a very similar version of the this gambling task as a previous study that did obtain significant findings (Haaland & Landrø, 2007). Not only did these findings reveal a difference between BPD individuals and health controls, they also found significantly worse performance on the IGT by individuals with comorbid BPD and substance use disorder, compared to both health controls and BPD-only individuals. Given the established relationship with substance use in those with high levels of sensation seeking (Mahoney et al., 2015) the presence of comorbid diagnoses of these nature could impact measurement of sensation seeking in BPD-populations. Future research should consider how best to address the issues raised by the presence of commonly comorbid disorders with known associations to sensation seeking.

Providing partial support for our hypothesis, behaviorally-measured impulsivity did show some associations with later engagement in risky behaviors. In particular, as predicted, only urgency was strongly associated with risky behaviors in the present study. This is consistent with previous findings suggesting that urgency either uniquely predicts risky behaviors (NSSI, Hamza et al., 2015), or predicts risky behaviors beyond other domains of impulsivity (risky sexual behaviors, Deckman & DeWall, 2011; NSSI, Glenn & Klonksy, 2010). Even in studies where multiple domains of impulsivity are implicated in relation to risky behaviors, urgency maintains a strong association (alcohol-related problems, Magid & Colder, 2007). Furthermore, this unique

association between urgency and risky behaviors is consistent with theory that risky behaviors serve an emotion regulation function for individuals with different forms of psychopathology (Linehan, 1993; Tice, Bratslavsky, & Baumeister, 2001; Weiss et al., 2012).

Additionally, post-hoc power analyses suggest that while the current study achieved adequate power to detect a large effect, with the current sample size, there is insufficient power to detect moderate-to-small effects. Future studies looking to achieve power to detect these smaller effects should consider the relatively large amount of noise in behavioral data. As previously discussed, behavioral measures in the current study may be tapping more than one construct of impulsivity, and variance in outcome scores on these measures might be explained by a variety of additional constructs. This notion is further supported by the high level of variability seen in scores all four behavioral tasks (see Table 3). Given that the PASAT-C alone was associated with risky behaviors, it may simply be that this task yields larger effect sizes and more directly accounts for its target construct. As previously discussed, the BART may touch on a variety on constructs related to sensation-seeking. Further, many of these tasks, particularly the DDT, may be heavily influenced by participants' cognitive abilities, such as their working memory (Bickel, Yi, Landes, Hill & Baxter, 2011). Finally, the current version of the Anagram Persistence Task was developed for use in the current study, due to the lack of availability of the full set of stimuli for past versions. Future work on this version should look to identify relationships with potentially related constructs that may confound findings.

The mixed nature of existing literature, in combination with the relatively weak associations between behavioral impulsivity and both BPD and risky behavior in the present study, suggest that behavioral impulsivity alone may not fully explain why individuals with BPD engage in risky, and potentially self-damaging behaviors. As previously mentioned, BPD is a

heterogeneous disorder that is characterized by several domains of difficulties beyond impulsivity (American Psychiatric Association, 2013). For instance, emotion dysregulation is often posited to underlie many areas of difficulty in BPD (Linehan, 1993). Research shows that emotion dysregulation may give rise to a variety of the other recognized features of BPD, including inappropriate anger (Mancke, Herpertz, Kleindienst, & Bertsch, 2017; Scott, Stepp, & Pilkonis, 2014) difficulties with interpersonal functioning (Herr, Rosenthal, Gieger, & Erikson, 2012), self-injury (Houben et al., 2017), and identity disturbance (Neacsiu, Herr, Fang, & Rodriguez, & Rosenthal, 2015). Given these well documented associations, emotion dysregulation may have some bearing on future work looking to clarify the literature on BPD and impulsivity. For instance, more recent literature on urgency has suggested that emotion-related behavioral impulsivity may differ based on the valence of the emotion (Lynam, Smith, Whiteside, & Cyders, 2006). As such, future research may benefit from investigating urgency as two separate constructs – negative and positive urgency – to capture impulsive behavior in response to both strong negative and positive emotions.

Interpersonal difficulties are another characteristic of BPD that may affect risky behaviors (American Psychiatric Association, 2013). This symptom cluster is not only characterized by fears of abandonment by peers, but also frantic behavioral efforts to prevent it from occurring (American Psychiatric Association, 2013). Given previous theory and research suggesting a regulatory function for risky behaviors (Linehan, 1993; Tice et al., 2001), individuals with BPD may engage in these behaviors to regulate emotions after a stressful social interaction, or to express emotional pain to another person (Klonsky, 2011). As such, it may be that urgency in response to interpersonal stressors may uniquely explain the relationship between BPD and risky behaviors.

Several limitations of the present study warrant mention. First, although the use of a one-month follow-up represents an improvement in identifying the predictive power of impulsivity, it remains a relatively brief time period. In addition, our sample exhibited relatively low rates of relevant risky behaviors, requiring us to aggregate across diverse risky behaviors. Although there is some support for combining these behaviors in the literature (Weiss et al., 2016), future studies will be needed to examine whether different aspects of impulsivity are unique predictors of specific forms of risky behaviors. Also, given the comprehensive nature of the present investigation, we conducted a large number of analyses, increasing the possibility of detecting significant effects that may not exist. Our sample size suggests that applying an overall Bonferonni-correction would have unacceptably reduced power to detect the expected effects. As a result, all of the effects detected need to be replicated to ensure they are not spurious. The relatively small sample size in the current study also resulted in limited power to detect findings with a more modest effect size. Finally, there is some research to suggest that impulsivity in individuals with BPD may depend on the emotional context of a situation (Chapman, Dixon-Gordon, Layden, & Walters, 2010). Further research should aim to expand on findings from the current study to examine the potential impact different emotional states may have on the influence of impulsivity on risky behaviors.

Despite these limitations, the current study contributes meaningfully to the literature on factors affecting risky behaviors among individuals with BPD. Findings underscore the relevance of the urgency domain as specific predictor of risky behavior. In conjunction with the empirically-supported link between emotion dysregulation and urgency, results from this study also provide useful information for future treatment development research. Specifically,

interventions targeting urgency explicitly may help to reduce engagement in health-compromising, risky behaviors, in populations known for high levels of emotion dysregulation.

