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Are inmates' subjective sleep problems associated with borderline personality, psychopathy, and antisocial personality independent of depression and substance dependence?

Laura Harty^{*}, Rebecca Duckworth, Aaron Thompson, Jeffrey Stuewig, and June P. Tangney
Department of Psychology, George Mason University, Fairfax, USA

Abstract

Previous research investigating the relationship between Borderline Personality Disorder (BPD) and sleep problems, independent of depression, has been conducted on small atypical samples with mixed results. This study extends the literature by utilizing a much larger sample and by statistically controlling for depression and substance dependence. Subjective reports of sleep problems were obtained from 513 jail inmates (70% male) incarcerated on felony charges. Symptoms of BPD were significantly associated with sleep problems even when controlling for depression. Thus, sleep problems associated with BPD cannot be attributed simply to co-morbid symptoms of depression and substance dependence was ruled out as proximal causes for this relationship. Symptoms of depression, but not Antisocial Personality features, were related to sleep problems independent of substance dependence. Treatment of individuals with BPD may be more effective if sleep problems are explicitly addressed in the treatment plan.

Keywords

sleep problems; depression; substance abuse; psychopathy; borderline; personality; anti-social personality

Borderline Personality Disorder (BPD) is characterized by marked impulsivity and pervasive instability of affect, self-image, and interpersonal relationships. High rates of substance abuse (Hatzitaskos, Soldatos, Kokkevi, & Stefanis, 1999; McCann & Ball, 2000), antisocial activity (Coid, 1993), and behaviors aimed at harming the self (Wilkins & Coid, 1991) or others (Hernandez-Avila, Burleson, Poling, Tennen, Rounsaville, & Kranzler, 2000) have been associated with BPD. As a consequence, individuals with BPD are at elevated risk for involvement in the criminal justice system. Whereas prevalence rates for BPD in the community are 1–2% (Kraus & Reynolds, 2001), rates among both male and female incarcerated offenders have been estimated at 23–30% (Jordan, Schlenger, William, Fairbank & Caddell, 1996; Drapalski, Youman, Stuewig, & Tangney, 2008). In this report, we draw on data from a larger longitudinal study of jail inmates to examine the implications of BPD for sleep disturbance, independent of potentially confounding factors such as depression and substance use. We also extend this literature by considering two other personality disorders prevalent among inmates – antisocial personality disorder and psychopathy.

^{*}Corresponding author. lhartygmu@gmail.com.

Previous Efforts to Disentangle the relationship of BPD and Sleep Problems, Independent of Depression

There is a well-documented relationship between symptoms of depression and sleep problems (Mayers & Baldwin, 2006; Rotenberg, Indursky, Kayumov, Sirota, & Melamed, 2000). In addition, recent research underscores a link between Borderline Personality Disorder (BPD) and impairment in sleep (Asaad, Okasha, & Okasha, 2002; Mauchnik, Schmahl, & Bohus, 2005). Since symptoms of depression often co-occur with BPD (Southwick, Yehuda, & Giller, 1995; Westin et al., 1992), recent research has examined whether impairments in sleep quality in patients with BPD can be largely explained by co-morbid depressive symptoms (Asaad et al., 2002; Battaglia, Strambi, Bertella, Bajo, & Bellodi, 1999; Bell, Lycaki, Jones, Kelwala, & Sitaram, 1983; Benson, King, Gordon, & Silva, 1990; De la Fuente et al., 2004).

In an attempt to disentangle the effects between symptoms of depression and symptoms of Borderline Personality Disorder (BPD), several researchers have assessed sleep quality in small samples of patients diagnosed with BPD who report no symptoms of depression. Battaglia et al. (1999) observed sleep anomalies in this subgroup of patients ($n = 10$, 6 women) compared to healthy, age- and gender-matched controls ($n = 10$, 6 women). The results revealed that persons in the non-depressed BPD subgroup had higher levels of REM density (eye movements per REM period) during the first REM period than did never-depressed, matched controls, but did not differ in terms of their delta sleep percentages. Philipsen et al. (2005) did not replicate Battaglia's finding for REM density. In their study comparing BPD individuals without current depression ($n = 20$, all women) with healthy age- and gender-matched controls ($n = 20$) across a broad array of objective measures of sleep, no differences were observed except that those with BPD had less percentage of Stage 2 sleep relative to controls (Philipsen et al., 2005). Group differences were more pronounced when considering subjective reports of sleep quality. While in the sleep lab, patients in the BPD group rated themselves as having more sleep related problems on a number of indicators, including lower sleep quality, than did controls. Furthermore, in the two weeks prior to being in the lab, patients in the BPD group rated the efficiency of their sleep (ratio of sleep time to the amount of time in bed) significantly worse and were significantly poorer at estimating their total sleep time than were the controls.

