

Borderline Personality Disorder Features, Perceived Social Support,  
Sleep Disturbance, and Rejection Sensitivity

by

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## ABSTRACT

Those who have borderline personality disorder (BPD), and those who have subclinical levels of BPD features, experience distress and impairment in important life domains, especially in their interpersonal interactions. It is critical to understand the factors that alleviate BPD symptoms in order to help affected individuals lead healthier lives.

Rejection sensitivity and sleep disturbance are two factors that may maintain or exacerbate BPD symptoms, yet new research indicates socially supportive relationships are related to symptom remission. While extensive research exists on the interpersonal impairments associated with borderline personality pathology, little research exists on how individuals with BPD or BPD features perceive and experience their social support.

The present study examined the relationships between BPD features, perceived social support, sleep quality, and rejection sensitivity in a racially diverse, large sample of primarily college-aged individuals (N = 396). Results indicated that BPD features had a significant positive relationship with self-reported rejection sensitivity and a significant negative relationship with self-reported perceived social support. Additionally, BPD features had a significant positive relationship with sleep disturbance. Sleep disturbance did not moderate the relationship between BPD features and rejection sensitivity as expected; however, the regression of rejection sensitivity on BPD features and sleep disturbance was significant. Finally, sleep disturbance moderated the relationship between BPD features and rejection sensitivity. Results extend and replicate recent research findings on the possible mechanisms that may maintain and alleviate BPD symptoms. Furthermore, the moderating effect of sleep disturbance on perceived social support for those with higher levels of BPD features is unique to this study.

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## CHAPTER 1

### INTRODUCTION

Borderline personality disorder (BPD) is an important public health issue due to its association with severe distress, impairment in significant life domains, and risk of self-injury for individuals. BPD is often diagnosed in individuals who use emergency room care after attempting suicide, especially individuals who have a history of multiple suicide attempts (Foreman, Berk, Henriques, Brown, & Beck, 2004). Approximately 12-20% of patients in inpatient settings, and 10% of patients in outpatient settings have BPD, making the diagnosis one of the most common in mental health settings (Trull, 2015). The hallmark of BPD is, “a pervasive pattern of instability in interpersonal relationships, self-image, and affects, and marked impulsivity that begins by early adulthood and is present in a variety of contexts” (American Psychiatric Association, 2013, p. 663). More than any other feature, borderline personality disorder has been characterized by interpersonal impairments (Gunderson, 2007).

Recent research has demonstrated that even those who have a few symptoms or features of borderline personality disorder, but not a full diagnosis, experience interpersonal impairments (Hill et al., 2008; Trull, Ueda, Conforti, & Doan, 1997). Considering the social difficulties experienced by those with borderline personality disorder and those with features of the disorder, it is critical to extend research on factors that promote symptom recovery and personal wellbeing along with research on the mechanisms that maintain interpersonal impairments. In terms of protective factors, an extensive literature supports the importance of social support and sleep for the promotion of health and wellbeing for individuals (Cohen & Wills, 1985; Uchino, 2004; Thoits,



2011; Walker, 2009). Individuals with BPD and features of BPD have interpersonal impairments that may decrease the beneficial effects of social support on their sense of wellbeing, yet new research suggests BPD symptoms may remit with healthy social support (Lariviere et al., 2015). Sleep disturbance is also a well-documented problem for individuals with BPD and those exhibiting features of BPD, and recent research has identified that sleep disturbance may induce social impairments in the normal population (Gilbert, Pond, Haak, Dewall, & Keller, 2015; Gordon & Chen, 2014; Gun, Troxel, Hall, & Buysse, 2014). One factor that several studies suggest undergirds the social difficulties of individuals with BPD and features of BPD is rejection sensitivity (RS), or the cognitive-affective predisposition to anxiously expect and react to perceived rejection (Downey & Feldman, 1996).

The primary aim of this study was to explore the relations between BPD features, social support, sleep quality, and RS. In the following review, I provide background information on BPD. I describe the history, diagnosis, and etiology of BPD. Then, I report on the prognosis and treatment for BPD. Next, the literature on the interpersonal difficulties experienced by many individuals with BPD is summarized, and the construct of BPD features defined. Literature on the protective factors of social support and sleep quality followed by the pathogenic mechanism of RS is reviewed, and the purpose and rationale of the proposed study are provided.

## CHAPTER 2

### BACKGROUND LITERATURE

#### **History, Diagnosis, and Etiology of Borderline Personality Disorder**

Stern (1938) was the first to use the term *borderline* to describe a disorder that seemed to be on the boundary of schizophrenia, and later Kernberg (1967) coined “borderline personality organization” to describe a cohort of patients who had functional reality testing but demonstrated psychotic personality organization. In the 1960s and 1970s, Grinker and Gunderson, working separately, outlined many of the key characteristics of the BPD diagnosis that are still in use today (Trull, 2015). In 1980, BPD was formally introduced into the DSM-III. However, the mental health community came to an impasse in regard to the classification of BPD as a variant of schizophrenia, affective disorder, or posttraumatic stress disorder (Trull, 2015).

The fundamental nature of borderline personality disorder is a maladaptive personality style characterized by at least five of the following nine DSM-5 Section II diagnostic criteria: a) “Frantic efforts to avoid real or imagined abandonment;” b) “A pattern of unstable and intense interpersonal relationships...;” c) “Identity disturbance...;” d) “Impulsivity...;” e) “Recurrent suicidal behavior, gestures, or threats, or self-mutilating behavior;” e) “Affective instability due to a marked reactivity of mood...;” f) “Chronic feelings of emptiness;” g) “Inappropriate, intense anger or difficulty controlling anger...;” and h) “Transient, stress-related paranoid ideation or severe dissociative symptoms” (American Psychiatric Association, 2013, p. 663).

Because none of the aforementioned criteria is essential to the diagnosis, tremendous diversity exists in the clinical presentation and diagnosis of BPD.

Nevertheless, several theorists have argued that specific groupings of criteria are central to the diagnosis of BPD, such as criteria representing emotional dysregulation (Linehan, 1993), criteria representing interpersonal difficulties, (Gunderson, 2007), and criteria representing self-regulation difficulties (Bornovalova, Fishman, Strong, Kruglanski, & Lejuez, 2008). While only two of the nine criteria are directly related to interpersonal difficulties, it is significant that emotional dysregulation and self-regulation issues most often arise in response to interpersonal stressors (Trull, 2015).

The etiology of BPD seems best supported by a diathesis-stress model (Paris, 2009; Trull, 2015). The majority of theories on the origination of BPD have identified physical, emotional, and/or sexual abuse, parental neglect and conflict, and separations and abandonment as early-developmental risk factors for a subsequent BPD diagnosis (Bateman & Fonagy, 2004; Clarkin & Kernberg, 2006; Linehan, 1993). Support for the biological underpinnings of BPD exists broadly in the literature on the heritability of personality disorders (Livesley & Jang 2008; Reichborn-Knennerud 2008; Torgersen et al. 2000) and more specifically in several recent twin studies, which suggest that heritability may account for 35% to 66% of BPD features (Belsky et al., 2012; Bornovalova, Hicks, Iacono, & McGue, 2013; Bornovalova et al., 2013; Distel, Hottenga, Trull, & Boomsma, 2008; Kendler, Aggen, Knudsen, Roysamb, Neale, & 2011; Kendler et al., 2011; Torgersen et al., 2000). Furthermore, some studies indicate that the impulsivity characteristic of BPD may be due to structural differences in the prefrontal lobe of the brain, which is responsible for executive functioning (O'Leary & Cowdry, 1994; Silbersweig et al., 2007), and serotonergic functioning (Coccaro et al., 1989; Rinne, Van Den Brink, Wouters, & van Dyck, 2002).

## **Prognosis and Treatment of Borderline Personality Disorder**

It is important to note that while BPD is not exclusive to females, about 75% of those diagnosed are female (American Psychiatric Association, 2013, p. 666). The disorder has a distinctive course with most clinically significant symptoms appearing during adolescence, and by ages 30 through 40 the majority of BPD patients see symptoms dissipate and remit (Paris, 2009). Although the road to recovery may take time, a positive prognosis is possible for individuals with BPD. Several longitudinal studies indicate that BPD symptoms often remit over time (Gunderson et al., 2011; Skodol et al. 2005). However, two of the most recent studies indicate that over the course of a decade, BPD symptom remission does not necessarily coincide with significant positive developments in social and occupational functioning (Gunderson et al., 2011) or sustained recovery (Zanarini, Frankenburg, Reich, & Fitzmaurice, 2012). Hope exists for individuals with BPD in the variety of new therapies designed for the treatment of BPD, and a small group of medications that can effectively relieve some BPD symptoms (Paris, 2009).

A variety of therapies exist for the treatment of BPD. In an extensive review of 28 studies on treatments for BPD, Stoffers et al. (2012) found that Dialectical Behavior Therapy (DBT) was the most efficacious in the treatment of BPD and had the most research support. DBT centers on developing the following four skills, which Linehan (1993b) suggested are underdeveloped in persons with BPD: distress tolerance, mindfulness, emotion regulation, and interpersonal effectiveness. The skills allow clients to develop healthy lifestyles and better manage their emotions and behaviors during interpersonal interactions. In addition to DBT, research by Stoffers et al. (2012) suggests

that some of the most effective therapies for the treatment of BPD include: Cognitive Behavior Therapy, which concentrates on correcting maladaptive cognitions (Beck, 1976), Schema-Focused Therapy, which centers on correcting maladaptive schema from early development (Young, 1999), Mentalization Based Therapy, which hinges on developing boundaries in cognitions and affects (Bateman & Fonagy, 2004), and Transference-Focused Psychotherapy, which focuses on identifying transference patterns in significant relationships (Clarkin, & Kernberg, 2006). In general, structured therapy seems more effective than unstructured therapy for individuals with BPD (Paris, 2009), and the most effective therapies listed here also have a focus on healthy relationships.