Table 1. Demographic and Diagnostic Characteristics

	Low BPD (*n* = 25) M (SD) or *N* (%)	High BPD (*n* = 8) M (SD) or *N* (%)
Demographics		
Age	21.67 (4.05)	21.50 (1.69)
Sex	--	--
Female	19 (76.00%)	8 (100.00%)
Male	6 (24.00%)	0 (0.00%)
Intersex	0 (0.00%)	0 (0.00%)
Race/ethnicity	--	--
White	13 (52.00%)	3 (37.50%)
Black	1 (4.00%)	1 (12.50%)
Asian/Southeast Asian	8 (32.00%)	1 (12.50%)
Latinx	0 (0.00%)	0 (0.00%)
Indigenous	0 (0.00%)	0 (0.00%)
More than one	2 (8.00%)	2 (25.00%)
Another category	0 (0.00%)	1 (12.50%)
Education	--	--
High school	1 (4.00%)	0 (0.00%)
Some college	16 (64.00%)	0 (0.00%)
College degree	2 (8.00%)	6 (75.00%)
Some graduate school	4 (16.00%)	1 (12.50%)
Graduate degree	1 (4.00%)	1 (12.50%)
Diagnoses		
Major Depressive Disorder	3 (12.00%)	3 (37.50%)
Panic Disorder	4 (16.00%)	3 (37.50%)
Agoraphobia	0 (0.00%)	0 (0.00%)
Social Phobia	1 (4.00%)	2 (25.00%)
Generalized Anxiety	2 (8.00%)	3 (37.50%)
PTSD	0 (0.00%)	1 (12.5%)
BPD	0 (0.00%)	1 (12.5%)
BPD criteria (#)	0.32 (0.69)	1.50 (2.83)

Table 2. Measures Administered at Study Sessions

	Study Sessions			
Measures	Prescreen	Baseline	Laboratory	One month follow-up
Demographics				
Study specific Demographic items		✓		
Sexual Orientation "Outness" items		✓		
Diagnostic data				
PAI-BOR[a]	✓	✓*		
DASS-21		✓		✓
MINI 7.02		✓		
SCID-II, BPD portion		✓		
Self-report Impulsivity				
UPPS		✓		✓
Behavioral Impulsivity				
PASAT-C			✓	
Delay Discounting task			✓	
Anagram Persistence task			✓	
BART			✓	
Risky Behaviors				
DSHI		✓		✓
QNSSI		✓		
ACSS		✓		
SBQ-r		✓		
AUDIT		✓		
DUDIT		✓		
RBQ		✓		✓
Risk assessment				
UWRAP		✓	✓	

Note. [a]The PAI-BOR is only administered at baseline if the participant has not completed the prescreen questionnaire or phone screen

Table 3. Interrelations of Primary Study Variables in Full Sample (N = 33)

	1.	2.	3.	4.	5.	6.
1. PAI-BOR	--					
2. PASAT-C[a]	-.10	--				
3. DDT	.04	.06	--			
4. APT	-.06	-.17	.15	--		
5. BART	.08	.23	-.10	-.16	--	
6. T1 RBQ	.38*	.46**	.04	-.22	.06	--
M (*SD*)	28.67 (13.71)	333.58 (232.74)	26.79 (14.31)	68.41 (37.72)	31.16 (12.92)	3.15 (3.32)
Range	9.00-59.00	7.00 – 540.00	0.67 - 49.13	0.00 – 154.63	3.73 – 59.09	0.00 – 11.00
Skew (*SE*)	0.59 (0.41)	-1.01 (0.41)	-0.11 (0.41)	0.30 (0.41)	0.25 (0.41)	0.71 (0.41)
Kurtosis (*SE*)	-0.35 (0.80)	-0.40 (0.80)	-1.02 (0.80)	0.30 (0.80)	-0.30 (0.80)	-0.70 (0.80)

Note. * $p<.05$; ** $p<.01$; PASAT-C = Paced Auditory Serial Addition Task – Computer Version, DDT = Delay Discounting Task, APT = Anagram Persistence Task, BART = Balloon Analogue Risk Task, RBQ = Risky Behavior Questionnaire at 1-month follow-up

[a]The PASAT-C was log(10) transformed for all analyses but mean, SD, and range are presented for the raw variable.

Table 4. Descriptive Statistics for Self-Report Measures

	Baseline		Follow-up	
	M (*SD*)	Range	*M* (*SD*)	Range
ACSS	1.52 (0.51)	0.00 – 2.20	--	--
AUDIT	0.44 (0.43)	0.00 – 1.60	--	--
DASS-21	12.29 (9.11)	2.00 – 43.00	15.91 (11.45)	0.00 – 44.00
Depression	3.65 (2.74)	0.00 – 11.00	5.39 (4.66)	0.00 – 18.00
Anxiety	3.16 (3.30)	0.00 – 14.00	4.15 (3.92)	0.00 – 14.00
Stress	5.48 (4.46)	0.00 – 21.00	6.36 (5.53)	0.00 – 21.00
DSHI (*n* = 8)	--	--	--	--
Types	0.82 (1.81)	0.00 – 7.00	0.15 (0.51)	0.00 – 2.00
Frequency[a]	169.63 (350.63)	0.00 – 1000.00	6.00 (6.93)	2.00 – 14.00
Medical attention[a] (1=yes)	1.13 (1.13)	0.00 – 3.00	0.00 (0.00)	0.00 – 0.00
DUDIT	3.29 (5.84)	0.00 – 24.00	--	--
RBQ	--	--	--	--
Frequency	35.19 (5.27)	29.00 – 51.00	3.15 (3.32)	0.00 – 11.00
Positive	32.39 (4.32)	29.00 – 43.00	--	--
Negative	34.52 (5.71)	29.00 – 51.00	--	--
SBQ-r	2.29 (3.58)	0.00 – 12.00	--	--
Past attempts	0.87 (1.31)	0.00 – 5.00	--	--
Frequency	0.48 (0.93)	0.00 – 4.00	--	--
Threat	0.45 (1.03)	0.00 – 4.00	--	--
Likelihood	0.48 (0.85)	0.00 – 2.00	--	--
UPPS	--	--	--	--
Urgency	2.38 (0.66)	1.25 – 3.67	2.34 (0.63)	1.00 – 3.75
(Lack of) Premeditation	1.98 (0.54)	1.09 – 3.18	1.97 (0.45)	1.09 - 3.00
(Lack of) Perseverance	2.13 (0.64)	1.30 – 3.50	2.20 (0.59)	1.40 – 3.80
Sensation seeking	2.88 (0.64)	1.42 – 4.00	2.85 (0.56)	1.67 – 3.83

Note. [a]These subscales are computed from the subsample of participants who reported engaging in NSSI (baseline, *n* = 8; follow-up, *n* = 3). All other analyses used the full sample (*N* = 33).

Table 5. Multiple Regression Analyses for Behavioral Impulsivity Variables Predicting Risky Behaviors at One Month

	b	*SE*	*β*
PASAT-C[a]	-3.08	0.92	-0.55**
DDT	0.01	0.04	0.05
APT	-0.02	0.01	-0.30
BART	0.04	0.04	0.15
R^2		0.32	
F (df1, df2)		3.31 (4, 28)*	

Note. * $p<.05$; ** $p<.01$; PASAT-C = Paced Auditory Serial Addition Task – Computer Version, DDT = Delay Discounting Task, APT = Anagram Persistence Task, BART = Balloon Analogue Risk Task

[a] The PASAT-C was log(10) transformed for all analyses.

