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Borderline personality pathology and insomnia symptoms in community-dwelling older adults

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Abstract

Prior research has associated BPD with sleep problems, but the relationship has been explored primarily in small clinical samples of younger adults. Findings from our lab have demonstrated that borderline symptoms remain present in later middle age and are associated with several negative life outcomes. A representative community sample of older adults (N = 633, M_{age} = 62.3) was obtained from the St Louis area, and interviewer-reports, self-reports, and informant-reports of personality pathology were completed along with an insomnia symptoms questionnaire. Cross-sectional analyses revealed that symptoms from all 10 DSM-IV personality disorders were significantly correlated with insomnia symptoms. However, after statistically controlling for major depression, body-mass index, race and gender, only borderline personality pathology remained significantly associated with insomnia symptoms. Our results demonstrate that in addition to other negative health outcomes, borderline personality pathology is uniquely associated with sleep problems in later middle-aged adults in the community.

Borderline personality disorder is defined by symptoms such as affective instability, impulsivity and identity disturbance. These, along with other characteristic pathological symptoms such as unstable relationships, intense anger and suicidal behaviour inevitably interfere with various aspects of a person's life and are associated with an increased risk of medical illnesses (Frankenburg & Zanarini, 2004). The estimated prevalence of BPD is 2.9% in the general population (Trull, Jahng, Tomko, Wood, & Sher, 2010). In addition to the symptoms and consequences described earlier, borderline pathology has been associated with sleep problems (e.g. Asaad, Okasha, & Okasha, 2002; Harty, Forkner, Thompson, Stuewig, & Tangney, 2010; Semiz, Basoglu, Ebrinc, & Cetin, 2008). Sleep problems present a major hardship in their own right and are associated with increased risk for stressful life events, mood disorders and problems with health, family, work and school (Bastien, Vallieres, & Morin, 2004; Harvey, 2011; Healey et al., 1981). Up to the present time, research linking BPD and sleep problems have predominantly explored the relationship in small clinical samples of young adults and largely ignored its development across the lifespan.

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Prior studies using self-reported sleep quality have demonstrated that sleep problems are the characteristic of younger individuals with borderline pathology (Asaad et al., 2002; Philipsen et al., 2005; Schredl et al., 2012; Semiz et al., 2008). Philipsen et al. (2005) found with a sample of 20 non-depressed BPD patients that, in comparison with controls, BPD patients complained of significantly reduced total sleep quality as well as significantly decreased sleep time, decreased sleep efficiency, feeling significantly more exhausted and a worse evening mood. Self-reported sleep quality was also significantly impaired in a study of 27 non-depressed BPD patients by Schredl et al. (2012). The patients reported significantly more sleep arousals, awakenings, time awake and overall sleep quality problems. Semiz et al. (2008) found that 96% of 88 non-depressed BPD patients self-identified as poor sleepers, as compared with only 12% of controls, and had a significantly higher rate of nightmares and dream anxiety than controls. Asaad et al. (2002) reported that 45%of 20 non-depressed BPD patients complained of sleep problems in comparison with only 10% of controls. Examining a larger sample of 513 jail inmates (70% men), Harty et al. (2010) found borderline pathology to be significantly correlated with sleep problems on the Personality Assessment Inventory (Morey, 1991). These studies all reported mean ages in the 20s (with the exception of Harty et al., who reported a mean age of 32). Taken as a whole, this evidence demonstrates that significant self-reported sleep problems are prevalent in younger adults with borderline personality pathology.

Using data from the National Comorbidity Survey Replication (Kessler & Merikangas, 2004), Selby (2013) recently reported that symptoms of BPD were significantly related to sleep disturbance in a community-based sample of 5692 participants aged 18 years and up. Data reported in this paper represent a significant advance beyond earlier studies, but the results were not examined with regard to age, leaving unanswered questions about sleep and symptoms of BPD in older adults.