To date, there is not a medication that has an effect on overall BPD symptomology. A few classes of medications seem to be useful for certain types of symptom reduction in BPD. The most effective classes of medication are low-doses of serotonin reuptake inhibitors (SSRIs) and neuroleptics. SSRIs have demonstrated effectiveness in the treatment of depressive symptoms (McKenzie & McFarlane, 2007), and mood swings (Rinne et al., 2002), as well as anger and impulsivity (Zanarini, Frankenburg, & Parachini, 2004). Historically, neuroleptics have been used to treat impulsivity, but they produce many negative side-effects (Paris, 2009).

### **Interpersonal Difficulties Associated with Borderline Symptomology**

Disturbed relationships are a hallmark of BPD symptomology (Gunderson, 2007). In fact, Gunderson and Lyons-Ruth (2008) proposed that BPD develops from the interplay of a genetic disposition to have hypersensitive reactions to negative interpersonal interactions, and dysfunctional experiences with childhood guardians. That interplay often results in insecure attachment styles (i.e., fearful, preoccupied, and

unresolved styles) characterized by a dual desire for and fear of closeness with others (Agrawal, Gunderson, Holmes, & Lyons-Ruth, 2004). Insecure attachment typifies the interpersonal behavior of those with BPD (Agrawal, Gunderson, Holmes, & Lyons-Ruth, 2004). In this way, insecure attachment styles and hypersensitive reactions combine to make persons with BPD less effective at handling interpersonal strains.

Individuals with BPD demonstrate a variety of problematic social behaviors. Lejuez (2003) found that BPD-related symptomology was related to interpersonal sensitivity and interpersonal aggression. These findings have been corroborated by two recent studies that asked individuals with BPD symptomology to report on their emotions and social interactions following naturally occurring interpersonal situations. Using data from a 20-day period, Russell, Moskowitz, Zuroff, Sookman, and Paris (2007) found that individuals with BPD experienced more negative emotions in interactions and were more extreme or variable in their behavior than were healthy controls. Additionally, they were more likely to be submissive than dominant, yet more quarrelsome than agreeable. Similiary, Stepp, Pilkonis, Yaggi, Morse, and Feske (2009) examined the social behavior of persons with BPD using a diary method over the course of a week and noted these individuals had higher levels of anger, disagreement, and anxiety after social interactions than did the control group with other personality disorders and the control group without personality disorders. Hilsenroth, Menaker, Peters, and Pincus (2007) discovered that persons with BPD assessed with the Inventory of Interpersonal Problems Circumplex Scales (IIP-C; Alden et al., 1990; Horowitz et al., 2000; Horowitz, Rosenberg, Baer, Ureno, & Vil-laseñor, 1988) self-reported higher interpersonal distress due to overly accommodating, self-sacrificing, and intrusive or needy social behavior patterns when

compared to controls without BPD. In addition, Barnow et al. (2009) found that persons with BPD self-reported more extreme social behaviors compared to self-reports of controls. Persons with BPD scored higher on hostile dominance, hostile submissiveness, and friendly dominance, and scored lower on the dimension of affiliation. Taken together, these findings are in line with clinical descriptions that associate BPD symptomology with disagreeableness, submissiveness, as well as unpredictable and wide-ranging behavioral reactions (Gunderson, 2008; Linehan, 1993).

Research also indicates that individuals with BPD differ in their evaluation and treatment of others. For example, Barnow et al. (2009) had study participants evaluate people in film clips, and found that when compared to controls, individuals with BPD evaluated people as more negative and aggressive. The authors concluded that individuals with BPD may have a bias towards negative and aggressive interpersonal evaluations, which may account for some of their interpersonal difficulties. In terms of the treatment of others, in a longitudinal study, Stepp, Smith, Morse, Hallquist, and Pilkonis (2012) found that after two-years, persons with BPD symptoms who reported interpersonal aggression and the need for social approval during baseline assessment had a much higher likelihood of experiencing and committing acts of physical and psychological hostility, and those who reported a lack of sociability at baseline were also more likely to have committed acts of physical hostility.

Many of the problematic interpersonal behavior patterns exhibited by individuals with BPD are frequently triggered by relational events that imply real or imagined abandonment or separation (Stiglmayr et al., 2005), a reaction that may have roots in the insecure attachment styles often seen in BPD (Agrawal et al., 2004; Levy, 2005). For

those with BPD, anger is often provoked by social interactions, that may involve loss or disappointment. The effects of anger are particularly disruptive and predictive of social dysfunction in the lives of those with BPD (Morse et al., 2009).

Evidence from clinical interactions also indicates that individuals with BPD are intolerant of being alone (Gunderson, 1996). In a study by Stiglmayr et al., (2005), individuals with BPD recorded their hourly state of unpleasant emotional tension, along with precipitating events for two consecutive days. Results indicated that 39% of the precipitating events had to do with self-reported themes of rejection, being alone, and failure. In a recent 10-year prospective study, Choi-Kain, Zanarini, Frankenburg, Fitzmaurice, and Reich, (2010) discovered that while the behavioral features of BPD (i.e., recurrent breakups, sadism, demandingness, entitlement, regression in treatment, and boundary violations; Choi-Kain et al., 2010) were not present for many individuals two years after baseline assessment, the emotional responses to interpersonal events (i.e., being alone, active caretaking, discomfort with care, and dependency; Choi-Kain et al., 2010) were still present for many individuals at the end of the study.

These findings from self-report research, experience sampling studies, and clinical observations indicate individuals with BPD present with insecure attachment styles and hypersensitivity to rejecting experiences from others. Many interpersonal difficulties experienced by those with BPD, such as extremely variable behaviors with tendencies toward hostility and neediness, often reflect a fear of being alone, that is consistent with insecure attachment styles.

### **Borderline Personality Disorder Features**

While a diagnosis of BPD is synonymous with clinical distress and social



impairments, research indicates that even the presence of a few clinical criteria for BPD also known as BPD features may predict impairment in important life areas. In a 2-year follow-up study of 65 college students with BPD features, Trull et al. (1997) found that individuals with BPD features had increased risk for academic problems, unstable social relationships, self-destructive behaviors, and mood disorders. More recently, Zimmerman et al. (2012) researched minimal levels of BPD symptomology in 1,976 out-patients and found that individuals with even 1 criterion for BPD at evaluation had more Axis I disorders, suicide attempts, suicidal ideation, time missed from work due to mental illness, and lower scores on the Global Assessment of Functioning. Those individuals were also more likely to have been hospitalized due to mental health problems (Zimmerman et al., 2012). BPD features also predict other health impairments. Using a community sample of later middle-aged adults, Oltmanns et al. (2015) found that after controlling for major depression, body-mass index, race and gender, only borderline personality symptoms rather than other personality disorder symptoms were significantly related to insomnia.

Similar to individuals with a diagnosis of BPD, individuals with BPD features may experience interpersonal impairment. Hill et al. (2008) found that persons with BPD experience lower levels of functioning in academic, occupational, friendship, and romantic domains. For example, in a 4-year study, Daley, Burge, and Hammen, (2000) found that BPD symptoms were associated with chronic romantic stress, conflicts, partner dissatisfaction, abuse, and unwanted pregnancies. Interpersonal impairments seem to be engendered by problematic interpersonal styles. Ryan and Shean (2007) identified two groups of individuals with high levels of borderline features: an

autonomous subtype, typified by excessively assertive, distant, and aloof interpersonal behavior; and a dependent subtype typified by submissiveness, low levels of interpersonal power, deficits in advocating for personal needs, social intrusiveness, and low levels of self-confidence. Furthermore, after analyzing the results of a 14-day daily diary study on romantic relationship experiences and BPD features, Bhatia, Davila, Eubanks-Carter, and Burckell (2013) concluded that persons with BPD features may have a negative evaluation bias when interpreting both positive partner-initiated daily romantic relationship experiences, such as a partner saying “I love you,” and negative daily romantic relationship experiences, such as a partner yelling at the other partner. Moreover, a higher number of BPD features were also linked with experiencing more emotional loss in response to negatively evaluated romantic relationship experiences.

In summary, individuals who have even a few BPD features experience distress, poor health, and social difficulties. Research is needed to understand the nature of their interpersonal impairments in order that they may be best helped.

### **Social Support**

Having a sense of belonging is a fundamental and powerful human need (Baumaister & Leary, 1995), and having social supports is protective of both physical and psychological well-being (Cassel, 1976; Cohen & Wills, 1985; Uchino, 2004). However, individuals with BPD experience interpersonal impairments (Gunderson, 2007).

Establishing a sense of belonging requires developing and preserving healthy and reliable social relationships. Most people form social attachments willingly and try to maintain them (Baumaister & Leary, 1995). This creates social support, defined by

Cohen (2004) as “a social network’s provision of psychological and material resources intended to benefit an individual’s ability to cope with stress” (p. 676). Individuals gain support from a variety of types of relationships, such as friends, family members, and significant others. According to Cohen, Brittney, and Gottlieb (2000) there are five main functions of social support: emotional support (e.g., allows for the discussion of feelings and concerns), informational support (e.g., provides guidance on problem-solving), instrumental support (e.g., provides practical support, such as lending money), companionship support (e.g., provides for social integration needs, like having a companion at a movie), feedback support (e.g., provides feedback information on the self relative to others).