Table 6. Mediation Effects of Behavioral Impulsivity on the Relationship between BPD and Risky Behaviors at One Month

			99% Bias-Correct CI	
	b	*SE*	Lower	Upper
Total	0.09	0.04	-0.02	0.20
Direct	0.08	0.04	-0.03	0.18
Indirect (PASAT-C)	0.01	0.02	-0.03	0.10
Indirect (DDT)	0.0003	0.008	-0.03	0.04
Indirect (APT)	0.004	0.01	-0.02	0.06
Indirect (BART)	0.002	0.01	-0.02	0.07

Note. * $p<.05$; ** $p<.01$; PASAT-C = Paced Auditory Serial Addition Task – Computer Version, DDT = Delay Discounting Task, APT = Anagram Persistence Task, BART = Balloon Analogue Risk Task

[a]The PASAT-C was log(10) transformed for all analyses.

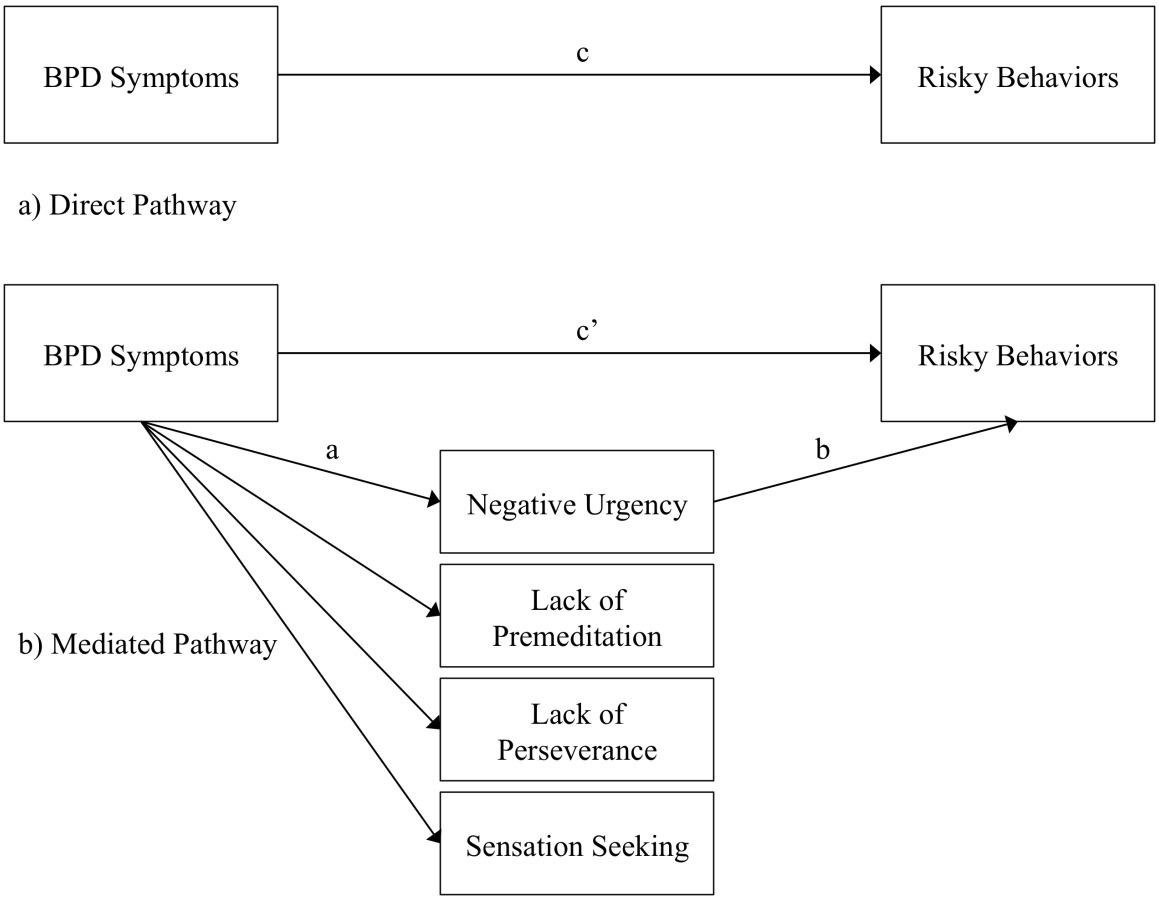

Figure 1. Path diagrams for a) the direct effect of BPD symptoms on risky behaviors and b) the indirect effect of BPD symptoms on risky behaviors through negative urgency.

BIBLIOGRAPHY

Albers, A. B., Siegel, M., Ramirez, R. L., Ross, C., DeJong, W., & Jernigan, D. H. (2015). Flavored alcoholic beverage use, risky drinking behaviors, and adverse outcomes among underage drinkers: Results from the ABRAND study. *American Journal of Public Health*, *105*(4), 810–815. http://doi.org/10.2105/AJPH.2014.302349

Aldao, A., & Dixon-Gordon, K. L. (2014). Broadening the scope of research on emotion regulation strategies and psychopathology. *Cognitive Behaviour Therapy*, *43*(1), 22–33. http://doi.org/10.1080/16506073.2013.816769

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Amstadter, A. B., Daughters, S. B., MacPherson, L., Reynolds, E. K., Danielson, C. K., Wang, F., … Lejuez, C. W. (2012). Genetic associations with performance on a behavioral measure of distress intolerance. *Journal of Psychiatric Research*, *46*(8), 87–94. http://doi.org/10.1016/j.jpsychires.2011.09.017

Andover, M. S., & Morris, B. W. (2014). Expanding and clarifying the role of emotion regulation in nonsuicidal self-injury. *The Canadian Journal of Psychiatry*, *59*(11), 569–575.

Ansell, E. B., Sanislow, C. A., McGlashan, T. H., & Grilo, C. M. (2007). Psychosocial impairment and treatment utilization by patients with borderline personality disorder, other personality disorders, mood and anxiety disorders, and a healthy comparison group. *Comprehensive Psychiatry*, *48*(4), 329–336. http://doi.org/10.1016/j.comppsych.2007.02.001

Blaszczynski, A., & Steel, Z. (1998). Personality disorders among pathological gamblers. *Journal of Gambling Studies*, *14*(1), 51–71. http://doi.org/12766434

Babor, T. F., Higgins-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). Audit: The alcohol use disorder identification test. Guidelines for use in primary care. *World Health Organization*.