Polysomnography (PSG) has also been used to examine the relationship between BPD and sleep problems in younger adults (M_{age} in the 20s and 30s). PSG studies have found sleep differences between BPD-only patients (without co-morbid major depression) and controls. For example, Asaad et al. (2002) found that BPD patients without a history of depression have significantly greater sleep onset latency, less sleep efficiency, lower slow wave sleep percentage, higher rapid eye movement (REM) percentage and REM density, shorter REM latency and longer first REM period in comparison with controls. Some of these findings have been replicated, whereas others have not. For example, regarding the finding of shortened REM latency, which is associated with major depression (Giles, Roffwarg, & Rush, 1990), four studies replicated this finding in BPD patients when compared with controls (Akiskal, Yerevanian, Davis, King, & Lemmi, 1985; Battaglia, Ferini-Strambi, Smirne, Bernardeschi, & Bellodi, 1993; McNamara et al., 1984; Schredl et al., 2012). However, four comparable studies did not find shortened REM latency in BPD patients compared with controls (Benson, King, Gordon, & Silva, 1990; De la Fuente, Bobes, Vizuete, & Mendlewicz, 2001; Hornung et al., 2008; Philipsen et al., 2005). Other discrepancies between findings from PSG studies of BPD and sleep are frequent (Fleischer, Schafer, Coogan, Haßler, & Thome, 2012). Nevertheless, it is interesting that some PSG findings are congruent with results obtained using self-report measures, indicating that there

is converging evidence of a relationship between borderline pathology and sleep problems in younger adults.

Although studies have investigated borderline personality pathology and sleep problems, very few studies have addressed the relationship between other types of personality disorder (PD) and sleep problems. Sleep problems have been associated with the Five-Factor Model domain of neuroticism (e.g. van de Laar, Verbeek, Pevernagie, Aldenkamp, & Overeem, 2010; Williams & Moroz, 2009) and more specifically with other personality traits that are associated with various PDs. For example, one recent study found sleep problems to be correlated with harm avoidance (Park, An, Jang, & Chung, 2012); high levels of harm avoidance (caution, fear, pessimism, and shyness) are characteristic of avoidant and dependent PDs. Sleep deprivation has been associated with increased superstitious thinking (Kilgore et al., 2008), which is one diagnostic criterion for schizotypal PD. Anxious concerns and traits related to perfectionism have been associated with sleep problems (van de Laar et al., 2010) and are a criterion for obsessive–compulsive PD. Excessive worry related to high levels of anxious concerns and traits related to perfectionism may cause sleep problems (Takano, Iijima, & Tanno, 2012). Additionally, antisocial PD has been associated with increased slow wave sleep (Lindberg et al., 2003; Lindberg et al., 2009) and self-reported sleep problems (Harty et al., 2010; Semiz et al., 2008), although the reported relationships are relatively weak compared to the relationship between BPD and sleep problems. To our knowledge, this is the extent of the literature regarding the other PDs and sleep problems.

The literature reviewed earlier suggests that out of all of the DSM-IV PDs, borderline personality pathology, in particular, is associated with significant sleep problems. However, most of the research on this topic has been conducted with young adults, primarily in clinical samples. A gap in the literature exists with respect to the connection between borderline pathology and sleep problems in older populations and in large community samples. At the St Louis Personality and Ageing Network (SPAN), we recruited a representative community sample of 1630 adults who were between the ages of 55 and 64 years to participate in a longitudinal study of personality and health in later life. Previous articles from our study have demonstrated that symptoms of BPD persist into later middle age and continue to have a detrimental impact on several aspects of our participants' lives, even though few of our participants exceed the DSM-IV threshold for a diagnosis of BPD. For example, symptoms of BPD are associated with increased frequency of threatening life events (Gleason, Powers, & Oltmanns, 2012) and increased likelihood of obesity and various health-related problems (Powers & Oltmanns, 2013). In this paper, we extend our consideration of these difficulties associated with borderline personality pathology to sleep problems. On the basis of the reviewed literature and the nature of affective dysregulation in BPD, it was expected that BPD symptoms would be significantly associated with sleep problems in our sample of older adults, even after controlling for relevant psychological, physical and demographic variables.