It is also crucial to differentiate between enacted support or received and perceived support. When individuals perceive that others support them, they feel better physically and psychologically (Cohen & Wills, 1985; Uchino, 2004). Research on the stress-buffering hypothesis of social support indicates that support does not need to be received in order to reap the health benefits of social support. Interestingly, perceived support extends the health benefits of received support, which means individuals just need to believe support will be available when needed (Cohen & Wills, 1985; Cohen, Brittney, & Gottlieb, 2000). Having reliable social supports is associated with decreased risk for depression and other psychological disorders (Joiner, 2000), enhanced immune system functioning (Jaremka et al., 2013), and an increased sense of happiness (Csikszentmihalyi & Hunter, 2003). In contrast, when rejected or excluded, individuals may experience less positive mood, more negative mood, lower self-esteem, more anger, and a less meaningful experience of their existence (Tang & Richardson, 2013).

Given that social support has so many benefits for well-being and that individuals with BPD experience such a high degree of social impairment, it is important to understand more about how individuals with BPD perceive support within their social networks. There is some evidence that suggests that BPD symptoms may diminish in a positive interpersonal environment (Lariviere et al., 2015). Recent qualitative research by Lariviere et al. (2015) examined the subjective reports on recovery from 12 women between 18 and 65 years old with a diagnosis of BPD who had received two years of specialized counseling for BPD. Results indicated that healthy social supports and relationships, along with participation in counseling, letting go of the past, and participating in meaningful activities facilitated recovery, while maintaining unstable or unhealthy bonds with family members or romantic partners was damaging to recovery (Lariviere et al., 2015).

Individuals with BPD may have differences in their social networks that are indicative of their interpersonal difficulties. In a six-year longitudinal study, Zanarini, Frankenburg, Hennen, Reich, and Silk (2005) found that psychosocial functioning in individuals with BPD improved over time, yet their relationships with their romantic partners and their parents remained much worse than those of controls. Romantic relationship dysfunction is particularly prominent for those with BPD. Bouchard, Sabourin, Lussier, and Villeneuve (2009) investigated romantic relationship dysfunction in individuals diagnosed with BPD. One startling result revealed that over 30 of the 35 couples who began the study were not together 18 months later. That finding is consistent with the literature on intimate relationship dysfunction in BPD, which associates symptomology with a number of negative romantic relationship outcomes, such as

negative and ambivalent sexual attitudes towards partners (Bouchard, Godbout, & Sabourin, 2009), frequent breakups and reconciliations (Bouchard, Sabourin, Lussier, & Villeneuve, 2009; Labonte & Paris, 1993), high levels of attachment insecurity, demand-withdraw communication patterns (Bouchard et al., 2009), high levels of conflict and violence (Bouchard, Sabourin, Lussier, Villeneuve, 2009; Whisman & Schonbrun, 2009), lower rate of marrying (Labonte & Paris, 1993), less marital satisfaction, and marital disruption (Whisman & Schonbrun, 2009).

While the social networks of persons with BPD may not be different from that of healthy controls in a general sense, Clifton, Pilkonis, and McCarty, (2007) found several significant compositional differences. Individuals with BPD reported terminating a greater number of relationships within their social network. This suggests social supports are less stable and permanent in the lives of those with BPD. Furthermore, they had more former romantic partners in their social networks (Clifton et al., 2007). Over seven days, Stepp et al. (2009) investigated the interpersonal dynamics and emotional experiences resulting from the social interactions of individuals with BPD. They found that individuals with BPD rely on a limited social network.

Research suggests that individuals with BPD have impaired relationships with the social supports in their lives. Additionally, research also suggests that healthy social relationships may facilitate recovery from BPD. Understanding how individuals with BPD perceive their social supports is an important part of developing treatments that target the interpersonal impairments of those with BPD.

## **Sleep Disturbance**

Adequate sleep is necessary for both psychological and physical health (Barnes & Drake, 2015; “Sleep and Mental Health,” 2009). Research indicates that adults require between 7 and 8 hours of sleep each night for good health (Barnes & Drake, 2015; Puterbaugh, 2011). There are two main types of sleep which contribute to different health benefits. Non-rapid-eye-movement (NREM) sleep enhances immune system functioning, while rapid-eye-movement (REM) sleep enhances learning, memory, and emotional wellbeing. During sleep, the average individual cycles between the two types of sleep, and disruptions of sleep, impair the benefits (“Sleep and Mental Health,” 2009).

On a psychological level, sleep deprivation increases the likelihood of negative moods and distress (Barnes & Drake, 2015), inability to regulate emotions, increased levels of cortisol (“Sleep and Mental Health,” 2009), daytime fatigue, and impaired concentration. While on a physical level, sleep deprivation increases the risk for weight gain, diabetes (Puterbaugh, 2011), coronary heart disease, physical injuries, and early death (Barnes & Drake, 2015). Furthermore, difficulties with sleep are closely related to a host of mental disorders including: depression, bipolar disorder, anxiety disorders, ADHD (“Sleep and Mental Health,” 2009), and BPD (Hafizi, 2013). In the past, sleep disorders represented symptoms; however, new research indicates that sleep difficulties could increase the risk for the development of mental disorders. Moreover, some researchers suggest that biological underpinnings may explain the high co-occurrence of many mental disorders and sleep disorders (“Sleep and Mental Health,” 2009).

According to a recent review by Hafizi (2013), anywhere from 15% to 95.5% of individuals with BPD may experience sleep related problems; moreover, sleep issues are

a frequent ailment of individuals with BPD in clinical settings. The following sleep disturbances are associated with BPD: low sleep quality (Oltmanns, Weinstein, & Oltmanns, 2014; Philipsen et al., 2005; Schredl, et al., 2012; Semiz, Basoglu, Ebrinc, & Cetin, 2008); short sleep duration (Benson, King, Gordon, Silva, & Zarcone, 1990; De la Fuente, Bobes, Vizuete, & Mendlewicz, 2001; De La Fuente et al. 2004; Philipsen et al., 2005; Selby, 2013; Semiz et al., 2008); sleep continuity issues and sleep efficiency problems (Asaad, Okasha, & Okasha, 2002; Battaglia et al., 1993; La Fuente et al., 2001; La Fuente et al. 2004; Schredl, et al., 2012; Selby, 2013; Semiz et al., 2008); increased sleep latency (Asaad et al. 2002; Battaglia, Ferini-Strambi, Smirne, Bernardeschi, & Bellodi, 1993; Benson et al., 1990; De La Fuente et al., 2001; Selby, 2013; Semiz et al., 2008); and nightmares (Asaad et al., 2002; Selby, Ribeiro, & Joiner, 2013; Semiz et al., 2008).

The negative impact and potential risks of sleep deprivation for individuals with BPD are manifold. Individuals with BPD who experience sleep problems may also experience increased aggression (Semiz et al., 2008), relationship difficulties (Selby, 2013) increased suicide risk (Hafizi, 2013), emotional, cognitive, and self-care impairments (Selby, 2013), along with increased impairment of serotonergic functioning and prefrontal cortex functioning (Hafizi, 2013). In DBT treatment manuals, Linehan (1993a, 1993b) suggests that sleep hygiene is an important part of recovery from BPD.

Sleep disturbances may put individuals with BPD at increased risk for rejection sensitivity. Sleep is associated with emotional regulation and management of interpersonal stressors, such as rejection in social interactions (Eisenberger, Lieberman, & Williams, 2003; Etkin, Egner, & Kalisch, 2011; Walker, 2009). This is significant

considering individuals with BPD already experience impairments in emotional regulation and high levels of rejection sensitivity (Ayduk et al., 2008; Trull, 2015). Sleep deprivation could mean additional interpersonal impairment, which may put already unstable interpersonal relationships in further jeopardy.

Furthermore, recent research by Gilbert, Pond, Haak, Dewall, and Keller (2015) demonstrated that even healthy individuals experienced more perceived rejection and hurt feelings within romantic relationships after poor sleep. Specifically, on days following self-reported poor quality sleep, participants indicated high levels of rejection. On days following shorter sleep duration or less sleep efficiency, partner rejection was related to an increase in hurt feelings (Gilbert et al., 2015). Notably, romantic relationships improved when individuals were able to achieve adequate sleep duration, sleep efficiency, and sleep quality.

Despite the growing literature on sleep issues and BPD, little research exists on the consequences of poor sleep quality for those with BPD. This is important because evidence suggests sleep quality may play an important role in the rejection sensitivities experienced by those with BPD; thus, sleep quality may be an important influencing factor in the social relationships of those with BPD.

### **Rejection Sensitivity and Borderline Personality Disorder**

Downey and Feldman (1996) created the Rejection Sensitivity (RS) model in order to understand individual differences in maladaptive reactions to rejection. RS is a cognitive-affective disposition to "...anxiously expect, readily perceive, and overreact to social rejection" (p.1338), and may develop from continuous and consistent incidents of rejection, neglect, and exclusion from important persons, such as parental guardians,



beginning in early development (Pietrzak, Downey, & Ayduk, 2005). Due to those experiences, individuals begin to anxiously expect rejection and become constantly alert to possible signs of rejection over time (London, Downey, Bonica, & Paltin, 2007), and their affective reactions to perceived rejections are strong (Pietrzak et al., 2005). Etiology of RS shares some similarities with the etiology of borderline personality disorder proposed by developmental theorists (Gunderson, 2008; Levy, 2005; Linehan 1993). Linehan (1993) theorized that invalidating environments or environments high in criticizing or shaming contribute to the development of borderline personality disorder.