Barker, V., Romaniuk, L., Cardinal, R. N., Pope, M., Nicol, K., & Hall, J. (2014). Impulsivity in borderline personality disorder. *Biological and Neurobehavioral Studies of Borderline Personality Disorder*, 1–22. http://doi.org/10.1017/S0033291714003079

Bechara, A., Damasio, A. R., Damasio, H., & Anderson, S. W. (1994). Insensitivity to future consequences following damage to human prefrontal cortex. *Cognition*, *50*(1-3), 7–15. http://doi.org/ 10.1016/0010-0277(94)90018-3

Berman, A. H., Bergman, H., Palmstierna, T., & Schlyter, F. (2005). Evaluation of the Drug Use Disorders Identification Test (DUDIT) in criminal justice and detoxification settings and in a Swedish population sample. *European Addiction Research*, *11*(1), 22–31. http://doi.org/10.1159/000081413

Bickel, W. K., Yi, R., Landes, R. D., Hill, P. F., & Baxter, C. (2012). Discounting among stimulant addicts. *Biological Psychiatry*, *69*(3), 260–265. http://doi.org/10.1016/j.biopsych.2010.08.017.Remember

Birthrong, A., & Latzman, R. D. (2014). Aspects of impulsivity are differentially associated with risky sexual behaviors. *Personality and Individual Differences*, *57*, 8–13. http://doi.org/10.1016/j.paid.2013.09.009

Bornovalova, M. A, Gratz, K. L., Daughters, S. B., Nick, B., Delany-Brumsey, A., Lynch, T. R., … Lejuez, C. W. (2008). A multimodal assessment of the relationship between emotion dysregulation and borderline personality disorder among inner-city substance users in residential treatment. *Journal of Psychiatric Research*, *42*, 717–726.

Cackowski, S., Reitz, A.-C., Ende, G., Kleindienst, N., Bohus, M., Schmahl, C., & Krause-Utz, A. (2014). Impact of stress on different components of impulsivity in borderline personality disorder. *Psychological Medicine*, *44*, 3329–3340. http://doi.org/10.1017/S0033291714000427

Chapman, A. L., Dixon-Gordon, K. L., Layden, B. K., & Walters, K. N. (2010). Borderline personality features moderate the effect of a fear induction on impulsivity. *Personality Disorders: Theory, Research, and Treatment*, *1*(3), 139–152. http://doi.org/10.1037/a0019226

Chapman, A. L., Specht, M. W., & Cellucci, T. (2005). Borderline personality disorder and deliberate self-harm: does experiential avoidance play a role? *Suicide & Life-Threatening Behavior*, *35*(4), 388–399. http://doi.org/10.1521/suli.2005.35.4.388

Charnigo, R., Noar, S. M., Garnett, C., Crosby, R., Palmgreen, P., & Zimmerman, R. S. (2013). Sensation seeking and impulsivity: Combined associations with risky sexual behavior in a large sample of young adults. *Journal of Sex Research*, *50*(5), 480–488. http://doi.org/10.1080/00224499.2011.652264

Coffey, S. F., Schumacher, J. A., Baschnagel, J. S., Hawk, L. W., & Holloman, G. (2011). Impulsivity and risk-taking in borderline personality disorder with and without substance use disorders. *Personality Disorders: Theory, Research, and Treatment*, *2*(2), 128–141. http://doi.org/10.1037/a0020574

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Erlbaum.

Collado, A., Felton, J. W., MacPherson, L., & Lejuez, C. W. (2014). Longitudinal trajectories of sensation seeking, risk taking propensity, and impulsivity across early to middle adolescence. *Addictive Behaviors*, *39*(11), 1580–1588. http://doi.org/10.1016/j.addbeh.2014.01.024

Connor, J., Psutka, R., Cousins, K., Gray, A., & Kypri, K. (2013). Risky drinking, risky sex: a national study of New Zealand university students. *Alcoholism, Clinical and Experimental Research*, *37*(11), 1971–8. http://doi.org/10.1111/acer.12175

Coskunpinar, A., Dir, A. L., & Cyders, M. A. (2013). Multidimensionality in impulsivity and alcohol use: A meta-analysis using the UPPS model of impulsivity. *Alcoholism: Clinical and Experimental Research*, *37*(9), 1441–1450. http://doi.org/10.1111/acer.12131

Cowdry, R. W., Pickar, D., & Davies, R. (1985). Symptoms and EEG findings in the borderline syndrome. *International Journal of Psychiatry in Medicine*, *15*(3), 201–211. http://doi.org/10.2190/3Y0C-HAUK-04JX-GBPN

Curran, M. F., Fuertes, J. N., Alfonso, V. C., & Hennessy, J. J. (2010). The association of sensation seeking and impulsivity to driving while under the influence of alcohol. *Journal of Addictions and Offender Counseling*, *30*(April), 84–98.

Curran, P. J., West, S. G., & Finch, J. F. (1996). The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological Methods*, *1*(1), 16–29. http://doi.org/10.1037/1082-989X.1.1.16

Cyders, M. A., & Coskunpinar, A. (2011). Measurement of constructs using self-report and behavioral lab tasks: Is there overlap in nomothetic span and construct representation for impulsivity? *Clinical Psychology Review*, *31*(6), 965–982. http://doi.org/10.1016/j.cpr.2011.06.001

Cyders, M. A., & Coskunpinar, A. (2012). The relationship between self-report and lab task conceptualizations of impulsivity. *Journal of Research in Personality*, *46*(1), 121–124. http://doi.org/10.1016/j.jrp.2011.11.005

Deckman, T., & Nathan DeWall, C. (2011). Negative urgency and risky sexual behaviors: A clarification of the relationship between impulsivity and risky sexual behavior. *Personality and Individual Differences*, *51*(5), 674–678. http://doi.org/10.1016/j.paid.2011.06.004

Derefinko, K. J., Peters, J. R., Eisenlohr-Moul, T. A., Walsh, E. C., Adams, Z. W., & Lynam, D. R. (2014). Relations between trait impulsivity, behavioral impulsivity, physiological arousal, and risky sexual behavior among young men. *Archives of Sexual Behavior*, *43*(6), 1149–1158. http://doi.org/10.1007/s10508-014-0327-x

Dir, A. L., Coskunpinar, A., & Cyders, M. A. (2014). A meta-analytic review of the relationship between adolescent risky sexual behavior and impulsivity across gender, age, and race. *Clinical Psychology Review*, *34*(7), 551–562. http://doi.org/10.1016/j.cpr.2014.08.004

Echeburua, E., & Fernandez-Montalvo, J. (2008). Are there more personality disorders in treatment-seeking pathological gamblers than in other kin of patients? A comparative study between the IPDE and the MCMI. *International Journal of Clinical and Health Psychology*, *8*(1), 53–64. Retrieved from: http://www.aepc.es/ijchp/articulos_pdf/ijchp-263.pdf

Evenden, J. (1999a). Impulsivity: a discussion of clinical and experimental findings. *Journal of Psychopharmacology*, *13*(2), 180–192. http://doi.org/10.1177/026988119901300211

Evenden, J. L. (1999b). Varieties of impulsivity. *Psychopharmacology*, *146*(4), 348–361. http://doi.org/10.1007/PL00005481

Fernie, G., Cole, J. C., Goudie, A. J., & Field, M. (2010). Risk-taking but not response inhibition or delay discounting predict alcohol consumption in social drinkers. *Drug and Alcohol Dependence*, *112*(1-2), 54–61. http://doi.org/10.1016/j.drugalcdep.2010.05.011

First, M. B., Spitzer, R. L., Gibbon, M., Williams, J. B. W., & Benjamin, L. (1996). Structured Clinical Interview for DSM-IV: Patients Edition (with Psychotic Screen, Version 2.0). *New York: Biometrics Research Department, New York State Psychiatric Institute*.