Asaad et al. (2002) compared objective and subjective measures of sleep quality obtained from (a) individuals diagnosed as BPD without co-morbid depressive symptoms ($n = 20$, 12 women), (b) individuals diagnosed with depressive symptoms without co-morbid BPD ($n = 20$, 12 women), and (c) healthy, age- and gender-matched controls ($n = 20$, 12 women). All of the depression-only group and 45% of the BPD-only group reported significant sleep problems whereas only 10% of the control participants indicated subjective sleep difficulties. The researchers also utilized polysomnography equipment to identify where the three groups differed. Participants with depression only showed significantly more impaired sleep latency (between when the participant attempts to sleep and when sleep actually occurs), sleep efficiency and number of arousals than the BPD only and control groups. Sleep latency and sleep efficiency were also significantly worse in the BPD group compared to the controls but there was not a significant difference for the number of arousals (Asaad et al., 2002).

Benson et al. (1990) obtained objective measures of sleep from (a) individuals diagnosed with BPD *and* a past or present diagnosis of Major Depressive Disorder (MDD) or Bipolar Disorder (BD; $n = 8$, all men), (b) individuals diagnosed with BPD *without* past/present MDD or BD diagnosis ($n = 10$, all men), and (c) age and gender matched healthy controls ($n = 15$, all men). In contrast to Asaad et al. no differences were found between BPD groups and controls in sleep latency (Benson et al., 1990). Compared to controls, both BPD groups had less total sleep, more Stage 1 sleep, and less Stage 4 sleep. Differences in sleep between the two BPD groups,

however, were not tested. T-tests were thus applied by the present researchers on the data presented in their article and significant results were not found.

De la Fuente, Bobes, Vizuite, and Mendlewicz (2001) found differences between sleeping patterns of (a) BPD patients without current depression (n=20, 14 women), (b) non-BPD MDD patients (n=20, 15 women), and (c) controls (n=20, 14 women) matched on age and gender. In contrast to Philipsen et al.'s generally null findings, De la Fuente et al. found a number of different objective measures to be significant between BPD and controls. BPD and MDD groups had less total sleep, longer sleep latency, and more wakefulness than control subjects. However, BPD patient sleep was characterized by more REM sleep and less Stage 3, Stage 4, and slow wave sleep as compared to those with MDD and controls (De la Fuente et al., 2001). Furthermore when subdividing the BPD group, BPD patients with a past history of MDD (n=9) reported more wakefulness and less slow wave sleep than BPD patients without such history (n=11). The authors concluded that while participants with BPD and MDD had similar sleep-continuity, the groups can be distinguished by the architecture of sleep.

De la Fuente et al. (2004) extended this work by adding a group of patients with Recurrent Brief Depression (RBD; n = 20, 14 women) to the samples compared in De la Fuente, et al. (2001). BPD patients had greater REM duration and less stage 3 and slow wave sleep than RBD patients (De la Fuente et al., 2004).

Finally, Bell et al. (1983) compared patients with BPD and MDD (n=15, 10 women) to patients with MDD but no current or past Borderline features (n=18, 10 women) on sleep quality and duration, including percent Delta and percent REM sleep. No differences were observed between the two groups. However, when depressive symptoms were partialled out, one of the 13 dependent variables (REM latency), was statistically significant. BPD-MDD patients showed shorter REM latency compared to MDD-only patients (Bell et al., 1983).

Taken together, the available evidence suggests that some – but by no means all – of the sleep difficulties associated with BPD can be explained by comorbid symptoms of depression. Available research, however, is limited by a reliance on atypical, discrete groups (e.g., “non-affective” BPD), small sample sizes, or both. A diagnosis of BPD without a history of depression is unusual, and thus it is not clear whether the results of studies focusing on “non-affective” BPD groups generalize to the much larger population of individuals with BPD and co-morbid affective symptoms.

