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Van Veen, M. M.; Karsten, J.; Lancel, M.

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Poor Sleep and Its Relation to Impulsivity in Patients with Antisocial or Borderline Personality Disorders

M. M. Van Veen[a], J. Karsten[a,b], and M. Lancel[a,c]

[a]Mental Health Services Drenthe; [b]University of Groningen; [c]University Medical Center Groningen

ABSTRACT

Studies investigating sleep and personality disorders consistently demonstrate a relation between personality disorders characterized by behavioral disinhibition and/or emotional dysregulation (traditionally termed cluster B personality disorders) and poor sleep. This finding is in line with previous studies associating insomnia with impulsive behavior, since this is a core characteristic of both antisocial and borderline personality disorder. The current study investigates a group (n = 112) of forensic psychiatric inpatients with antisocial or borderline personality disorder or traits thereof. Subjective sleep characteristics and impulsivity were assessed with the Pittsburgh Sleep Quality Index, the Sleep Diagnosis List, and the Barratt Impulsiveness Scale, respectively. More than half of the patients (53.6%) report poor sleep quality and 22.3% appears to suffer from severe chronic insomnia. Both poor sleep quality and chronic insomnia are significantly associated with self-reported impulsivity, in particular with attentional impulsiveness. This association was not significantly influenced by comorbid disorders. Actively treating sleep problems in these patients may not only improve sleep quality, mental health, and physical well-being, but may also have impact on impulsivity-related health risks by increasing self-control.

KEYWORDS

impulsivity; insomnia; personality disorder; sleep

Introduction

Chronic insomnia is characterized by problems with initiating and/or maintaining sleep, present for at least three nights a week for a period of at least three months, and leading to substantial daytime dysfunction (International Classification of Sleep Disorders, 3rd edition). Prevalence rates of chronic insomnia in the general population vary between 4% and 10%, depending on the strictness of diagnostic criteria used.[1–3] The detrimental effects of chronic insomnia on general health are widely known,[4] covering a range of negative influences for instance on metabolic,[5] cardiovascular,[6] stress regulatory,[7] and cognitive processes.[8] Individuals suffering from chronic insomnia frequently report co-occurring physical and mental health problems, leading to considerable functional impairment.[9–12]

The importance of insomnia as distinct comorbidity in psychiatric disorders is gaining awareness.[13,14] A majority of patients suffering from schizophrenia, depression, or alcohol dependence experience substantial problems with their sleep.[12,15–17] Not only do chronic sleep problems, like insomnia, have a major influence on quality of life and everyday functioning,[18–21] they are also predictive of both incidence and relapse in several psychiatric disorders, including psychotic, mood, and substance abuse disorders.[22–27] Interestingly, treatment of sleep problems in psychiatric patients not only improves insomnia, but also accelerates the general treatment response and increases remission rates of the primary disorder.[28–31]

Research on the prevalence and impact of poor sleep in patients with personality disorders, including those characterized by impulsive behavior and/or emotional dysregulation—traditionally termed "cluster B personality disorders"—is still limited. In persons with symptoms of antisocial personality disorder (ASPD), studies consistently show that self-reported sleep problems are very common[32–34] and have been related to distinct polysomnographic features.[35] In patients with symptoms of borderline personality disorder (BPD), research on subjectively and objectively assessed sleep problems is more abundant. Results consistently show the frequent occurrence of sleep disturbances in borderline patients to be comparable to the prevalence in those with other major psychiatric disorders.[36,37] Comorbid sleep problems have been related to poor recovery status,[38] and chronic

CONTACT M. M. Van Veen maaike.van.veen@ggzdrenthe.nl Department of Forensic Psychiatry, Mental Health Services Drenthe, Dennenweg 9, 9404 LA, Assen, The Netherlands.

insomnia is especially predictive of functional impairment in this group.[39] Several theories on the associations of disordered sleep and psychopathological features of ASPD and BPD have been proposed, for example circadian rhythm disturbances[40] and alterations in sleep architecture.[35,36,41]