Gardner, K., & Qualter, P. (2009). Reliability and validity of three screening measures of borderline personality disorder in a nonclinical population. *Personality and Individual Differences*, *46*, 636–641. http://doi.org/10.1016/j.paid.2009.01.005

Glenn, C. R., & Klonsky, E. D. (2010). A multimethod analysis of impulsivity in nonsuicidal self-injury. *Personality Disorders: Theory, Research, and Treatment*, *1*(1), 67–75. http://doi.org/10.1037/a0017427

Grant, B. F., Chou, S. P., Goldstein, R. B., Huang, B., Stinson, F. S., Saha, T. D., … Ruan, W. J. (2008). Prevalence, correlates, disability, and comorbidity of DSM-IV borderline personality disorder: Results from the wave 2 National Epidemiologic Survey on Alcohol and Related Conditions. *The Journal of Clinical Psychiatry, 69*(4), 533–545.

Gratz, K. L. (2001). Measurement of deliberate self-harm: Preliminary data on the Deliberate Self-Harm Inventory. *Journal of Psychopathology and Behavioral Assessment*, *23*(4), 253–263. http://doi.org/10.1023/A:1012779403943

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment*, *26*(1), 41–54. http://doi.org/10.1023/B:JOBA.0000007455.08539.94

Gratz, K. L., Rosenthal, M. Z., Tull, M. T., Lejuez, C. W., & Gunderson, J. G. (2006). An experimental investigation of emotion dysregulation in borderline personality disorder. *Journal of Abnormal Psychology*, *115*(4), 850–855. http://doi.org/10.1037/0021-843X.115.4.850

Haaland, V. Ø., & Landrø, N. I. (2007). Decision making as measured with the Iowa Gambling Task in patients with borderline personality disorder. *Journal of the International Neuropsychological Society*, *13*, 699–703. http://doi.org/10.1017/S1355617707070890

Hair, E. C., Park, M. J., Ling, T. J., & Moore, K. A. (2009). Risky behaviors in late adolescence: Co-occurrence, predictors, and consequences. *Journal of Adolescent Health*, *45*(3), 253–261. http://doi.org/10.1016/j.jadohealth.2009.02.009

Hamza, C. a., Stewart, S. L., & Willoughby, T. (2012). Examining the link between nonsuicidal self-injury and suicidal behavior: A review of the literature and an integrated model. *Clinical Psychology Review*, *32*(6), 482–495. http://doi.org/10.1016/j.cpr.2012.05.003

Hamza, C. A., Willoughby, T., & Heffer, T. (2015). Impulsivity and nonsuicidal self-injury: A review and meta-analysis. *Clinical Psychology Review*, *38*, 13–24. http://doi.org/10.1016/j.cpr.2015.02.010

Hanson, K. L., Thayer, R. E., & Tapert, S. F. (2014). Adolescent marijuana users have elevated risk-taking on the balloon analog risk task. *Journal of Psychopharmacology*, *28*(11), 1080–1087. http://doi.org/http://dx.doi.org/10.1177/0269881114550352

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* New York, NY: Guilford Press.

Henges, A. L., & Marczinski, C. A. (2012). Impulsivity and alcohol consumption in young social drinkers. *Addictive Behaviors*, *37*(2), 217–220. http://doi.org/10.1016/j.addbeh.2011.09.013

Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): construct validity and normative data in a large non-clinical sample. *The British Journal of Clinical Psychology / the British Psychological Society*, *44*, 227–239. http://doi.org/10.1348/014466505X29657

Herr, N. R., Rosenthal, M. Z., Geiger, P. J., & Erikson, K. (2013). Difficulties with emotion regulation mediate the relationship between borderline personality disorder symptom severity and interpersonal problems. *Personality and Mental Health*, *7*(3), 191–202. http://doi.org/10.1002/pmh.1204

Houben, M., Claes, L., Vansteelandt, K., Berens, A., Sleuwaegen, E., Claes, L., … Kuppens, P. (2016). The emotion regulation function of nonsuicidal self-injury: A momentary assessment study in inpatients with borderline personality. *Journal of Abnormal Psychology*, *126*(1), 89–95. http://doi.org/http://dx.doi.org/10.1037/abn00002

Hull, J. W., Clarkin, J. F., & Yeomans, F. (1993). Borderline personality disorder and impulsive sexual behavior. *Hospital and Community Psychiatry*, *44*(10), 1000–1002. http://doi.org/10.1176/ps.44.10.1000

Iverson, K. M., Follette, Victoria, M., Pistorello, J., & Fruzzetti, A. E. (2012). An investigation of experiential avoidance, emotion dysregulation, and distress tolerance in young adult outpatients with borderline personality disorder symptoms. *Journal of Personality Disorders*, *3*(4), 415–422. http://doi.org/10.1016/j.cmet.2012.08.002.

Ivis, F. J., Adlaf, E. M., & Jurgen Rehm. (2000). Incorporating the AUDIT into a general population telephone survey: a methodological experiment. *Drug and Alcohol Dependence*, *60*(1), 97–104. http://doi.org/10.1016/S0376-8716(99)00145-3

Jacob, G. A., Gutz, L., Bader, K., Lieb, K., Tüscher, O., & Stahl, C. (2010). Impulsivity in borderline personality disorder: Impairment in self-report measures, but not behavioral inhibition. *Psychopathology*, *43*(3), 180–188. http://doi.org/10.1159/000304174

Jacobo, M. C., Blais, M. A, Baity, M. R., & Harley, R. (2007). Concurrent validity of the Personality Assessment Inventory Borderline scales in patients seeking dialectical behavior therapy. *Journal of Personality Assessment*, *88*, 74–80. http://doi.org/10.1207/s15327752jpa8801_10

Kim, H.-Y. (2013). Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis. *Restorative Dentistry & Endodontics*, *38*(1), 52–54. http://doi.org/10.5395/rde.2013.38.1.52

Kleindienst, N., Bohus, M., Luda, P., Limberger, M. F., Kuenkele, K., & Ebner-priemer, U. W. (2008). Motives for nonsuicidal self-injury among women with borderline personality disorder. *The Journal of Nervous and Mental Disease*, *196*(3), 230–236. http://doi.org/10.1097/NMD.0b013e3181663026

Klonsky, E. D. (2011). Non-suicidal self-injury in United States adults: prevalence, sociodemographics, topography and functions. *Psychological Medicine*, *41*, 1981–1986. http://doi.org/10.1017/S0033291710002497