Individuals who are high in RS experience interpersonal impairments that are comparable to those of individuals with BPD (Downey & Feldman, 1996), such as fear of possible abandonment and more conflicts in social relationships. In normal populations, RS has been linked to a self-fulfilling prophecy in romantic partnerships where the actions of a partner who is high in rejection sensitivity are linked to an increase in rejecting behavior from their partner (Downey, Freitas, Michaelis, & Khouri, 1998). Additionally, romantic relationships between individuals with high RS are more unstable and more likely to dissolve than individuals with low rejection-sensitivity. In a study of men high in RS, some of the men showed a high tendency to be violent to romantic partners when facing perceived rejection if they were highly invested in the relationship. Other men high in RS used low investment in their romantic relationships as a general strategy to avoid rejection from partners (Downey, Feldman, & Ayduk, 2000). Relatedly, Ayduk, Downey, Testa, Yen, and Shoda (1999) primed women high and low in RS with thoughts about their romantic partners rejecting them. Afterwards women high in RS were more likely to have hostile thoughts and negative evaluations of their romantic

partners as well as an increased drive to engage in conflict with them than were women low in RS.

Given these findings, it is not surprising that there is a strong association between BPD and RS. For example, Stiglmayr et al., (2005) concluded that events prompting emotional suffering in BPD are frequently colored by social rejection. Over a 20-day period, Sadikaj, Russell, Moskowitz, and Paris (2010) found individuals with BPD showed increased affective dysregulation and sensitivity to stimuli associated with possible rejection. In a similar vein, Berenson, Downey, Rafaeli, Coifman, and Paquin (2011) found that “rejection-contingent rage” (p. 6) typified those with a BPD diagnosis. Staebler, Helbing, Rosenbach, and Renneberg (2011) found a strong positive relationship between RS and BPD. Bungert et al. (2015) found that both BPD patients with acute symptoms and those BPD patients in remission reported high levels of RS. Moreover, RS was positively correlated with symptom severity.

Those with BPD features are also prone to rejection sensitivity. Ayduk et al. (2008) examined the relationship between RS, BPD features, and executive control. Individuals who scored low on executive control and high on RS had more BPD features. For individuals with high levels of executive control, the relationship between BPD features and RS diminished (Ayduk et al., 2008). Boldero, Hulbert, Bloom, Cooper, and Gilbert (2009) found that RS partially mediated relationships between the number of borderline features and avoidant and anxious attachment styles, which is consistent with developmental perspectives on BPD (Agrawal et al., 2004; Gunderson & Lyons-Ruth, 2008; Levy, 2005). While Zeilinski and Veilleux, (2014) found that RS mediated the relationship between borderline features and number of social supports. Higher levels of

borderline features were associated with less satisfaction with social support. For those individuals with more BPD features and high RS, even minor social rejection stimuli may be distracting, actively avoided (Berenson et al., 2009), increase emotional and physiological arousal (Dixon-Gordon, Yiu, & Chapman, 2013), and inhibit the ability to trust (Miano, Fertuck, Arntz, & Stanley, 2013).

These findings suggest that RS is an enduring feature of BPD and perhaps a risk factor for the development and maintenance of related BPD symptomology and features. Furthermore, RS may play an important role in the ability of individuals with BPD and BPD features to maintain satisfying social supports.

### **Summary**

Recent research has demonstrated that even those who meet a few clinical criteria for BPD, or what is referred to as BPD features, experience significant interpersonal impairments (Hill et al., 2008; Trull et al., 1997). Individuals with BPD and elevated levels of BPD features live lives of clinically significant distress without many stable relationships to support them. While extensive research exists on the interpersonal impairments of those with BPD, little research exists on how individuals with BPD features perceive their social supports. This is crucial considering having social supports is protective of both physical and psychological well-being (Uchino, 2004), while social rejection decreases the likelihood of experiencing wellbeing (Csikszentmihalyi & Hunter, 2003; Tang & Richardson, 2013). A recent study on BPD features and social support indicated that individuals with BPD features experience less satisfaction with their social supports (Zielinski & Veilleux, 2014). Understanding how individuals with BPD perceive their social supports may be integral to their recovery (Lariviere et al., 2015).

Many individuals with BPD experience sleep related problems (Hafizi, 2013), and sleep plays an important role in emotional regulation, as well as the management of interpersonal stressors, such as rejection in social interactions (Eisenberger et al., 2003; Etkin et al., 2011; Walker, 2009); therefore, sleep disturbances may put individuals with BPD at increased risk for rejection sensitivity. Relatedly, sleep quality may be a significant factor influencing how individuals with BPD or BPD features perceive their social support. However, little research exists on the consequences of poor sleep quality for individuals with BPD and BPD features.

RS, or the cognitive-affective disposition to anxiously expect, readily perceive, and overreact to social rejection (Downey & Feldman, 1996), is a pathogenic mechanism in BPD symptomology that seems to increase social difficulties. Several studies have indicated that individuals with BPD, those in remission from BPD, and those with BPD features have elevated levels of RS (Bungert et al., 2015). Most significantly, RS may play an important role in the ability of individuals with BPD to maintain social support (Zeilinski & Veilleux, 2014). To date the relations among BPD features, social support, sleep quality, and rejection sensitivity have not been examined.

### **The Present Study**

The present study examined the relations among BPD features, social support, sleep disturbance, and rejection sensitivity. The primary aims of this study were to examine how sleep disturbance relates to the association between BPD features and rejection sensitivity (Ayduk et al., 2008), and to examine how sleep disturbance relates to the interpersonal relationships of those with BPD features. Additionally, this study will

also extend research on the relationships among BPD features, social support, sleep quality, and rejection sensitivity.

It is hypothesized that:

1. BPD features will have a negative relationship with perceived social support.
2. BPD features will have a positive relationship with sleep disturbance.
3. BPD features will have a positive relationship with rejection sensitivity.
4. The relationship between BPD features and rejection sensitivity will be moderated by sleep disturbance.
5. The relationship between BPD features and perception of social support will be moderated by sleep disturbance.

## CHAPTER 3

### METHOD

#### **Participants**

All procedures in this study were approved by the Institutional Review Board of Arizona State University. Recruitment materials were distributed through Arizona State University (ASU) and Craigslist.com in efforts to collect a diverse sample. ASU department coordinators were sent an IRB approved recruitment email with information on how to distribute the study information and link inviting staff and students at least 18 years old to participate. Two course coordinators of undergraduate career courses and the counseling psychology department advertised the study to staff and students using an IRB approved recruitment letter. Due to technical malfunctions, study participants were not recruited through Craigslist.com.

A Gpower (Erdfelder, Faul, & Buchner, 2007) power analysis was used to estimate an appropriate sample size of 129 participants, and 396 participants were included in the analyses. The participant mean age was 21 years old ( $SD = 6.17$ , Range = 51). Participant gender demographics were as follows: females ( $n = 232$ ), males ( $n = 163$ ), and other gender ( $n = 1$ ). The racial composition of study participants was: Caucasian ( $n = 230$ ), Latino/Hispanic ( $n = 79$ ), Asian ( $n = 31$ ), African American/Black ( $n = 30$ ), Other Race ( $n = 15$ ), Native/Indigenous ( $n = 7$ ), and Middle Eastern ( $n = 4$ ). The highest educational level completed by participants was: some college ( $n = 233$ ), high school ( $n = 102$ ), master's degree ( $n = 18$ ), associates degree ( $n = 13$ ), some graduate school ( $n = 13$ ), bachelor's degree ( $n = 11$ ), professional or doctoral degree ( $n = 5$ ), and less than high school ( $n = 1$ ). Participants' romantic relationship statuses were: unmarried

and single ( $n = 221$ ), unmarried in a romantic relationship ( $n = 144$ ), married ( $n = 31$ ); most participants had not been married before ( $n = 374$ ).

## **Measures**

**Demographics.** Each of the following demographic variables was assessed with a single question: age, current relationship status, previous marriages, gender, racial/ethnic background, and highest educational level achieved. Age and gender were included in the moderation analyses to control for variance as both are directly related to BPD. Over time, BPD features tend to remit with age, and about 75% of individuals with BPD are female (American Psychiatric Association, 2013, p. 665-666). All demographic questions are listed in Appendix A.

**Borderline personality disorder features.** Borderline personality disorder features were measured using the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003). The 10-item questionnaire utilizes DSM-IV-TR criteria to assess for the presence of borderline features. Response options are limited to yes or no, with corresponding weights of 1 or 0. Sample questions include: “Have any of your closest relationships been troubled by a lot of arguments or repeated breakups?” and “Have you been extremely moody?” ‘Yes’ items are summed to generate the overall score, which is out of 10 points possible. Higher scores evidence more symptoms or features of borderline personality disorder. During the validation of the screening tool at McClean Hospital, a cut-off score of 7 effectively predicted a diagnosis of BPD, which was assessed with the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID I; Spitzer, Williams, Gibbon, First et al., 1992) and the BPD module of the DIPD-IV (Zanarini et al., 1996). The cut-off score showed good sensitivity

(81% of cases correctly identified) and good specificity (85% of non-cases correctly identified). However, for individuals 25 years old and younger that cut-off score demonstrates a sensitivity of .90 and a specificity of .93. The MSI-BPD has acceptable internal reliability ( $\alpha = .74$ ) and test–retest reliability ( $r = .72$  after a 2-week interval [Zanarini et al., 2003]).