Although the mechanisms underlying sleep problems in various types of personality disorders may differ between types of personality disorders, the consequences may be largely independent of diagnostic classification. Insomnia has been related to several forms of impulsivity or self-control, revealing negative effects of sleep loss on decision-making, risk-taking, and behavioral inhibition to negative stimuli.[42–44] These findings are clinically relevant for psychiatric populations, for whom comorbid insomnia might negatively affect behavioral and emotional inhibition. Persons with already poor impulse control, as in ASPD or BPD, could be more vulnerable to the detrimental effects of sleep loss on inhibition. This theory is illustrated by a recent pilot study in forensic patients, of whom the majority were diagnosed with antisocial personality disorder or traits thereof, and insomnia was found to be directly related to the severity of psychopathology through a significant positive association with impulsivity and aggression.[45] Such findings have implications for nonforensic psychiatric samples as well, as poor sleep could further increase maladaptive behaviors (e.g., substance abuse[46,47]) and interpersonal dysfunction (e.g., relational problems and aggression[48–50]). If so, treatment of sleep problems in patients with antisocial or borderline personality disorders may specifically contribute to improving self-control mechanisms.

We therefore investigate the prevalence of insomnia and its association with impulsivity in a large sample of forensic psychiatric inpatients with antisocial or borderline personality disorder or traits thereof. Based on the previous body of work, we hypothesize that sleep problems, especially chronic insomnia, are highly prevalent this group and significantly related to subjectively measured impulsivity.

Methods

Participants and procedure

Data have been extracted from a larger, ongoing Routine Outcome Monitoring (ROM) project at the Forensic Psychiatric Hospital in Assen, the Netherlands. The ROM project has been approved by the local ethics committee (Hospital Ethics Committee of the Isala Clinics in Zwolle, the Netherlands). The study was conducted in accordance with the Declaration of Helsinki. Participants were informed about the ROM project three months after admission. After two weeks they were approached again and asked if they were willing to participate. Participation consists of filling out the informed consent forms and annual completion of a set of questionnaires. Whether they decide to partake in the project is not shared with their treating physicians, and has no further influence on clinical treatment. All data are stored anonymously and only group averages are reported as outcome measures.

All 323 patients admitted between October 2006 and November 2015 were approached; 185 were able and willing to participate (total response rate 57.2%). Data for all parameters were complete for 167 participants. Information concerning mental health status [*Diagnostic and Statistical Manual of Mental Disorders, 4th Edition* (DSM-IV) classification] at the time of discharge was obtained from the medical file, therefore covering both current and (partially) remitted disorders. Psychiatric disorders were diagnosed based on clinical interviews by experienced forensic psychologists and psychiatrists as well as multidisciplinary observations during the stay at the hospital. Only patients with a diagnosis of antisocial personality disorder, borderline personality disorder, or personality disorder not otherwise specified (NOS) with antisocial and/or borderline traits were included. For diagnosing personality disorder NOS, according to DSM-IV criteria, features must be present for one or more specific personality disorder(s) that do not meet the full criteria for any one personality disorder. For example, a patient with less than five borderline traits was classified as having personality disorder NOS with borderline traits, and a patient with three borderline traits and two antisocial traits was classified as having personality disorder NOS with borderline and antisocial traits. No individual information was available on the total number or nature of traits leading to a classification of personality disorder NOS with antisocial and/or borderline traits. The resulting sample consisted of 112 participants eligible for further analyses. For the purpose of the current study, only the first data obtained from each participant were included in the analysis.