Klonsky, E. D., May, A. M., & Glenn, C. R. (2013). The relationship between nonsuicidal self-injury and attempted suicide: Converging evidence from four samples. *Journal of Abnormal Psychology*, *122*(1), 231–237. http://doi.org/10.1037/a0030278

Klonsky, E. D., & May, A. M. (2015). The Three-Step Theory (3ST): A new theory of suicide rooted in the "ideation-to-action" framework. *International Journal of Cognitive Therapy*, *8*(2), 114–129. http://doi.org/10.1521/ijct.2015.8.2.114

Krause-Utz, A., Sobanski, E., Alm, B., Valerius, G., Kleindienst, N., Bohus, M., & Schmahl, C. (2013). Impulsivity in relation to stress in patients with borderline personality disorder with and without co-occurring attention-deficit/hyperactivity disorder: an exploratory study. *The Journal of Nervous and Mental Disease*, *201*(2), 116–123. http://doi.org/10.1097/NMD.0b013e31827f6462

Lauriola, M., Panno, A., Levin, I. P., & Lejuez, C. W. (2014). Individual differences in risky decision making: A meta-analysis of sensation seeking and impulsivity with the balloon analogue risk task. *Journal of Behavioral Decision Making*, *27*, 20–36. http://doi.org/10.1002/bdm

Lavan, H., & Johnson, J. G. (2002). The association between axis I and II psychiatric symptoms and high-risk sexual behavior during adolescence. *Journal of Personality Disorders*, *16*(1), 73–94. http://doi.org/10.1521/pedi.16.1.73.22559

Lawrence, K. A., Allen, J. S., & Chanen, A. M. (2010). Impulsivity in borderline personality disorder: reward-based decision-making and its relationship to emotional distress. *Journal of Personality Disorders*, *24*(6), 786–799. http://doi.org/10.1521/pedi.2010.24.6.785

Le Bas, G. A., Hughes, M. A., & Stout, J. C. (2015). Utility of self-report and performance-based measures of risk for predicting driving behavior in young people. *Personality and Individual Differences*, *86*, 184–188. http://doi.org/10.1016/j.paid.2015.05.034

Leeman, R. F., Hoff, R. a., Krishnan-Sarin, S., Patock-Peckham, J. a., & Potenza, M. N. (2014). Impulsivity, sensation-seeking, and part-time job status in relation to substance use and gambling in adolescents. *Journal of Adolescent Health*, *54*(4), 460–466. http://doi.org/10.1016/j.jadohealth.2013.09.014

Lejuez, C. W., Daughters, S. B., Danielson, C. W., & Ruggiero, K. Unpublished manual. 2006. The behavioral indicator of resiliency to distress (BIRD).

Lejuez, C. W., Kahler, C. W., & Brown, R. A. (2003). A modified computer version of the Paced Auditory Serial Addition Task (PASAT) as a laboratory-based stressor. *The Behavior Therapist*, *26*(4), 290–293.

Lejuez, C. W., Read, J. P., Kahler, C. W., Richards, J. B., Ramsey, S. E., Stuart, G. L., … Brown, R. A. (2002). Evaluation of a behavioral measure of risk taking: the Balloon Analogue Risk Task (BART). *Journal of Experimental Psychology. Applied*, *8*(2), 75–84. http://doi.org/10.1037/1076-898X.8.2.75

Leyton, M., Okazawa, H., Diksic, M., Paris, J., Rosa, P., Mzengeza, S., … Benkelfat, C. (2001). Brain regional α-[11C]methyl-l-tryptophan trapping in impulsive subjects with borderline personality disorder. *American Journal of Psychiatry*, *158*, 775–782.

Lieb, K., Zanarini, M. C., Schmahl, C., Linehan, M. M., & Bohus, M. (2004). Borderline personality disorder. *Lancet*, *364*(453-461). http://doi.org/10.1016/S0140-6736(04)16770-6

Linehan, M. M. Cognitive–behavioral treatment of borderline personality disorder. New York: Guilford Press; 1993

Linehan, M. M., Comtois, K. A., & Murray, A. (2000). The University of Washington Risk Assessment Protocol (UWRAP). Unpublished manuscript, University of Washington, Seattle, WA.

Linehan, M. M., Comtois, K. A., & Ward-Ciesielski, E. F. (2012). Assessing and managing risk with suicidal individuals. *Cognitive and Behavioral Practice*, *19*(2), 218–232. http://doi.org/10.1016/j.cbpra.2010.11.008

Links, P. S., Heslegrave, R., & van Reekum, R. (1999). Impulsivity: core aspect of borderline personality disorder. *Journal of Personality Disorders*, *13*(1), 1–9. http://doi.org/10.1521/pedi.1999.13.1.1

Lobbestael, J., Leurgans, M., & Arntz, A. (2011). Inter-rater reliability of the Structured Clinical Interview for DSM-IV axis I disorders (SCID I) and axis II disorders (SCID II). *Clinical Psychology and Psychotherapy*, *18*(18), 75–79. http://doi.org/10.1002/cpp

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the depression anxiety stress scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy*, *33*(3), 335–343. http://doi.org/10.1016/0005-7967(94)00075-U

Lynam, D. R., Smith, G. T., Whiteside, S. P., & Cyders, M. A. (2006). The UPPS-P: Assessing five personality pathways to impulsive behavior. *West Lafayette, IN: Purdue University*.

MacLeod, C., Rutherford, E., Campbell, L., Ebsworthy, G., & Holker, L. (2002). Selective attention and emotional vulnerability: Assessing the causal basis of their association through the experimental manipulation of attentional bias. *Journal of Abnormal Psychology, 111*(1), 107–123. http://doi.org/10.1037/0021-843X.111.1.107

MacPherson, L., Reynolds, E. K., Daughters, S. B., Wang, F., Cassidy, J., Mayes, L. C., & Lejuez, C. W. (2010). Positive and negative reinforcement underlying risk behavior in early adolescents. *Prevention Science*, *11*(3), 331–342. http://doi.org/10.1007/s11121-010-0172-7

Magid, V., & Colder, C. R. (2007). The UPPS Impulsive Behavior Scale: Factor structure and associations with college drinking. *Personality and Individual Differences*, *43*(7), 1927–1937. http://doi.org/10.1016/j.paid.2007.06.013

Mancke, F., Herpertz, S. C., Kleindienst, N., & Bertsch, K. (2017). Emotion dysregulation and trait anger sequentially mediate the association between borderline personality disorder and aggression. *Journal of Personality Disorders*, *31*(2), 256–272. http://doi.org/10.1521/pedi_2016_30_247

Martínez-Loredo, V., Fernández-Hermida, J. R., Fernández-Artamendi, S., Carballo, J. L., García-Cueto, E., & García-Rodríguez, O. (2015). The association of both self-reported and behavioral impulsivity with the annual prevalence of substance use among early adolescents. *Substance Abuse Treatment, Prevention, and Policy*, *10*(23), 1–8. http://doi.org/10.1186/s13011-015-0019-0