Method

Participants

Over the course of 3.5 years, a representative community sample of 1630 older adults in the St Louis area was recruited and enrolled in the SPAN, a longitudinal study of personality and health in later life. The analyses reported in this article are based on data from 633 participants who completed in-person baseline and 2.5-year follow-up assessments, both of which included a semi-structured diagnostic interview as well as self-report and informant-report questionnaires describing personality pathology. Participants completed follow-up questionnaires about their personality and health every 6 months between baseline and 2.5-year follow-up. All participants provided close informants (i.e. a partner, close friend or family member) who completed questionnaires that described their personality (for the utility of multi-method ratings of border-line pathology, see Carlson, Vazire, & Oltmanns, 2013). Our analyses focus primarily on personality data gathered at the 2.5-year follow-up assessment as well as insomnia symptoms data gathered exclusively at the 2.5-year follow-up assessment. Of the 633 participants who are the focus of our analyses in this article, the mean age at 2.5-year follow-up assessment was 62.3 (*SD* = 2.8; ranging from 57 to 68) and 57% were women. The sample was representative of the St Louis area in terms of race: 73% white (*n* = 459), 25% African–American (*n* = 161), 0.7% Hispanic/Latino (*n* = 4), 0.7% bi-racial/multi-racial (*n* = 4), and 0.9% other (*n* = 5). A comprehensive account of the sample, recruitment and interview procedures can be found in Oltmanns, Rodrigues, Weinstein, and Gleason (2013).

Measures

Participants were assessed for personality pathology by trained interviewers using the Structured Interview for DSM-IV Personality (SIDP-IV) (Pfohl, Blum, & Zimmerman 1997). Each of the criteria for the 10 DSM-IV PDs was rated from 0 (*not present*) to 3 (*strongly present*). Reliability tests for the SIDP-IV demonstrated ICC = 0.77 for borderline and 0.67 for personality pathology overall (Gleason et al., 2012). Internal consistency for SIDP borderline items ($\alpha = 0.66$) and personality pathology overall (average $\alpha = 0.63$) was acceptable.

Self-version and informant-version of the 80-item Multi-Source Assessment of Personality Pathology (Oltmanns & Turkheimer, 2006) were also used to measure personality pathology. Using the MAPP, participants rated themselves on each of the DSM-IV criteria for PDs (with each item translated into lay language). Possible responses ranged from 0 (*I am never like this*) to 4 (*I am always like this*). Internal consistency for MAPP borderline symptoms was good ($\alpha = 0.70$ self; $\alpha = 0.81$ informant) and acceptable for personality pathology overall (average $\alpha = 0.67$ self; average $\alpha = 0.76$ informant).

Standardized self-report and informant-report of personality pathology on the MAPP and ratings on the SIDP-IV interview were summed and averaged to create a composite score for each type of DSM-IV personality pathology for each participant. Each source has its own strengths and weaknesses. The composite is analogous to a ‘best estimate’ diagnosis based on integrating information from several sources (Bucholz et al., 2006; Pilkonis, Heape,

Ruddy, & Serrao, 1991). Internal consistency was good for the borderline composite score items (α = 0.83) and personality pathology composite score items overall (average α = 0.78).

The Insomnia Severity Index (ISI) (Bastien, Vallieres, & Morin, 2001) is a seven-itemself-report questionnaire that is used to measure a person's insomnia symptoms over the past 2 weeks. Perceived problems with sleep such as difficulties falling asleep, staying asleep, early waking and the amount of distress these difficulties caused the person are assessed. Item examples include: 'How satisfied/dissatisfied are you with your current sleep pattern?' and 'Please rate the current (i.e. last 2 weeks) severity of your insomnia problem(s).' Response options range from 0 to 4, with higher scores indicating more severe distress. The ISI can be compared with the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), one of the most popular self-report measures of sleep quality in current sleep research. The ISI has demonstrated strong convergent validity with the Pittsburgh SleepQuality Index (r = 0.80) as well as high internal consistency in both clinical (α = 0.91) and community samples (α=0.90) (Morin, Belleville, Belanger, & Ivers, 2011). Internal consistency of the ISI was good in our sample (α = 0.89). A total cut score of 10 was best suited to identify clinical insomnia in community-dwelling adults (Morin et al., 2011). We decided to use the ISI because it enabled a quicker report of sleep quality from our participants, who were completing an extensive array of questionnaires on personality and health. For our analyses, scores on the seven items were summed to create a total ISI score.

The Computerized Diagnostic Interview Schedule (C-DIS-IV) (Robins & Helzer, 1994) screener was used to identify DSM-IV major depressive disorder (MDD). This tool was designed for non-clinicians to assess potential mood disorders and psychosis. We used the C-DIS-IV to assess possible current month MDD, which is included as a control variable in our analyses.