**Rejection sensitivity.** Rejection sensitivity was measured using the Rejection Sensitivity Questionnaire (RSQ; Downey & Feldman, 1996). The 18- item measure is designed to measure the construct of rejection sensitivity or the predisposition to anxiously expect rejection (Downey & Feldman, 1996). Each item includes a social scenario where rejection might occur (e.g., “You approach a close friend to talk after doing or saying something that seriously upset him/her”). Each scenario is followed by two questions. The first question prompts test-takers to rate their concern about being rejected in the scenario (e.g., How concerned or anxious would you be over whether or not your friend would want to talk with you?). Response options are on a Likert scale ranging from 1 (very unconcerned) to 6 (very concerned). The second question prompts test-takers to rate their belief that the other person(s) in the scenario will act in an accepting manner (e.g., “I would expect that he/she would want to talk with me to try to work things out”) on a Likert scale ranging from 1 (very unlikely) to 6 (very likely). Total scores range from 1 (low) to 36 (high). The RSQ shows high internal consistency ( $\alpha = .81$ ) and high test–retest reliability ( $r = .83$  after a 3-week interval and  $r = .73$  after a 4-month interval [Downey & Feldman, 1996]). The RSQ has demonstrated good convergent validity when correlated with the Interpersonal Sensitivity Scale of the



SCL-90 ( $r = .48$ ), the Social Avoidance and Distress Scale ( $r = .41$ ), and the Beck Depression Inventory ( $r = .35$ ) (Downey, n.d.).

**Perceived social support.** Perceived social support was measured with the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988). The 12-item scale of social support is designed to measure the test-taker's satisfaction with social support from friends, family, and significant others, which are measured by three subscales. Response options are on a Likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). Sample questions include: "There is a special person who is around when I am in need" (significant other) and "My family is willing to help me make decisions" (family) and "I can count on my friends when things go wrong" (friends). Scores for each item range from 0 (very strongly disagree) to 6 (very strongly agree). Scores are derived by summing points from each question. Higher scores indicate higher levels of perceived social support. The MPSS has strong internal reliability for the total scale ( $\alpha = .88$ ) as well as for each subscale (significant other subscale  $\alpha = .91$ , family subscale  $\alpha = .87$ , and friends subscale  $\alpha = .85$ ). Moreover, after a 2 to 3 month period, the MPSS showed good test-retest reliability for the total scale ( $r = .85$ ), and good test-retest reliability for each subscale (significant other subscale  $r = .72$ , family subscale  $r = .87$ , and friends subscale  $r = .85$ ; Zimet et al., 1988). The total score will be used for analysis in this study. Zimet et al. (1988) established divergent validity for the MPSS through the inverse relations between MPSS subscale scores and Depression and Anxiety subscale scores on the Hopkins Symptoms Checklist (HSCL; Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974).

**Sleep disturbance.** Sleep disturbance was measured using the Insomnia Severity

Index (ISI; Bastien, Vallieres, & Morin, 2001). The 7-item scale is designed to measure insomnia symptoms experienced over the previous two weeks. An individual's perception of his or her problems with three specific sleep issues (i.e., sleep latency, sleep continuity, and awakening earlier than desired) is assessed as well as the individual's distress regarding sleep difficulties. Sample items include: "Please rate the current (i.e., last 2 weeks) severity of your insomnia problem(s)." and "To what extent do you consider your sleep problem to INTERFERE with your daily functioning (e.g., daytime fatigue, mood, ability to function at work/daily chores, concentration, memory, mood, etc.) CURRENTLY?" Response options are on a Likert scale ranging from 0 to 4 with lower scores indicating less sleep disturbance. The total score is calculated by adding the responses across all seven items and can range from 0 to 28. Scores between 8 and 14 indicate subthreshold insomnia and scores above 15 indicate clinical insomnia. The ISI has demonstrated strong internal consistency with community ( $\alpha = .90$ ) and clinical samples ( $\alpha = .91$ ) (Morin, Belleville, Belanger, & Ivers, 2011). The ISI correlates highly with the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) ( $r = .80$ ).

### **Procedures**

All questionnaire items were compiled into an online questionnaire in Qualtrics. The four questionnaires within the master questionnaire were delivered in the order listed above for half the sample and in reverse order for half the sample. At the start of the questionnaire, participants read and electronically signed their informed consent. Participants were informed that the study is about exploring psychological symptoms, interpersonal issues, and sleep. The questionnaire takes approximately 15 minutes to

complete. This time estimate is based on an earlier administration of the questionnaire to a counselor and a teacher. Once a participant completed the questionnaire, debriefing occurred via text on the computer screen. Participants were offered a chance to win one of three \$25 Amazon gift cards for their participation if they emailed the co-investigator after completing the questionnaire. Winning participants were selected through a random drawing, and gift cards were sent.

## CHAPTER 4

### ANALYSIS

The questionnaire data were first reviewed for missing values as well as adherence to the principal assumptions of multiple linear regression analysis. All statistical analyses were conducted using SPSS version 23 as well as Microsoft Excel version 15.18. Missing survey data were handled with Expectation-Maximization (EM) in SPSS. Then, data were checked to ensure they met the principal assumptions of multiple linear regression, which include a linear relationship, no measurement error in the independent variables, homoscedasticity of the residuals, independence of the residuals, and normality of the residuals (Cohen, Cohen, West, & Aiken, 2003).

Scatterplots of the residuals were examined to identify any deviations from linearity, homoscedasticity, and independence. Coefficient alphas were obtained to estimate the reliability or internal consistency of the scores, and histograms were examined to assess normality. The above assessments of the assumptions of multiple linear regression are recommended by Cohen et al. (2003).

The following analyses were conducted:

1. A bivariate correlation analysis between MSI-BPD scores for BPD features and MSPSS scores for perceived social support was completed to test hypothesis 1 that BPD features would have a negative relationship with perceived social support.
2. A bivariate correlation analysis between MSI-BPD scores for BPD features and ISI scores for sleep disturbance was completed to test hypothesis 2 that BPD features would have a positive relationship with sleep disturbance.

3. A bivariate correlation analysis between MSI-BPD scores for BPD features and RSQ scores for RS was completed to test hypothesis 3 that BPD features would have a positive relationship with rejection sensitivity.
4. A multiple linear regression analysis with MSI-BPD scores for BPD features as the predictor variable, ISI scores for sleep disturbance as the moderator variable, and RSQ scores for RS as the outcome variable was completed to test hypothesis 4 that the relationship between BPD features and rejection sensitivity would be moderated by sleep disturbance. If the moderation was significant, post-hoc probing was conducted with 2-way interaction utilities by Preacher, Curran, and Bauer (2003).
5. A multiple linear regression analysis with MSI-BPD scores for BPD features as the predictor variable, ISI scores for sleep disturbance as the moderator variable, and MSPSS scores for perceived social support as the outcome variable was completed to test hypothesis 5 that the relationship between BPD features and perceived social support would be moderated by sleep disturbance. If the moderation was significant, post-hoc probing was conducted with 2-way interaction utilities by Preacher, Curran, and Bauer (2003).

## CHAPTER 5

### RESULTS

#### **Missing data**

There were 421 respondents; 25 participants only responded to the demographic questions before exiting the questionnaire. For the remaining 396 cases, a total of 13.38% of cases were missing at least one response. The following numbers reflect the number of cases missing at least one response by scale: 21 from the MSPSS, 13 from the RSQ, 9 from the MSI-BPD, and 6 from the ISI.

Expectation-Maximization, or EM in SPSS version 23, was used for missing data. The procedure determines associations amongst parameters of the model with missing data. Prior to conducting EM, Little's-Missing-Completely-at-Random (MCAR) Test was completed in SPSS. Little's MCAR test was not significant for any of the scales when considered together ( $\chi^2 = 1027.94$ ,  $df = 1103$ ,  $p = .948$ ). This indicates the data were missing at random, and missing data were unrelated to the specific variables under study. For additional analysis, each scale was examined separately with Little's MCAR test. All scales passed the test, except the RSQ ( $\chi^2 = 105.46$ ,  $df = 59$ ,  $p = .000$ ), which indicates some data in the RSQ were not missing completely at random. Given that the total scale passed Little's MCAR test, EM was utilized to substitute missing data. See Table 1 for scale properties.

Table 1

*Scale Properties (N = 396)*

Scale	<i>M</i>	<i>SD</i>	$\alpha$
McLean Screening Instrument for Borderline Personality Disorder	3.76	2.89	.81
Multidimensional Scale of Perceived Social Support	64.68	13.52	.92
Insomnia Severity Index	8.7	5.26	.84
Rejection Sensitivity Questionnaire	9.13	4.11	.78

### Hypothesis Testing

**Hypothesis 1: BPD features will have a negative relationship with perceived social support.** BPD features and perceived social support had a significant negative relationship ( $r = -.361, p = .000$ ).

**Hypothesis 2: BPD features will have a positive relationship with sleep disturbance.** BPD features and sleep disturbance had a significant positive relationship ( $r = .435, n = 396, p = .001$ ).

**Hypothesis 3: BPD features will have a positive relationship with rejection sensitivity.** BPD features and rejection sensitivity had a significant positive relationship ( $r = .335, p = .000$ ). See Table 2 for the correlation matrix.

Table 2

*Bivariate Correlations (N=396)*

Measures	1	2	3	4
1. Rejection Sensitivity (RSQ)	-			
2. BPD Features (MSI-BPD)	.335**	-		
3. Sleep Disturbance (ISI)	.158**	.435**	-	
4. Perceived Social Support (MSPSS)	-.452**	-.361**	-.199**	-

*Note.* All variables were mean-centered. \*\*  $p < .000$

**Hypothesis 4: The relationship between BPD features and rejection sensitivity will be moderated by sleep disturbance.** A hierarchical linear regression of RS on BPD features and sleep disturbance was completed to assess hypothesis 5. All independent variables were mean-centered to control for multicollinearity. Descriptive statistics for this regression and the following one are displayed in Table 3.

Table 3

*Descriptive Statistics (N = 396)*

Variable	Range	<i>M</i>	<i>SD</i>
Rejection Sensitivity (RSQ)	25.89	9.13	4.11
Perceived Social Support (MSPSS)	72.00	64.68	13.52
BPD Features (MSI-BPD)	10.00	3.76	2.89
(Mean-Centered)		0.00	2.89
Sleep Disturbance (ISI)	24.00	8.70	5.26
(Mean-Centered)		0.00	5.26

*Note.* Dependent variables were not mean-centered for MLR or Post-Hoc Moderation Probing.