McCloskey, M. S., New, A. S., Siever, L. J., Goodman, M., Koenigsberg, H. W., Flory, J. D., & Coccaro, E. F. (2009). Evaluation of behavioral impulsivity and aggression tasks as endophenotypes for borderline personality disorder. *Journal of Psychiatric Research*, *43*(12), 1036–1048. http://doi.org/10.1016/j.jpsychires.2009.01.002

McGlashan, T. H., Grilo, C. M., Skodol, a E., Gunderson, J. G., Shea, M. T., Morey, L. C., … Stout, R. L. (2000). The collaborative longitudinal personality disorders study: baseline Axis I/II and II/II diagnostic co-occurrence. *Acta Psychiatrica Scandinavica*, *102*(4), 256–264. http://doi.org/10.1034/j.1600-0447.2000.102004256.x

Miller, G. A., & Chapman, J. P. (2001). Misunderstanding analysis of covariance. *Journal of Abnormal Psychology*, *110*(1), 40–48. http://doi.org/10.1037/0021-843X.110.1.40

Mitchell, S. H. (1999). Measures of impulsivity in cigarrette smokers and non-smokers. *Psychopharmacology*, *146*, 455–464. https://doi.org/10.1007/PL00005491

Mohr, J., & Fassinger, R. (2000). Measuring dimensions of lesbian and gay male experience. *Measurement And Evaluation In Counseling And Development*, *33*(2), 66-90.

Morey, L. C. (1991). *Personality assessment inventory*. Odessa, FL: Routledge.

Mortensen, J. A., Rasmussen, L. A., & Håberg, A. (2010). Trait impulsivity in female patients with borderline personality disorder and matched controls. *Acta Neuropsychiatrica*, *22*(3), 139–149. http://doi.org/10.1111/j.1601-5215.2010.00468.x

Neacsiu, A. D., Herr, N. R., Fang, C. M., Rodriguez, M. a, & Rosenthal, M. Z. (2014). Identity Disturbance and Problems With Emotion Regulation Are Related Constructs Across Diagnoses, *0*(3026), 1–16. http://doi.org/10.1002/jclp.22141

Oldham, J. M. (2007). Borderline personality disorder and suicidality. *American Journal of Psychiatry*, *163*(1), 20–26. http://doi.org/10.1176/appi.ajp.163.1.20

Oldham, J. M., Gabbard, G. O., Soloff, P., Spiegel, D., Stone, M., & Phillips, K. A. (2001). Practice guideline for the treatment of patients with borderline personality disorder. *American Psychiatric Association*.

Osman, A., Bagge, C. L., Guiterrez, P. M., Konick, L. C., Kopper, B. A., & Barrios, F. X. (2001). The Suicidal Behaviors Questionnaire - revised (SBQ-R): Validation with clinical and nonclinical samples. *Assessment*, *8*(4), 443–454. http://doi.org/10.1177/107319110100800409

Oumaya, M., Friedman, S., Pham, A., Abou Abdallah, T., Guelfi, J. D., & Rouillon, F. (2008). Personnalité borderline, automutilations et suicide: revue de la littérature. *L'Encéphale*, *34*(5), 452–458. http://doi.org/10.1016/j.encep.2007.10.007

Patton, J. H., Stanford, M. S., & Barratt, E. S. (1995). Factor structure of the Barratt Impulsiveness Scale. *Journal of Clinical Psychology*. *51*(6), 768-774.

Pearson, M. R., Murphy, E. M., & Doane, A. N. (2013). Impulsivity-like traits and risky driving behaviors among college students. *Accident Analysis and Prevention*, *53*, 142–148. http://doi.org/10.1016/j.aap.2013.01.009

Perry, J. L., & Carroll, M. E. (2008). The role of impulsive behavior in drug abuse. *Psychopharmacology*, *200*(1), 1–26. http://doi.org/10.1007/s00213-008-1173-0

Peters, J. R., Upton, B. T., & Baer, R. A. (2013). Brief report: Relationships between facets of impulsivity and borderline personality features. *Journal of Personality Disorders*, *27*(4), 547–552. http://doi.org/10.1521/pedi_2012_26_044

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*(3), 879–891. http://doi.org/10.3758/BRM.40.3.879

Reynolds, S. K., Lindenboim, N., Comtois, K. A., Murray, A., & Linehan, M. M. (2006). Risky assessments: participant suicidality and distress associated with research assessments in a treatment study of suicidal behavior. *Suicide & Life-Threatening Behavior*, *36*(1), 19–34. http://doi.org/10.1521/suli.2006.36.1.19

Ribeiro, J. D., Witte, T. K., Van Orden, K. A., Selby, E. A., Gordon, K. H., Bender, T. W., & Joiner, T. E. (2014). Fearlessness about death: The psychometric properties and construct validity of the revision to the Acquired Capability for Suicide Scale. *Psychological Assessment*, *26*(1), 115–126. http://doi.org/10.1037/a0034858

Sansone, R. A., & Sansone, L. A. (2011a). Personality disorders: A nation-based perspective on prevalence. *Innovations in Clinical Neuroscience*, *8*(4), 13–18.

Sansone, R. A., & Sansone, L. A. (2011). Substance use disorders and borderline personality: Common bedfellows. *Innovations in Clinical Neuroscience*, *8*(9), 10–14. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3196330/

Sansone, R. A., Lam, C., & Wiederman, M. W. (2010). Borderline personality disorder and reckless driving. *Journal of Clinical Psychiatry*, *71*(4), 507. http://doi.org/10.4088/JCP.09l05494gre

Sansone, R. A., Levitt, J. L., & Sansone, L. A. (2005). The prevalence of personality disorders among those with eating disorders. *Eating Disorders*, *13*(1), 7–21. http://doi.org/10.1080/10640260590893593

Sansone, R. A., Watts, D. A., & Wiederman, M. W. (2014). Borderline personality symptomatology and legal charges related to drugs. *International Journal of Psychiatry in Clinical Practice*, *18*, 150–152. http://doi.org/http://dx.doi.org/10.3109/13651501.2013.847107

Sauer, S. E., & Baer, R. a. (2012). Ruminative and mindful self-focused attention in borderline personality disorder. *Personality Disorders: Theory, Research, and Treatment*, *3*(4), 433–441. http://doi.org/10.1037/a0025465

Schuermann, B., Kathmann, N., Stiglmayr, C., Renneberg, B., & Endrass, T. (2011). Impaired decision making and feedback evaluation in borderline personality disorder. *Psychological Medicine*, *41*, 1917–1927. http://doi.org/10.1017/S003329171000262X

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Janavs, J., Weiller, E., Keskiner, A., … Dunbar, G. C. (1998). The validity of the Mini International Neuropsychiatric Interview (MINI) according to the SCID-P and its reliability. *European Psychiatry*, *12*(5), 232–241. http://doi.org/10.1016/S0924-9338(97)83297-X