The Current Study

To better assess the degree to which symptoms of BPD are related to sleep difficulties, independent of affective symptoms, the current study draws on a much larger sample of individuals in which symptoms of BPD, anxiety and depression were assessed along continuous dimensions. As such, the study design provides a much more powerful context in which to evaluate the question: Is the association between sleep problems and symptoms of BPD largely accounted for by co-occurring symptoms of depression and anxiety? Or is BPD independently associated with sleep problems, perhaps reflective of more fundamental self-regulatory difficulties?

If features of Borderline Personality Disorder are related to sleep problems, independent of depression and anxiety, an alternative explanation remains. Comorbid substance dependence may account for the sleep problems reported by patients with BPD. Substance abuse and dependence are common problems among people with BPD (Miller, Abrams, Dulit, & Fyer, 1993; Trull, Sher, Minks-Brown, Durbin, & Burr, 2000) and sleep problems are also linked to alcohol and drug dependence (Karam-Hage, 2004; Teplin, Raz, & Daiter, 2006). Thus, in the

current study, we also examine the degree to which the relationship of symptoms of Borderline Personality Disorder and sleep problems is independent of symptoms of substance abuse.

Finally, we explore the relation of sleep problems to symptoms of two other disorders of personality – Antisocial Personality Disorder (ASPD) and psychopathy. The research reviewed thus far has focused on BPD and sleep in clinical and community samples. However, BPD and substance abuse may frequently co-occur with ASPD and psychopathy. Thus, studies of correctional samples are especially important to consider. Lindberg et al., (2003) found that inmates diagnosed with ASPD who had a history of recurrent violent acts with no history of psychosis, dementia, or major depression ($n = 19$, all men) also showed disordered sleep patterns as indicated by objective sleep parameters, relative to controls ($n=11$, all men). Philipsen et al. (2005) noted objective measures of sleep disturbance found in their study of non-depressed, non-incarcerated female BPD participants were similar to that observed the sample of incarcerated male participants with ASPD in the Lindberg et al. (2003) study.

Psychopathy is a more serious personality disorder than ASPD, characterized by pervasive antisocial behavior, as well as marked dysfunction in emotional connectedness to others. (Antisocial Personality Disorder requires just the former, not the latter.) We were able to locate only one study which investigated the relationship between sleep and psychopathy. Salley et al. found no evidence of sleep problems associated with psychopathy in prison sample ($n=23$, all males, however, the projective method (Rorschach) used to assess psychopathy is of highly questionable validity (Salley, Khanna, Byrum, & Hutt, 1980). Further research is needed using a well-validated measure of psychopathy such as the PCL-R (Hare, 1991). Because substance abuse is common among individuals diagnosed with Antisocial Personality Disorder and psychopathy (Hemphill, Hart, & Hare, 1994) we also examined whether any observed relationships between sleep problems and ASPD and psychopathy are independent of substance dependence.

Where's the Diagnosis? DSM-IV-TR and the PAI-BOR Scale

The current study assessed borderline personality using the Personality Assessment Inventory (PAI, Morey, 1991). Research demonstrates that scores on the PAI-BOR scale converge with clinicians' diagnoses of borderline personality disorder based on DSM-IV-TR (APA, 2000) criteria. In a sample of 63 outpatients (BPD base rate .72), a T-score of 65 was deemed optimal, with .91 sensitivity, .79 specificity, .94 positive predictive power, .73 negative predictive power, and an overall correct classification rate of .89 vis-à-vis SCID-II diagnoses (Jacobo, Blais, Baity, and Harley, 2007). Importantly, the concordance between PAI-derived and clinician-derived classification is equivalent to the concordance between clinicians using DSM criteria. For example, in a recent study (Critchfield, Levy & Clarkin, 2007), trained clinicians using the SCID-II agreed 87% of the time on a diagnosis of BPD (base rate .76). Thus, a cut-score of 65 on PAI-BOR agrees with a clinician-derived SCID-II diagnosis as well as two independent SCID-II assessments agree with each other.

Although it is possible to dichotomize the PAI-BOR scale into a meaningful diagnostic variable, several factors argue against doing so. First, the high cost of dichotomizing continuous variables in terms of statistical power is well known (Cohen, 1983). Second and related, a dimensional approach allows for less error in estimating the true shared (and unshared) variance in syndromes of interest, as is the focus here. Third, as discussed by Krueger and Piasecki (2002), a correlational approach may be ultimately more useful for assessing co-morbidity because it circumvents the problem of concordance by chance, especially in cases where the base rates are quite high, as in the current situation. Fourth, there is ample psychometric evidence that symptoms of borderline personality are meaningfully distributed on a continuum (Morey, 1991; Clark, 1999); there exists no empirical evidence arguing in favor of an

underlying taxon. Thus, for the purposes of the current study we elected not to dichotomize the PAI-BOR scale, but rather to capitalize on the more complete information inherent in the continuous measure.