The regression of rejection sensitivity on demographic variables was not statistically significant,  $F(3, 389) = 1.861, p = .136, R^2 = .014$ . Inclusion of BPD features and sleep disturbance accounted for a statistically significant amount of variance in rejection sensitivity,  $F(2, 387) = 23.722, p = .000, \Delta R^2 = .108$ . The final regression with the interaction term of BPD features by sleep disturbance was not statistically significant,  $F(1, 386) = 1.426, p = .233, \Delta R^2 = .003$ . As the interaction term was not statistically significant, post-hoc moderation probing was not completed. The final regression model was statistically significant,  $F(6, 386) = 9.194, p = .000, R^2 = .125$ . BPD features (standardized  $\beta = .330$ ) was a positive predictor of rejection sensitivity (RSQ scores;  $p < .000$ ). See Table 4 for the details of the hierarchical regression.



Table 4

*Hierarchical Linear Regression Analyses Predicting Rejection Sensitivity from Sleep Disturbance (ISI) and BPD Features (MSI)*

Predictor	<i>B</i>	$\beta$	$R^2$	$\Delta R^2$
Step 1			.014	.014
Demographics				
Step 2			.122**	.108**
Demographics				
MSI	.462**	.325**		
ISI	.012	.016		
Step 3			.125	.003
Demographics				
MSI	.469**	.330**		
ISI	.019	.024		
MSI x ISI	-.016	-.058		

*Note.* All variables are mean centered. Demographic variables are not described, as they do not pertain to the main analysis of the moderation.

<sup>a</sup>Demographic variables included: age and gender.

\* $p < .01$ , \*\* $p < .000$

**Hypothesis 5: The relationship between BPD features and perception of social support will be moderated by sleep disturbance.** A hierarchical linear regression of perceived social support on BPD features and sleep disturbance was completed to assess hypothesis 5. All independent variables were mean-centered to control for multicollinearity. The regression of perceived social support on demographic variables was statistically significant,  $F(3, 389) = 5.415, p = .001, R^2 = .040$ . Inclusion of BPD features and sleep disturbance accounted for a statistically significant amount of variance in perception of social support beyond demographics,  $F(2, 387) = 31.370, p = .000, \Delta R^2 = .134$ . The final regression with the the interaction term of BPD features by sleep disturbance accounted for a statistically significant amount of variance in perceived social support beyond demographics, BPD features, and sleep disturbance,  $F(1, 386) = 8.161, p = .005, \Delta R^2 = .017$ .

The final model was statistically significant,  $F(6, 386) = 15.198, p = .000, R^2 = .191$ . BPD features (standardized  $\beta = -.356$ ) was a negative predictor of perceived social support ( $p = .000$ ). The interaction term of BPD features by sleep disturbance (standardized  $\beta = .134$ ) was a positive predictor of perceived social support ( $p < .01$ ). Sleep disturbance was not predictive of perceived social support, ( $p > .05$ ). See Table 5 for a summary of this hierarchical regression.

Table 5

*Hierarchical Linear Regression Analyses Predicting Perceived Social Support from Sleep Disturbance (ISI) and BPD Features (MSI)*

Predictor	<i>B</i>	$\beta$	$R^2$	$\Delta R^2$
Step 1			.040*	.040*
Demographics				
Step 2			.174**	.134**
Demographics				
MSI	-1.611**	-.345**		
ISI	-.133	-.052		
Step 3			.191*	.017*
Demographics				
MSI	-1.665**	-.355**		
ISI	-.093	-.036		
MSI x ISI	.119*	.134*		

*Note.* All variables are mean centered. Demographic variables are not described, as they do not pertain to the main analysis of the moderation.

<sup>a</sup>Demographic variables included: age and gender.

\* $p < .01$ , \*\* $p < .000$

**Post-hoc moderation probing.** As the interaction term was statistically significant, post-hoc moderation probing of simple slopes was completed using 2-way moderation computation utilities (Preacher, Curran, & Bauer, 2006). First the association between BPD features and perceived social support was plotted at relatively low (-1SD) moderate (mean) and high (+1SD) values of sleep disturbance (Cohen, Cohen, West, & Aiken, 2003; Preacher, Curran, & Bauer, 2006). See Figure 1 for the graph of the

moderation. At all levels of sleep disturbance, borderline features produced a significant yet varying level of decrease in perception of social support. In individuals who experienced low sleep disturbance, borderline features predicted a decrease in perception of social support,  $\beta = -2.2915$ ,  $p < .001$ . In individuals who experienced moderate and high sleep disturbance, borderline features predicted a decrease in perception of social support,  $\beta = -1.665$ ,  $p < .001$ , and  $\beta = -1.0385$ ,  $p < .001$ , respectively.

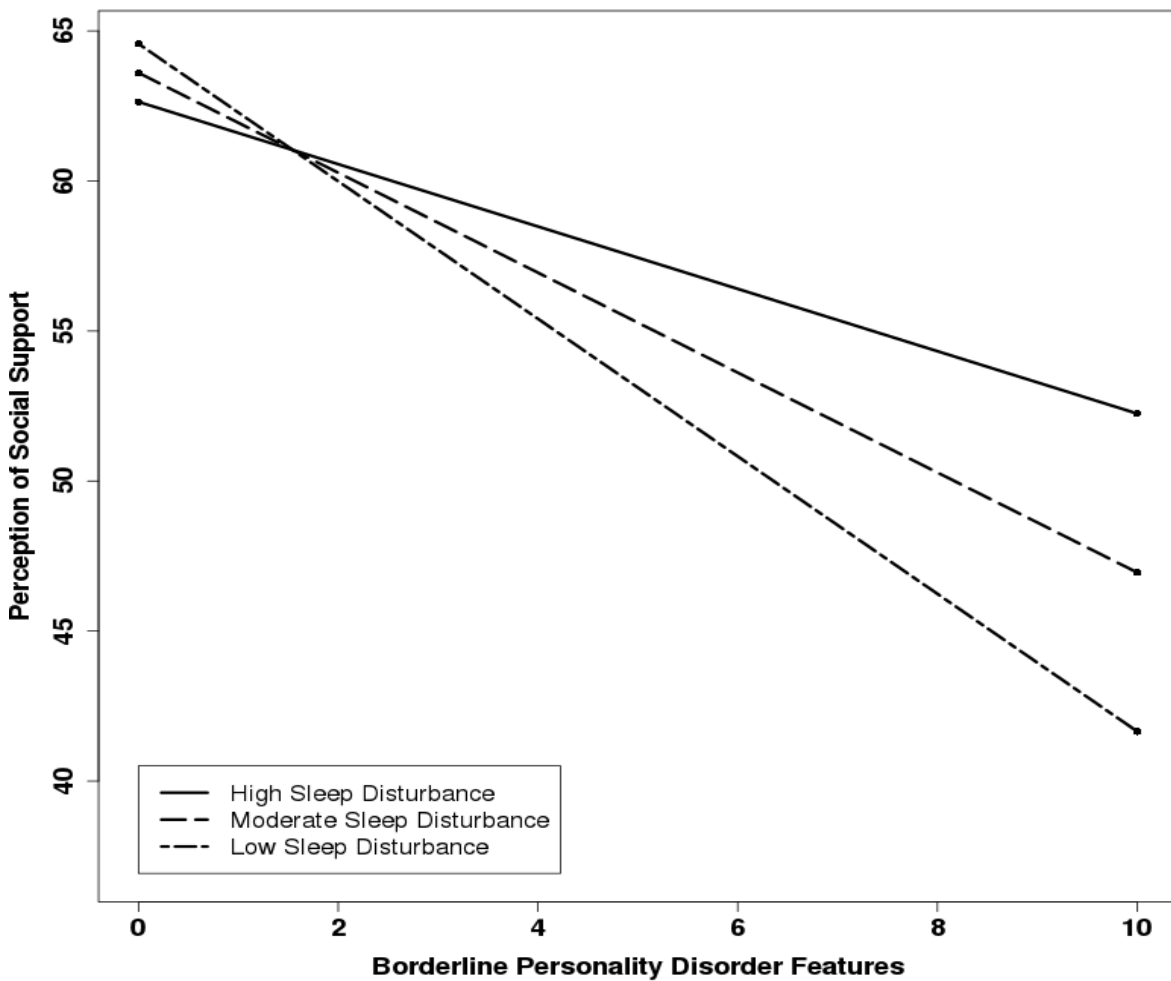


Figure 1. Sleep disturbance moderates the relationship between BPD features and perceived social support.

## CHAPTER 6

### DISCUSSION

The present study examined the relationships between BPD features, social support, sleep quality, and rejection sensitivity in a racially diverse, large sample of primarily college-aged individuals. Overall, study findings help to uncover the factors that interfere with social relationships for those with BPD. Results of bivariate correlations were in accordance with hypotheses, and extend and replicate recent research findings on the possible mechanisms that may maintain and alleviate BPD symptoms.

BPD features had a significant, moderate, positive relationship with self-reported rejection sensitivity. That is, as borderline features increase, rejection sensitivity, or anxious expectations of rejection, tends to increase as well. Findings are consistent with previous research demonstrating the direct association between BPD features and rejection sensitivity as measured by the RSQ (Ayduk et al., 2008; Bungert et al., 2015; Staebler et al., 2011; Zielinski & Veilleux, 2014).