Procedure

The analyses reported in this paper are based on data gathered in the SPAN Study, a longitudinal study of personality and health. At baseline and 2.5-year follow-up assessment, participants came to the lab for an in-person interview and completion of self-report questionnaires. During the first half of the baseline appointment, participants completed the SIDP-IV interview and were screened for depression, psychosis and substance use disorders. Potential participants who reported the presence of psychosis within the past year were excluded. During the second half of the appointment, participants completed the self-report questionnaires, including the MAPP. Participants spent approximately 3 hours in the lab and were compensated $60 for their time. Informants completed questionnaires including the informant-version of the MAPP via mail or website and were compensated $30. These procedures were repeated at 2.5-year follow-up assessment, with the addition of several new measures including the ISI.

Statistical analyses

Major depressive disorder and body-mass index (BMI) are possible mediators of the relationship between borderline pathology and sleep problems. Sleep problems are a diagnostic criterion of MDD. BMI is also associated with shorter sleep time (e.g. Gangwisch, Malaspina, Boden-Albala, & Heymsfield, 2005) and was found to mediate the relationship between borderline pathology and arthritis in our sample (Powers & Oltmanns, 2013). Additionally, race and gender have been associated with differences in health and sleep quality, respectively (Farmer & Ferraro, 2005; Zhang & Wing, 2006). In order to control for these possible influences as well as shared variance in sleep problems between all forms of personality pathology, a four-stage hierarchical linear regression analysis was performed with ISI total scores as the dependent variable. Current month MDD diagnosis was entered (coded 0 for ‘no’ and 1 for ‘yes’) in the first step because of its association with sleep problems and high comorbidity with BPD. BMI, a physical variable with possible confounding influence on the relationship between borderline pathology and sleep problems, was entered in the second step. Race (due to a lack of variability of other races, coded as white and all others = 0, African–American = 1) and gender were entered in the third step. Finally, our primary variable of interest (the borderline pathology composite score) was entered in the fourth step simultaneously with the nine other composite scores for personality pathology.

Results

Table 1 presents the endorsement frequency for each of the seven items on the ISI. Mean total score on the ISI was 5.27 (*SD* = 4.79). The difference between mean scores for females (*M* = 5.47, *SD* = 4.92) and males (*M* = 5.01, *SD* = 4.62) was not significant $t(631) = 1.19$, $p = 0.234$ (two-tailed). One-hundred nineteen participants (19%; 66% female) produced ISI total scores of 10 or above, which is the recommended cut score indicator of clinical insomnia in community-dwelling adults (Morin et al., 2011).

Nineteen participants (3%; 68% female) met criteria for MDD in the month leading up to the 2.5-year follow-up interview. One-hundred ninety-three participants (30%; 67% female) met criteria for MDD at some point during their lifetime. Of these participants, average age at first onset was 35.6 for females and 41.0 for males.

Out of 633 SIDP-IV interviews included in our analyses, 206 participants (33%) received a rating between 1 and 3 on at least one of the nine DSM-IV BPD criteria. Means on BPD items ranged from 0.01 (abandonment fears) to 0.20 (impulsivity). Thirty-five participants (6%) had one borderline symptom rated present or strongly present (a rating of 2 or 3 in the SIDP-IV), nine participants (1%) had two borderline symptoms, four participants (1%) had three borderline symptoms, two participants (<1%) had four borderline symptoms and one participant (<1%) met criteria for BPD with five borderline symptoms. On the self-report MAPP, 100 participants (15.7%) endorsed at least one borderline symptom (rated themselves as a 3 or above on the item). One participant met the DSM-IV threshold for a diagnosis of BPD on the basis of the self-report MAPP. On the informant-report MAPP, 182 participants (28.8%) had at least one borderline symptom rated as present by their informant (3 or above). Seven participants (1%) met criteria for BPD according to their informants.

For a more thorough description of PD prevalence in the SPAN study, see Oltmanns et al. (2013).