Clinical Relevance of Subjective Experience of Sleep Problems

The current study focused on subjective or *felt distress* associated with sleep problems. It is well known that, in many domains of medicine, patients' subjective experiences do not map on to physiological realities in a one-to-one fashion. Subjectively experienced pain is only moderately correlated with objective indicators of injury or pathology. When considering patients' functional adaptation to the demands of daily life, it is often the subjective experience, not the objective physical reality, that is most predictive of key outcomes. For example, in the domain of social support, subjective perceptions are most consistently and substantially linked to psychological and social adjustment. Objectively assessed dimensions of social support account for very little variance (Lakey, 2007). To date, most studies of sleep and BPD have focused on objective indicators of sleep in atypical patient samples, occasionally including subjective measures of sleep as a secondary consideration. However, if the focus is on identifying new targets for intervention in areas causing distress to those with BPD, subjective measures are of special relevance.

Methods

Participants

Study participants were 513 pre- and post-trial inmates in a metropolitan area county jail. The targeted population was inmates who would serve at least 4 months in jail. Selection criteria were (1) either (a) sentenced to a term of 4 months or more, or (b) arrested and held on at least one felony charge other than probation violation, with no bond or greater than \$7,000 bond, (2) assigned to the jail's medium and maximum security "general population" (e.g., not in solitary confinement, not in a separate forensics unit for actively psychotic inmates), and (3) sufficient language proficiency to complete study protocols in English or Spanish. Of the 603 participants who agreed to participate, 85% (N=513) remained at the jail long enough to complete portions of the 4–6-session initial assessment relevant to the behaviors reported here. Participants were on average 32 years old (SD = 10), mostly men (70%), and diverse in terms of racial/ethnic composition: 35.9% Caucasian, 45% African American, 9% Latina/o, 2.9% Asian, 0.8% Middle Eastern, 0.4% Native American, and 6% "Other" or "Mixed."

Procedures

Shortly after their move to the jail's "general population" (about 1–2 weeks), eligible inmates were presented with a description of the study and asked to participate. It was emphasized that the decision to participate or not would have no bearing on their status at the jail or their release date. Interviews were conducted in the privacy of professional visiting rooms and the data are protected by a Certificate of Confidentiality from Department of Health and Human Services. Inmates who completed the 4–6 session intake assessment received a \$15–18 honorarium, an amount deemed non-coercive based on interviews with knowledgeable informants (i.e., inmates and deputies) familiar with the economy of this particular correctional setting.

Participants with sufficient English skills completed questionnaires using "touch-screen" computers that presented items visually and aurally. For participants requiring Spanish versions of the measures (less than 5% of male participants), questionnaire responses were gathered via individual interview. Both the interviewer and participant had paper copies of the translated measures; however to approximate the level of privacy afforded by the touch-screens, participants filled in their own responses.

Measures

Borderline Personality, Antisocial Personality, Depression, and portions of a Sleep Problems Index were assessed with the *Personality Assessment Inventory* (PAI) (Morey, 1991) a 344 item self-report measure of clinically relevant psychopathology and personality traits. The PAI includes 13 clinical syndrome scales, many of which include subscales reflecting the multidimensional structure of most psychological disorders. In the current study, internal consistency estimates of reliability were acceptable, and consistent with those reported by Morey (Morey, 1991).

Borderline Personality—The Borderline Features total scale of the PAI comprises four subscales each comprised of six items: *Affective Instability*, assessing the intense and largely unmodulated emotional experiences with an emphasis on anger; *Identity Problems*, assessing confusion about self-identity and lack of an integrated concept of self and others; *Negative Relationships*, reflecting ambivalence about interpersonal relationships, characterized by acute dependence, fear of abandonment, and distrust; and *Self-Harm*, ostensibly reflecting self-harming behaviors that are characteristic of individuals with BPD, however most items assess the more general characteristic of impulsivity also a hallmark of BPD. Internal reliability of the total Borderline scale was high ($\alpha = .89$) while the subscales were acceptable ($\alpha = .64$ to $.77$; mean $\alpha = .73$). Overall, 31% of the sample obtained T-scores of 70 or above on the total Borderline scale, the cut score deemed as clinically significant by Morey (1991); 45.5% obtained T-scores of 65 or above, the cut score identified as optimal by Jacobo, et al, (2007).