Shipley, W. C. A self-administering scale for measuring intellectual impairment and deterioration. *The Journal of Psychology* 9.2 (1940): 371-377. http://doi.org/ 10.1080/00223980.1940.9917704

Spinella, M. (2007). Normative data and a short form of the Barratt Impulsiveness Scale. *International Journal of Neuroscience*, *117*(3), 359–368. http://doi.org/10.1080/00207450600588881

Sprague, J., & Verona, E. (2010). Emotional conditions disrupt behavioral control among individuals with dysregulated personality traits. *Journal of Abnormal Psychology*, *119*(2), 409–419. http://doi.org/10.1037/a0019194

Svaldi, J., Philipsen, A., & Matthies, S. (2012). Risky decision-making in borderline personality disorder. *Psychiatry Research*, *197*(1-2), 112–118. http://doi.org/10.1016/j.psychres.2012.01.014

Tice, D. M., Bratslavsky, E., & Baumeister, R. F. (2001). Emotional distress regulation takes precedence over impulse control: If you feel bad, do it! *Journal of Personality and Social Psychology*, *80*(1), 53–67. http://doi.org/10.1037/0022-3514.80.1.53

Torgersen, S., Kringlen, E., & Cramer, V. (2001). The prevalence of personality disorders in a community sample. *Archives of General Psychiatry*, *58*(6), 590–596. http://doi.org/10.1001/archpsyc.58.6.590

Tragesser, S. L., & Robinson, R. J. (2009). The role of affective instability and UPPS impulsivity in borderline personality disorder features. *Journal of Personality Disorders*, *23*(4), 370–383. http://doi.org/10.1521/pedi.2009.23.4.370

Trull, T. J., Tomko, R. L., Brown, W. C., & Scheiderer, E. M. (2010). Borderline personality disorder in 3-D: Dimensions, symptoms, and measurement challenges. *Social and Personality Psychology Compass*, *4*(11), 1057–1069. http://doi.org/10.1111/j.1751-9004.2010.00312.x

Tull, M. T., Gratz, K. L., & Weiss, N. H. (2011). Exploring associations between borderline personality disorder, crack/cocaine dependence, gender, and risky sexual behavior among substance-dependent inpatients. *Personality Disorders*, *2*(3), 209–19. http://doi.org/10.1037/a0021878

Van Orden, K. A., Witte, T. K., Gordon, K. H., Bender, T. W., & Joiner, T. E. (2008). Suicidal desire and the capability for suicide: Tests of the interpersonal-psychological theory of suicidal behavior among adults. *Journal of Consulting and Clinical Psychology*, *76*(1), 72–83. http://doi.org/10.1037/0022-006X.76.1.72

Weiss, N. H., Tull, M. T., Davis, L. T., Searcy, J., Williams, I., & Gratz, K. L. (2015). A preliminary experimental investigation of emotion dysregulation and impulsivity in risky behaviours. *Behaviour Change*, *32*(2), 127–142. http://doi.org/10.1017/bec.2015.5

Weiss, N. H., Tull, M. T., Viana, A. G., Anestis, M. D., & Gratz, K. L. (2012). Impulsive behaviors as an emotion regulation strategy: Examining associations between PTSD, emotion dysregulation, and impulsive behaviors among substance dependent inpatients. *Journal of Anxiety Disorders*, *26*(3), 453–458. http://doi.org/10.1016/j.janxdis.2012.01.007

Weiss, N. H., Tull, M. T., Dixon-Gordon, K. L., & Gratz, K. L. (2016). Assessing the negative and positive emotion-dependent nature of risky behaviors among substance dependent patients. *Assessment*, 1-14. https://doi.org/10.1177/1073191116665906

Weiss, N. H., Gratz, K. L., & Lavender, J. M. (2015). Factor structure and initial validation of a multidimensional measure of difficulties in the regulation of positive emotions: The DERS-Positive. *Behavior Modification*, *39*(3), 431–53. http://doi.org/10.1177/0145445514566504

Weitzman, M. L., McHugh, R. K., & Otto, M. W. (2011). The association between affect amplification and urgency. *Depression and Anxiety*, *28*(12), 1105–1110. http://doi.org/10.1002/da.20830

Whiteside, S. P., & Lynam, D. R. (2001). The five factor model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences*, *30*(4), 669–689. http://doi.org/10.1016/S0191-8869(00)00064-7

Whiteside, S. P., Lynam, D. R., Miller, J. D., & Reynolds, S. K. (2005). Validation of the UPPS Impulsive Behavior Scale: A four factor model of impulsivity. *European Journal of Personality*, *19*, 559–574. http://doi.org/10.1002/per.556

Winward, J. L., Bekman, N. M., Hanson, K. L., Lejuez, C. W., & Brown, S. A. (2014). Changes in emotional reactivity and distress tolerance among heavy drinking adolescents during sustained abstinence. *Alcoholism: Clinical and Experimental Research*, *38*(6), 1761–1769. http://doi.org/10.1111/acer.12415

Zanarini, M. C., Frankenburg, F. R., Hennen, J., Reich, D. B., & Silk, K. R. (2004). Axis I comorbidity in patients with borderline personality disorder: 6-year follow-up and prediction of time to remission. *American Journal of Psychiatry*, *161*, 2108–2114. http://doi.org/10.1176/appi.ajp.161.11.2108

Zanarini, M. C., Horwood, J., Wolke, D., Waylen, A., Fitzmaurice, G., & Grant, B. F. (2011). Prevalence of DSM-IV borderline personality disorder in two community samples: 6330 English 11-year-olds and 34,653 American adults. *Journal of Personality Disorders, 25(*5), 607–619.

Zanarini, M. C., Reichman, C. A., Frankenburg, F. R., Reich, D. B., & Fitzmaurice, G. (2010). The course of eating disorders in patients with borderline personality disorder: A 10-year follow-up study. *International Journal of Eating Disorders*, *43*(3), 226–232. http://doi.org/10.1002/eat.20689

Zelkowitz, R. L., Cole, D. A., Han, G. T., & Tomarken, A. J. (2016). The incremental utility of emotion regulation but not emotion reactivity in nonsuicidal self-injury. *Suicide and Life-Threatening Behavior*. http://doi.org/10.1111/sltb.12236

Zimmerman, M., & Mattia, J. I. (1999). Differences between clinical and research practices in diagnosing borderline personality disorder. *American Journal of Psychiatry*, *156*(10), 1570–1574. http://doi.org/10.1176/ajp.156.10.1570

Zimmerman, M., & Mattia, J. I. (1999). Axis I diagnostic comorbidity and borderline personality disorder. *Comprehensive Psychiatry*, *40*(4), 245–252. http://doi.org/10.1016/S0010-440X(99)90123-2

Zimmerman, M., Rothschild, L., & Chelminski, I. (2005). The prevalence of DSM-IV personality disorders in psychiatric outpatients. *American Journal of Psychiatry*, *162*(December), 1911–1918. http://doi.org/10.1176/appi.ajp.162.10.1911