In our first analyses, we tested the relationship between all forms of personality pathology and insomnia symptoms. Zero-order correlations between all 10 DSM-IV personality pathology composite scores and insomnia symptoms were statistically significant (borderline $r = 0.31$, schizotypal $r = 0.28$, avoidant $r = 0.24$, paranoid $r = 0.24$, dependent $r = 0.23$, schizoid $r = 0.23$, obsessive– compulsive $r = 0.16$, antisocial $r = 0.12$, histrionic $r = 0.11$ and narcissistic $r = 0.09$).[1]

Results of the hierarchical linear regression analysis are shown in Table 2. Current MDD, entered on the first step, was a significant covariate $F(1, 630) = 27.03$, $p < 0.001$, $R^2 = 0.04$, adjusted $R^2 = 0.04$. When BMI ($M = 29.1$, $SD = 6.9$) was entered on the second step, the model was again statistically significant, $F(1, 629) = 17.42$, $p < 0.001$, $R^2 = .05$, Adjusted $R^2 = 0.05$. The third step, which added race and gender, was also significant, $F(4, 627) = 13.28$, $p < 0.001$, $R^2 = 0.08$, Adjusted $R^2 = 0.07$. Race was a significant predictor of insomnia symptoms ($\beta = 0.16$, $p < 0.001$), whereas gender was not ($\beta = .02$, *ns*). When the 10 baseline composite personality pathology scores were entered on the fourth step, the model increased substantially in its predictive power, $F(10, 617) = 8.71$, $p < 0.001$, $R^2 = 0.17$, Adjusted $R^2 = 0.15$. However, in the fourth step of the regression controlling for current MDD, race, gender, BMI and all other composite personality pathology scores, only the borderline pathology composite score was significantly predictive of insomnia symptoms ($\beta = 0.23$, $p < 0.001$).

In an exploratory analysis, because personality pathology was also measured at baseline (although insomnia symptoms were not), we ran the same hierarchical linear regression analysis predicting insomnia symptoms using *baseline* composite personality pathology scores instead of 2.5-year follow-up personality pathology composite scores. The results were very similar. Step four of the hierarchical linear regression analysis, including all baseline personality pathology composite scores, accounted for 16% of the variance in 2.5-year follow-up insomnia symptoms. The baseline borderline pathology composite score was again the only personality pathology composite score that was still significantly associated with insomnia symptoms at the 2.5-year follow-up assessment ($\beta = 0.23$, $p < 0.001$).

Discussion

This study explored the relationship between borderline personality pathology and sleep problems in a large, representative sample of community residents in later middle age. We found that borderline personality pathology as assessed by interviewer-report, self-report and informant-report was significantly associated with self-reported sleep disturbance, even when controlling for MDD, BMI, race, gender and all other forms of personality pathology. Our findings add to the prior association of borderline pathology with detrimental health and relationship outcomes in later middle age (Gleason et al., 2012; Powers & Oltmanns, 2013; Weinstein, Gleason, & Oltmanns, 2012). It appears that, additionally, adults in later middle

[1]All correlations were significant at $p < 0.001$, except for antisocial ($p = 0.002$), histrionic ($p = 0.007$) and narcissistic ($p = 0.019$).

age in the community exhibiting borderline personality pathology are at risk of increased sleep disturbance, which in turn has been associated with many health and functioning difficulties (Bastien et al., 2004; Healey et al., 1981).

The present findings complement those reported by Selby (2013) using data from a large sample of participants from the National Comorbidity Survey Replication who were over 18 years of age. In that study, symptoms of BPD were assessed with a self-report screening questionnaire. Our multi-method procedure provides a more robust assessment of personality pathology and suggests strongly that the previously reported association between sleep problems and borderline symptoms is not simply an artefact of method variance (in this case, a tendency to report problems on two self-report instruments).

Insomnia symptom scores from our sample converge fairly well with the existing literature. Being in a unique age range (57–68) for this literature, they are generally lower than samples of older adults (65+) and higher than samples of younger adults (Ohayon, 2002). Our findings for lifetime MDD were somewhat high (30%) compared with other reports (Kessler et al., 2005), and this may be due to our use of the C-DIS-IV, a computerized screener developed for non-clinicians to identify possible MDD (Oltmanns et al., 2013).

The relationship between borderline pathology and insomnia symptoms in our sample was robust, explaining unique variance above and beyond current MDD, BMI, race, gender and other personality pathology. However, it remains unclear whether more specific characteristics of borderline pathology are responsible for associated sleep problems. Borderline symptoms such as impulsivity, affective instability, anger and stress-related dissociations are all related to a person's temperament. This form of emotion dysregulation may be distinct from emotional problems that are characteristic of depression and uniquely associated with sleep disturbance. The results of our regression analysis indicate that shared variance of personality pathology as a whole in predicting sleep disturbance appears to be largely explained by these borderline symptoms.