Antisocial Personality—The Antisocial Features scale (ANT) ($\alpha = .85$) of the PAI includes the subscales of *Antisocial Behaviors*, *Egocentricity*, and *Stimulus-Seeking*. Each subscale contained eight items and the internal reliability of the subscales were acceptable ($\alpha = .70$, $.66$, $.74$).

Depression—Three depression subscales from the PAI were used as control variables for the analyses. The first measures *cognitive* aspects (8 items, $\alpha = .77$); the second measures *ffective* features of depression (8 items, $\alpha = .79$); and the third taps physiological symptoms of depression. For the purposes of this study, we considered here only items that do not refer to sleep problems (4 items, $\alpha = .56$).

The Psychopathy Checklist-Screening Version—(PCL:SV) (Hart, Cox, & Hare, 1995) is a clinical rating instrument used to assess psychopathy. Like the PCL-R (Hare, 1991), the PCL:SV provides a total psychopathy score as well as two factor scores. *Factor 1* captures the personality characteristics associated with psychopathy, including superficiality, grandiosity, deceitfulness, lack of remorse, lack of empathy, and lack of responsibility. *Factor 2* captures the behaviors associated with psychopathy, such as impulsivity, poor behavioral controls, lack of goals, irresponsibility, adolescent antisocial behavior, and adult antisocial behavior. Single measure intraclass correlations, using a one-way random effects model, were $.85$, $.88$, and $.87$ for Factor 1, Factor 2, and Total PCL:SV scores, respectively, showing a high degree of interrater reliability.

Drug and alcohol dependence—Drug and alcohol dependency symptoms were assessed using Simpson and Knight's (Simpson & Knight, 1998) Texas Christian University Correctional: Residential Treatment Form, Initial Assessment (TCU-CRTF). Specifically, four scales were created to assess symptoms of dependency on *alcohol*, *marijuana*, *cocaine*, and *opiates* in the year prior to incarceration. Each scale was composed of items that assess each of the DSM-IV (APA, 2000) substance dependence domains (e.g., for the domain of tolerance participants answered the question "How often did you find that your usual number of drinks had much less effect on you or that you had to drink more in order to get the effect you

wanted?"). For domains with multiple items, responses were averaged and a total score was computed by taking the mean across the domains ($\alpha = .92$ to $.98$).

Sleep Problems—A five-item index of sleep problems was created comprising four items from the PAI's physiological subscale of depression that deal explicitly with sleep problems (I have no trouble falling asleep (reversed), I rarely have trouble sleeping (reversed), I often wake up very early in the morning and can't get back to sleep, I often wake up in the middle of the night) and one item from the Cohen-Hoberman Inventory of Physical Symptoms (CHIPS; Cohen & Hoberman, 1983) (How much were you bothered by sleep problems [for instance, can't fall asleep, wake up in the middle of night or early in the morning]?). The individual items were standardized and then averaged. Reliability of the 5 item index was good ($\alpha = .79$). Inspection of the items indicates strong face validity and, regarding content validity, the range of content is very similar to other widely used self report measures of sleep problems. An exploratory factor analysis extracted one factor verifying that the scale yields a unidimensional index of subjective sleep problems, similar to the widely used three-and four-item sleep problem scales developed by Jenkins, Stanton, Niemcryn & Rose (1988). Other, longer self-report measures of sleep problems exist, but with few exceptions the researchers in the field focus on subjectively experienced sleep problems as a unidimensional construct.

Results

Pearson's bivariate correlations were conducted to determine the extent to which subjective sleep problems were associated with symptoms of BPD, antisocial personality disorder, psychopathy, depression, and substance dependence (See Table 1). Consistent with previous studies there was a significant positive correlation between sleep problems and BPD. Furthermore, all four BPD subscales -- Affective Instability, Identity Problems, Negative Relationships, and Self Harm (assessing primarily impulsivity) -- were related to sleep problems. Positive correlations were also found between sleep problems and antisocial and stimulus seeking features of antisocial personality, Factor 2 psychopathy, cognitive, affective, and (minus sleep problem items) physiological depression, and symptoms of alcohol, cocaine and opiate dependence specifically (see Table 1).