BPD features had a significant, moderate, negative relationship with self-reported perceived social support; moreover, as BPD features increase, the belief that supportive others are available to meet one's needs tends to decrease. This association is supported by recent research on the social support relationships of those with BPD features. Lazarus, Southward, and Cheavens (2016) found that as BPD features increase satisfaction with one's social support network tends to decrease. Similarly, Zielinski and Veilleux (2014) found BPD features predict fewer supportive relationships as well as less satisfaction with support.

BPD features had a significant positive relationship with sleep disturbance. In this

sample, as BPD features increased insomnia symptoms tended to increase accordingly. This result corresponds with Selby's (2013) finding that BPD symptoms were related to chronic sleep disturbances in a large national sample of adults over 18 years-old. Similarly, Oltsmanns et al., (2014) found that borderline personality symptoms were associated with sleep disturbance while accounting for key covariates.

There are some additional correlations of interest that were not hypothesized. Rejection sensitivity was significantly associated with perception of support, which corresponds with results from a line of research on rejection sensitivity, and social support (Ayduk, Downey, Testa, Yen, & Shoda, 1999; Downey, Feldman, & Ayduk, 2000; Downey, Freitas, Michaelis, & Khouri, 1998 Pietrzak et al., 2005). Rejection sensitivity was also significantly associated with sleep disturbance, and sleep disturbance was significantly associated with perception of social support. These findings are in line with new research indicating attachment insecurity, a major contributor to experienced rejection sensitivity, and perceptions of both positive and aversive social support (Adams & McWilliams, 2015; Ailshire & Burgard, 2012; Kent, Uchino, Cribbet, Bowen, & Smith, 2015) influence sleep quality.

Sleep disturbance did not moderate the relationship between BPD features and rejection sensitivity as expected; however, the regression of rejection sensitivity on BPD features and sleep disturbance was significant. These results suggest that the association between BPD features and rejection sensitivity does not change based on the level of sleep disturbance experienced, yet BPD features and sleep disturbance may account for a significant amount of variance in rejection sensitivity experienced by individuals. These relationships may be explained via emotional dysregulation. Individuals with BPD

features experience decreased ability to regulate emotions along with an exacerbation of interpersonal issues associated with their features as a result of sleep disturbance (Selby, 2013).

As hypothesized, sleep disturbance moderated the relationship between BPD features and rejection sensitivity, albeit in an unanticipated manner. At all levels of sleep disturbance, borderline features produced a significant, yet varying level of decrease in perception of social support; however, increased sleep disturbance corresponded with increased perception of social support. This result is counterintuitive, but several recent research findings may help to explain this interaction.

First, BPD is linked to compositional differences in social networks. Some researchers have found that the social network size of those with BPD features is about the same as those without BPD features (Clifton, Pilkonis, & McCarty 2007; Lazarus et al., 2016), while others have found those with BPD have fewer social supports (Zielinski & Veilleux, 2014), and fewer social contacts each day (Stepp, Pilkonis, Yaggi, Morse, & Feske, 2009). Furthermore, individuals with BPD report more former romantic partners, more conflict within social relationships, and more terminations of relationships in their social networks (Clifton, Pilkonis, & McCarty 2007). In addition, BPD features predict less satisfaction with support from social relationships (Lazarus, Southward, & Cheavens, 2016; Zielinski & Veilleux, 2014) and romantic relationships (Bouchard, Sabourin, Lussier, & Villeneuve, 2009; Labonte & Paris, 1993; Whisman & Schonbrum, 2009). This indicates that those with BPD have unstable social networks characterized by dissatisfaction with available social support and conflictual social bonds.

Second, recent research indicates that supportive social ties are positively

associated with good sleep quality and aversive ties, especially in close relationships, are associated with poorer sleep quality (Ailshire & Burgard, 2012; Kent, Uchino, Cribbet, Bowen, & Smith, 2015). Because perceived social support was measured in this study, rather than satisfaction with social support or actual social support available, it is possible that those with high levels of BPD features who also have higher levels of sleep disturbance *perceive that support* is available, but that some or many of their supportive relationships are unsatisfying or aversive, as prior research suggests, and these negative social relationships contribute to sleep disturbance and perception of social support.

It may be that the social relationships in the social networks of those with BPD features are perceived as supportive if needed, but that many of these social relationships are far from positive, and thus impair the sleep quality of those with BPD features. Furthermore, this explanation is supported by research by Selby (2013), who found BPD was significantly associated with chronic sleep disturbance, which was also associated with increased impairment in emotional regulation and interpersonal problems. In this way, negative relationships may be predominant in the social relationships of those with BPD, and sleep problems may exacerbate BPD features leading to increased problems with social relationships.

Furthermore, this suggested explanation corresponds with research on attachment styles and sleep patterns. First, research indicates that those with BPD and BPD features have insecure attachment styles, characterized by a dual desire for and fear of closeness with others (Agrawal, Gunderson, Holmes, & Lyons-Ruth, 2004; Boldero, Hulbert, Bloom, Cooper, & Gilbert, 2009). Second, in a large sample Adams and McWilliams (2015) found that attachment insecurity is associated with sleep disturbances after

accounting for comorbid mental disorders and medical issues. These findings suggest that individuals with BPD features may maintain negative social ties out of attachment anxiety, and that sleep disturbances may be maintained via that attachment anxiety, especially through increased emotional dysregulation due to social conflicts (Selby, 2013) or unsatisfying social interactions during the day.

### **Limitations**

There are several limitations in this study. First, the strength of inferences drawn from this study is limited by the cross-sectional design. Longitudinal designs would help to determine if sleep disturbance exacerbates BPD symptoms or if those with BPD are particularly vulnerable to future sleep disturbance. Second, the sample for this study was not a clinical sample, and individuals self-reported BPD features based on a screening tool; therefore, results from this study may not generalize to clinical populations. Nevertheless, it is important to research the impact of both subclinical and clinical levels of BPD features, especially since research indicates having one BPD feature accounts for a significant amount of psychosocial dysfunction (Zimmerman, Chelminski, Young, Dalrymple, & Martinez, 2012). Third, all measures in this study are self-report which is subject to reporting biases. In particular, there may be a limitation in the use of self-report sleep measures with those who have BPD features. Discrepancies between self-report and electroencephalography sleep assessments in studies suggest there may be a negative reporting bias for sleep disturbance for those with BPD features (Asaad et al. 2002; Philipsen et al., 2015).



## **Implications for Future Research**

Some of the limitations of this study might be addressed in future research. Longitudinal studies using objective measures are needed. For instance, inferences could be strengthened by using objective measures of sleep, such as actigraphy and polysomnography, in conjunction with self-report measures, and experience sampling measures, like sleep diary monitoring. Researchers who replicate and extend these findings using BPD as assessed by structured clinical interviews could make important contributions. Additionally, exploration of these relationships within clinical populations might reveal stronger associations, and perhaps the moderation of rejection sensitivity on BPD features and sleep disturbance will be significant. Future researchers may want to explore the moderation of perceived social support on BPD features and sleep disturbance using an alternative measure of social support. For instance, perceived social support was measured in this study; however, exploration of other aspects of social support, such as received social support, satisfaction with social support, or social network composition, may yield useful results. It may be particularly relevant to explore the contribution of both positive and negative aspects of social support in this interaction.

Finally, this is one of the first studies that examined the role of sleep in the social relationships experienced by those with BPD features. Future work replicating and extending these findings with possible covariates is needed. Other factors that are related to rejection sensitivity, BPD features, and sleep disturbance, not assessed in this study, such as emotional regulation, executive functioning, and attachment insecurity, may be important covariates to explore in conjunction with the relationship between BPD features and sleep disturbance.

## **Implications for Practice**

This study has some implications for practice. First, this and numerous other studies using qualitative and experimental designs, make clear the relationship between BPD features and rejection sensitivity; furthermore, individuals with both acute and remitted BPD have more elevated levels of rejection sensitivity than healthy controls (Bungert et al., 2015), and rejection sensitivity is linked with impaired social relationships and relational distress (Ayduk, Downey, Testa, Yen, & Shoda, 1999; Berenson et al., 2011; Bungert et al., 2015; Downey, Feldman, & Ayduk, 2000; Downey, Freitas, Michaelis, & Khouri, 1998; Pietrzak et al., 2005; Sadikaj, Russel, Moskowitz, & Paris, 2010; Staebler et al., 2011; Stiglmayr et al., 2005). Rejection sensitivity may be important to discuss with individuals who have BPD and features of BPD seeking therapy. Reducing rejection sensitivity may be an important goal of therapy for those with BPD, and could be directly incorporated into treatment protocols for the disorder.

Furthermore, sleep disturbance may also be a target for therapeutic intervention due to its positive association with BPD symptoms (Hafizi, 2013; Selby, 2013), and relation to perception of social support for those with BPD symptoms. Increased sleep hygiene may offer individuals with BPD increased capacity for emotional regulation and decrease the negative impact of BPD features on relationships.

## **Conclusion**

This study adds to the literature on BPD features and interpersonal impairments. Results indicate that those with BPD features experience higher levels of rejection sensitivity, or anxious expectations of rejection. These individuals may also experience or be at higher risk for sleep disturbance. Furthermore, Individuals with elevated levels of

BPD features may perceive that they have less social support available to them. In an unexpected finding, individuals with higher levels of BPD features may perceive that more support is available to them if they experience higher levels of sleep disturbance. This finding is perhaps due to the fact that individuals with BPD have many conflictual relationships in their social networks, and such aversive social ties are linked to poorer sleep quality. These findings are limited based on the cross-sectional study design, nonclinical sample, and reliance on self-report measures. Future researchers may address these limitations, and especially assess the moderation between BPD features, sleep disturbance, and social support, with alternative measures of social support. Findings suggest that rejection sensitivity and sleep disturbance may be important factors to monitor in the treatment of borderline personality pathology, especially in relation to social support. In conclusion, the results of this study point to pathways by which BPD features may be addressed and alleviated.