A more in-depth examination of possible mediation and moderation effects on the relationship between borderline pathology and sleep problems will be an important future research direction. Physical factors such as pain, stress and medical illnesses affect sleep quality (Ashworth, Davidson, & Espie, 2010; Bastien et al., 2004) and may be more prevalent in people with borderline pathology. Additional factors such as drug and alcohol dependence are also associated with borderline impulsivity, and demographic variables such as race and gender could moderate these relationships. Our regression analysis indicated that race was associated with insomnia symptoms, whereas gender was not. Both of these factors may play larger roles in the relationships among all of these possible moderators. If a more precise model could be developed, individuals with borderline pathology presenting sleep disturbance might be treated more efficiently.

There are some limitations to our study. One is that the relationship between borderline pathology and sleep problems may be the result of negative reporting bias. It is possible that a person with borderline symptoms might exaggerate their report of difficulties, yet prior studies using both self-report and electroencephalography sleep measures have found

irregularities between borderline patients and controls with both methods (e.g. Asaad et al., 2002; Philipsen et al., 2005). We believe that these ISI scores are actual representations of serious subjective sleep difficulty endured by individuals with borderline symptoms and that subjective distress is important clinically. In fact, the magnitude of the association between BPD and insomnia symptoms may be underestimated in our study because so few of our participants experienced enough symptoms to meet the full diagnostic threshold for this disorder.

Another limitation to our study is the fact that insomnia symptoms were not measured at baseline. It is interesting that borderline pathology as measured at baseline was also significantly associated with insomnia symptoms at the 2.5-year follow-up. Because we could not control for insomnia symptoms at the time of the first assessment, however, we cannot draw firm conclusions about the direction of this relationship. A longitudinal, cross-lagged causal analysis regarding the relationship between borderline pathology and sleep problems would have allowed us to draw stronger casual inferences. Because sleep problems have been associated with affect dysregulation (Harvey, 2011), it is possible that borderline symptoms emerge from, or are exacerbated by, sleep problems. But it is also logical that borderline symptoms would cause sleep problems. In fact, the relationship is probably bi-directional.

This study is the first to examine borderline pathology and sleep problems in a large, representative community sample using a comprehensive, multi-method assessment of personality pathology. Our findings suggest that borderline symptoms are still present in later middle age in the community, and they are associated with various kinds of distress. We believe that it is important for community health to consider broadly the risks that are associated with personality pathology, and we hope that these findings will shed light on the relationship between personality and health in this age range and continuing into later life.

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Table 1

Percentage of each item endorsed on the Insomnia Severity Index

	Item response choice*				
Item	**0**	**1**	**2**	**3**	**4**
1. Difficulty falling asleep	59.4	22.6	12.8	2.2	0.9
2. Difficulty staying asleep	38.4	34.1	19.7	5.1	1.3
3. Problems with early wakening	42.8	34.3	16.7	3.3	0.8
4. Satisfaction with sleep pattern	18.3	37.8	18.5	22.0	3.5
5. Interference with daily functioning	56.7	30.5	8.5	2.5	1.6
6. Sleep difficulty noticeable to others	78.4	15.3	3.9	1.1	0.8
7. Worried about sleep pattern	66.4	22.6	7.6	1.4	1.4

*Items 1–3: 0, no problem; 1, mild; 2, moderate; 3, severe; 4, very severe.
*Item 4: 0, very satisfied; 1, satisfied; 2, neutral; 3, dissatisfied; 4, very dissatisfied.
*Items 5–7: 0, not at all; 1, a little; 2, somewhat; 3, much; 4, very much.

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Table 2

Hierarchical regression analysis for predictors of insomnia symptoms

Step	R^2	ΔR^2	Model	β
1	0.04	0.04	**MDD**	**0.20**
2	0.05	0.01	**MDD**	**0.20**
			BMI	**0.11**
3	0.08	0.03	**MDD**	**0.18**
			BMI	0.08
			Gender	0.02
			Race	**0.16**
4	0.17	0.09	MDD	0.07
			BMI	0.07
			Gender	0.05
			Race	**0.14**
			Paranoid	−0.02
			Schizoid	0.05
			Schizotypal	0.08
			Histrionic	−0.04
			Borderline	**0.23**
			Antisocial	−0.07
			Narcissistic	−0.06
			Obsessive	0.04
			Avoidant	0.04
			Dependent	0.06

Bold = $p < 0.01$.

MDD, major depressive disorder; BMI, body-mass index.