When indices of cognitive, affective, and physiological depression (not including sleep items) were partialled out, the correlation between BPD and sleep problems remained significant. Symptoms of BPD were associated with poor sleep, above and beyond the influence of any co-morbid depressive symptoms. In contrast, the association between sleep problems and most other personality and behavioral problems (antisocial behavior, sensation-seeking, psychopathy, alcohol and cocaine dependence) did not hold once depression was partialled out. Only opiate dependence showed a unique relationship to sleep problems, beyond depression.

Next, we examined the degree to which the association between sleep problems and personality and behavioral problems could be attributed to co-morbid substance dependence. The right-most column of Table 1 presents the relationship of psychological measures to sleep problems, partialling out alcohol, marijuana, cocaine, and opiate dependence. When controlling for substance dependence, sleep problems remained significantly associated with BPD and depression. The link between sleep problems and features of antisocial personality and Factor 2 psychopathy appears largely due to substance dependence, depression, or both.

Discussion

In the present study of 513 jail inmates, BPD and its four subscales (identity problems, negative relationships, self-harm and affective instability) were significantly associated with the

subjective experience of sleep problems. Further, the relationship between subjective sleep problems and the BPD total scale as well as the subscales remained significant when controlling for co-morbid depression, assessed in detail along three sub-dimensions (affective, cognitive, and physiological). These results indicate that symptoms of BPD are uniquely associated with sleep problems above and beyond the effect of depression, which itself is associated with sleep difficulties. In short, the sleep problems associated with BPD cannot be attributed simply to co-morbid symptoms of depression.

The current results also speak to the question of whether subjective sleep problems experienced by individuals with BPD may be due to co-morbid substance dependence. Although substance use is common among individuals with BPD (Miller et al., 1993; Trull et al., 2000) and also can exacerbate sleep problems, to our knowledge no previous studies have taken into account chronic substance use or dependence when examining the link between BPD and sleep problems.¹ In the current study, a detailed assessment of participants' recent history of substance use and symptoms of dependency was conducted. Analyses indicated that the link between BPD and sleep problems was independent of the effects of substance dependence. Sleep problems appear to be uniquely related to symptoms of BPD.

In contrast, although sleep problems were associated with features of antisocial personality, Factor 2 psychopathy (antisocial lifestyle), and alcohol, and cocaine dependence at the bivariate level, these findings did not remain significant when depression was partialled out. In other words, depression accounted for these correlations, suggesting that co-morbid symptoms of depression were primarily responsible for the sleep problems associated with these personality and behavioral factors. Only the relationship between opiate dependence and sleep problems remained significant after controlling for depression. Opiate dependence appears to have a unique relationship with sleep problems above and beyond the effects of depression.

Previous research investigating the relationship between BPD and sleep problems, independent of depression, have been conducted on small, atypical samples of individuals with BPD (e.g., patients with BPD but with no history of depression) and have yielded mixed results. The low statistical power of previous studies precludes interpretation of null findings, and the use of atypical patient samples seriously limits the ability to generalize results to the larger BPD population. The present study circumvented limitations of the previous research by obtaining data from a much larger sample and by statistically controlling for the effects of depression, rather than attempting to segregate the sample into discrete clinical groups. In addition, this study extends the empirical research on sleep problems associated with BPD by ruling out substance dependence as a proximal cause for this relationship.

Clinical Implications

People with BPD are particularly vulnerable to sleep difficulties, above and beyond what would be expected due to co-occurring depression (or substance abuse problems). Thus, mental health professionals working with individuals with BPD should routinely assess the degree to which such clients are experiencing difficulties with sleep. Given that sleep problems have been found to significantly increase the risk for aggression (Ireland & Culpin, 2006), depression (Kupfer, 2006; Perlis et al., 2006; Perlman, Johnson, & Mellman, 2006; Roman, Hagewoud, Luiten, & Meerlo, 2006) and other psychiatric illnesses (Hajak et al., 2003) treatment of individuals with BPD may be more effective if sleep problems are explicitly addressed in the treatment plan. There are a range of effective behavioral and psychopharmacological interventions for ameliorating this source of stress and distress.

¹De la Fuente, et al.'s (2001, 2004) study included a "drug washout period," but individual differences in substance abuse were not considered.