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APPENDIX A  
DEMOGRAPHIC QUESTIONS

1. How old are you? (Type response in years)
2. What is your current relationship status?
  - a. Unmarried and single
  - b. Unmarried in a relationship
  - c. Married
3. Have you been married before?
  - a. Yes
  - b. No
4. What is your gender?
  - a. Female
  - b. Male
  - c. Other (Type response)
5. What is your racial/ethnic background?
  - a. African American/Black
  - b. Asian
  - c. Caucasian/White
  - d. Latino/Hispanic
  - e. Middle Eastern
  - f. Native American/Indigenous
  - g. Other (Type response)
6. What is your highest educational level achieved?
  - a. Less than a high school diploma
  - b. High school diploma
  - c. Some college/university
  - d. Associates degree
  - e. Bachelors degree
  - f. Some graduate school
  - g. Masters degree
  - h. Professional and/or doctoral degree (MD, JD, Ph.D., etc.)

APPENDIX B

REJECTION SENSITIVITY QUESTIONNAIRE

The items below describe situations in which people sometimes ask things of others. For each item, imagine that you are in the situation, and then answer the questions that follow it.

1. You ask your parents or another family member for a loan to help you through a difficult financial time.

How concerned or anxious would you be over whether or not your family would want to help you?

very unconcerned			very concerned		
1	2	3	4	5	6

I would expect that they would agree to help as much as they can.

very unlikely			very likely		
1	2	3	4	5	6

2. You approach a close friend to talk after doing or saying something that seriously upset him/her.

How concerned or anxious would you be over whether or not your friend would want to talk with you?

very unconcerned			very concerned		
1	2	3	4	5	6

I would expect that he/she would want to talk with me to try to work things out.

very unlikely			very likely		
1	2	3	4	5	6

3. You bring up the issue of sexual protection with your significant other and tell him/her how important you think it is.

How concerned or anxious would you be over his/her reaction?

very unconcerned			very concerned		
1	2	3	4	5	6

I would expect that he/she would be willing to discuss our possible options without getting defensive.

very unlikely			very likely		
1	2	3	4	5	6

4. You ask your supervisor for help with a problem you have been having at work.

How concerned or anxious would you be over whether or not the person would want to help you?

very unconcerned			very concerned		
1	2	3	4	5	6

I would expect that he/she would want to try to help me out.

very unlikely			very likely		
1	2	3	4	5	6

5. After a bitter argument, you call or approach your significant other because you want to make up.

How concerned or anxious would you be over whether or not your significant other would want to make up with you?

very unconcerned			very concerned		
1	2	3	4	5	6

I would expect that he/she would be at least as eager to make up as I would be.

very unlikely			very likely		
1	2	3	4	5	6

6. You ask your parents or other family members to come to an occasion important to you.

How concerned or anxious would you be over whether or not they would want to come?

very unconcerned			very concerned		
1	2	3	4	5	6

I would expect that they would want to come.

very unlikely			very likely		
1	2	3	4	5	6

7. At a party, you notice someone on the other side of the room that you'd like to get to know, and you approach him or her to try to start a conversation.

How concerned or anxious would you be over whether or not the person would want to talk with you?

very unconcerned			very concerned		
1	2	3	4	5	6

I would expect that he/she would want to talk with me.

very unlikely			very likely		
1	2	3	4	5	6

8. Lately you've been noticing some distance between yourself and your significant other, and you ask him/her if there is something wrong.

How concerned or anxious would you be over whether or not he/she still loves you and wants to be with you?

very unconcerned			very concerned		
1	2	3	4	5	6

I would expect that he/she will show sincere love and commitment to our relationship no matter what else may be going on.

very unlikely			very likely		
1	2	3	4	5	6

9. You call a friend when there is something on your mind that you feel you really need to talk about.

How concerned or anxious would you be over whether or not your friend would want to listen?

very unconcerned			very concerned		
1	2	3	4	5	6

I would expect that he/she would listen and support me.

very unlikely			very likely		
1	2	3	4	5	6

APPENDIX C  
MCLEAN SCREENING INSTRUMENT FOR BORDERLINE  
PERSONALITY DISORDER

1. Have any of your closest relationships been troubled by a lot of arguments or repeated breakups?    Yes        No
2. Have you deliberately hurt yourself physically (e.g., punched yourself, cut yourself, burned yourself)? How about made a suicide attempt?    Yes        No
3. Have you had at least two other problems with impulsivity (e.g., eating binges and spending sprees, drinking too much and verbal outbursts)?    Yes        No
4. Have you been extremely moody?    Yes        No
5. Have you felt very angry a lot of the time? How about often acted in an angry or sarcastic manner?    Yes        No
6. Have you often been distrustful of other people?    Yes        No
7. Have you frequently felt unreal or as if things around you were unreal?  
Yes        No
8. Have you chronically felt empty?    Yes        No
9. Have you often felt that you had no idea of who you are or that you have no identity?    Yes        No
10. Have you made desperate efforts to avoid feeling abandoned or being abandoned (e.g., repeatedly called someone to reassure yourself that he or she still cared, begged them not to leave you, clung to them physically)?    Yes        No



APPENDIX D  
INSOMNIA SEVERITY INDEX

Please rate the CURRENT (i.e. LAST 2 WEEKS) SEVERITY of your insomnia/sleeping problem(s).

Insomnia Problem	None	Mild	Moderate	Severe	Very Severe
1. Difficulty falling asleep	0	1	2	3	4
2. Difficulty staying asleep	0	1	2	3	4
3. Problems waking up too early	0	1	2	3	4

4. How SATISFIED/DISSATISFIED are you with your CURRENT sleep pattern?

Very Satisfied	Satisfied	Moderately Satisfied	Dissatisfied	Very Dissatisfied
0	1	2	3	4

5. How NOTICEABLE to others do you think your sleep problem is in terms of impairing the quality of your life?

Not at all Noticeable	A Little	Somewhat	Much	Very Much Noticeable
0	1	2	3	4

6. How WORRIED/DISTRESSED are you about your current sleep problem?

Not at all Worried	A Little	Somewhat	Much	Very Much Worried
0	1	2	3	4

7. To what extent do you consider your sleep problem to INTERFERE with your daily functioning (e.g. daytime fatigue, mood, ability to function at work/daily chores, concentration, memory, mood, etc.) CURRENTLY?

Not at all Interfering	A Little	Somewhat	Much	Very Much Interfering
0	1	2	3	4

APPENDIX E

MULTIDIMENSIONAL SCALE OF PERCEIVED SOCIAL SUPPORT

1. There is a special person who is around when I am in need.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

2. There is a special person with whom I can share my joys and sorrows.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

3. My family really tries to help me.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

4. I get the emotional help and support I need from my family.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

5. I have a special person who is a real source of comfort to me.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

6. My friends really try to help me.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

7. I can count on my friends when things go wrong.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

8. I can talk about my problems with my family.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

9. I have friends with whom I can share my joys and sorrows.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

10. There is a special person in my life who cares about my feelings.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

11. My family is willing to help me make decisions.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

12. I can talk about my problems with my friends.

Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
1	2	3	4	5	6	7

APPENDIX F  
RECRUITMENT LETTER

Study Title: Psychological Symptoms, Interpersonal Issues, and Sleep

Dear Potential Research Participant,

I am a graduate student under the direction of Richard Kinnier, PhD, in the Counseling Psychology Department at Arizona State University. I am conducting a research study to assess the relationships between psychological symptoms, interpersonal issues, and sleep. I am inviting your participation if you are fluent in the English language and at least 18 years old. Participation involves completing an online questionnaire that should take approximately 15 minutes of your time.

**Voluntary Participation:** Because your participation in this study is voluntary, you have the right not to answer any question, and to stop participation at any time. If you choose not to participate or to withdraw from the study, there will be no penalty.

**Compensation and Credit:** All participants will be entered into a drawing to win one of three \$25 Amazon.com gift-cards. If your instructor distributed this study to you, you may also have the chance to earn extra credit points in your course. Alternative extra credit assignments are embedded in your course should you choose not to participate. Your participation in this study may also help to improve the scientific community's understanding of mental health, sleep hygiene, and interpersonal relationships.

**Risks and Confidentiality:** There are no foreseeable risks or discomforts to your participation. Your responses will be anonymous and confidential. The principal investigator and co-investigator of this study will be the only individuals with access to survey data. The results of this study may be used in reports, presentations, or publications, but your name will not be used. The study results will only be shared in aggregate form.

**Questions and Concerns:** If you have any questions concerning this research study, please contact the research team at: [kbarrosresearch123@gmail.com](mailto:kbarrosresearch123@gmail.com) or [kinnier@asu.edu](mailto:kinnier@asu.edu). If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

APPENDIX G  
DEBRIEFING LETTER



## You Have Completed the Study! Thank you!

Your participation in this study may help to improve the scientific community's understanding of mental health, sleep hygiene, and interpersonal relationships. Please read the information below on compensation and questions.

### How to Win a Gift-Card:

To be entered into the random drawing to win one of three Amazon.com gift-cards, please send an email with subject line "STUDY COMPLETE" to the co-investigator at kbarrosresearch123@gmail.com. Please do not include any identifying information, like your name. Your email address will be used for the random drawing, and the gift-card will be sent via email to that email address.

### How to Receive Extra Credit:

If your instructor is offering extra credit for completing this study, please take a screenshot of this study completion page, and email it to your instructor in order to prove your participation.

### Questions and Concerns:

If you have any questions concerning the research study, please contact the research team at: kbarrosresearch123@gmail.com or kinnier@asu.edu. If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.