In addition, these results may provide clues for basic research on the biopsychosocial bases of BPD. Although sleep problems are associated with a range of psychological problems, most can be explained by co-morbid symptoms of depression. BPD stands out as having a special, independent link with sleep problems. It is possible that the problems with sleep regulation experienced by individuals with BPD are reflective of a more general impairment in self-regulation. A common biological substrate may account for both BPD-related sleep problems and for the severe impairment in psychological self-regulation that is the hallmark of BPD.

Limitations and Directions for Future Research

Although the current study adds substantially to the literature on sleep problems among individuals with BPD, the research is not without limitations. First, this study relied on self-reports for many of the measures. Nonetheless, research suggests that the Personality Assessment Inventory has a high concordance with clinical diagnoses (Jacobo, et al., 2007). And although research has documented a clear relationship between subjective and objective measures of sleep (Carlson, Karlson, Hamilton, Nelson, & Luxton, 2006) the two types of measures are by no means synonymous. Moreover, Philipsen et al. (2005) found that discrepancies between subjective and objective measures of sleep quality were, if anything, more pronounced among individuals with BPD, relative to asymptomatic controls. Future research, employing polysomnography recordings would provide a more detailed picture of the physiological patterns associated with perceived sleep problems as experienced by individuals with BPD.

Second, the current study used a dimensional measure of borderline personality disorder; thus it was not possible to examine definitive diagnoses at the individual level. Although dimensional assessments are most consistent with the actual distribution of patient characteristics and offer greater statistical precision than diagnostic dichotomies, future work also employing clinician-rated diagnostic measures would be useful.

Third, borderline personality disorder is often comorbid with other mental health problems that may influence sleep disturbances. While data on the symptoms of depression and substance dependence were gathered in this study, symptoms of other disorders that influence sleep problems such as attention-deficit/ hyperactivity disorder and post-traumatic stress disorder were not collected. This would be a useful direction for future research.

Finally, additional research is necessary to determine whether these findings apply to individuals in noncorrectional settings. The sample used in the current study was drawn from a jail inmate population, rather than a more traditional clinical setting. It's worth noting, however, that jail inmates do not represent a particularly atypical subgroup of individuals with BPD. Deinstitutionalization of the mentally ill has led to a dramatic increase in incarceration rates over the past few decades. In the current study, 77% of participants scored in the clinical range on at least one of the PAI clinical scales (Drapalski, et al., 2008), a figure consistent with other studies employing clinician-based diagnostic assessments (Teplin, Abram, & McClelland, 1996; Teplin et al., 2006). The prevalence of BPD is astoundingly high and gender neutral in correctional settings (Jordan, Schlenger, Fairbank, & Caddell, 1996; Tangney, Stuewig, Hastings, & Hashemi, 2004). Thus, jail inmates represent a large, woefully unrecognized, understudied and underserved subgroup of individuals with BPD. Recognizing and examining how BPD and sleep problems may co-occur above and beyond other symptoms of psychopathology may help us gain insight into new ways to intervene and treat this debilitating disorder.

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Table 1

Relationship of sleep problems to personality disorders.

	<i>Bivariate correlations</i>	<i>Partial correlations</i>	
		Cognitive, affective, & physiological depression removed	Substance dependence removed
Borderline personality – total scale	.43**	.20**	.39**
Affective instability	.32**	.10*	.29**
Identity problems	.41**	.16**	.37**
Negative relationships	.36**	.19**	.32**
Self-harm	.30**	.14**	.24**
Antisocial personality – total scale	.14**	.00	.06
Antisocial behaviors	.15**	.05	.06
Egocentricity	.08	-.05	.03
Stimulus seeking	.13*	.00	.06
PCL-SV – Psychopathy total	.06	.06	.01
Factor 1 - Psychopathic personality	-.02	.03	-.04
Factor 2 – Antisocial lifestyle	.12**	.07	.06
Cognitive depression	.39**	---	.36**
Affective depression	.42**	---	.39**
Physiological depression	.42**	---	.40**
Alcohol dependence symptoms	.14**	.04	---
Marijuana dependence symptoms	.07	.00	---
Cocaine dependence symptoms	.11*	.05	---
Opiate dependence symptoms	.21**	.17**	---

Note: $N = 498$ -- 512 ($N = 467$ for psychopathy).*
p<.05;**
p<.01.