Questionnaires

Pittsburgh Sleep Quality Index (PSQI)

Self-reported sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI).[51] The PSQI is a widely used measure of sleep quality and sleep-related symptoms over the past month. It has been shown to be valid and reliable in psychiatric populations. The 19 items are grouped into 7 component scores that reflect the frequency and severity of sleep problems, including subjective appreciation of sleep quality, sleep latency,

sleep duration, habitual sleep efficiency, presence of sleep disturbing factors, use of sleep medication, and daytime dysfunction. Each component obtains a value between 0 (no difficulty) and 3 (severe difficulty). A score of two was considered clinically relevant. All component scores were summed to yield a total score that ranges from 0 to 21, with poorer sleep quality associated with a higher score. A cutoff total score of 5 (PSQI > 5) was used to distinguish "poor" from "good" sleepers.[51]

Sleep Diagnosis List (SDL)

The Sleep Diagnosis List (SDL)[52] was used to assess chronic insomnia. The SDL has been derived from the Sleep Diagnostic Questionnaire[53] and consists of 75 randomly distributed questions covering specific sleep disorders and sleep related problems during the past 6 months. Subscales cover symptoms of insomnia, hypersomnia, Restless Legs Syndrome, Sleep-Related Breathing Disorders, daytime dysfunction, dissatisfaction with social or sexual functioning, psychiatric symptoms, and negative sleep conditioning. The items are scored on a 5-point scale ranging from 1 (never) to 5 (very often or always). Fifteen items are specifically related to insomnia, a mean score of 3 is generally used as a cut-off score.[53] In this way, chronic insomnia as measured by the SDL is defined by a mean score of 3 or higher on this subscale, indicating serious and frequent complaints to be present during the previous 6 months. For the other subscales, the same cutoff was employed. The psychometric properties of the SDL have been evaluated in Dutch participants with sleep disorders.[52] The factor insomnia showed a good Cronbach's $a = 0.93$.

Barratt Impulsiveness Scale (BIS-11)

The Dutch translation of the Barratt Impulsiveness Scale (BIS-11)[54] was used to assess self-rated impulsivity. This questionnaire has been found valid and reliable in psychiatric patients, substance-abuse patients and prisoners, with an acceptable internal consistency (Cronbach's α 0.79–0.83). The BIS-11 is comprised of 30 items, each of which is answered on a 4-point scale ranging from 1 (rarely/never) to 4 (almost always/always). Principal components analysis identified three second order factors, leading to three subscales: Motor Impulsiveness (11 items, involving acting without thinking), Attentional Impulsiveness (8 items, involving difficulties with focus, thought control and restlessness), and Non-planning Impulsiveness (11 items, involving a lack of forethought). Higher scores indicate higher levels of impulsiveness, with a maximum total score of 120. Total scores vary between different samples, for example, in healthy participants (62.3 ± 10.3), participants with substance abuse (69.3 ± 10.3), and violent offenders (72.8 ± 17.7).[54–57] A score of 72 or higher has been suggested to be indicative of highly impulsive individuals.[55] Higher BIS scores are indicative of low self-control and have a significant, but modest effect on a wide range of undesired behaviors, especially addictive and deviant behavior.[58]

Statistical analysis

First, descriptive analyses were conducted to describe the study group and their scores on sleep and impulsivity questionnaires. Second, multiple regression analyses were conducted to investigate the relation between sleep quality (total PSQI score) or chronic insomnia (SDL insomnia score) and subjective impulsivity (total BIS-11 score). The potential influence of DSM-classification on the relation of sleep and impulsivity was explored by individually adding the following covariates to the model: substance abuse disorder (yes / no), any mood or anxiety disorder (yes / no), psychotic disorder (yes / no), mental retardation (yes / no), and autism spectrum disorder (yes / no). To differentiate between patients with antisocial personality disorder or traits (yes / no) and borderline personality disorder or traits (yes / no) in our mixed sample, both were added to the model individually. Relevant confounding was defined as a change in regression coefficient of 10% or more. Effect modification was subsequently explored by creating interaction terms between covariates and either total PSQI score or SDL insomnia score, and adding these to each regression model. Third, the relationship between sleep quality and insomnia on the one hand and impulsivity on the other was further specified using multivariate multiple regression with the three subscales of the impulsivity scale as dependent variables. Missing values were imputed with the subscale average. Alpha levels of $p < 0.05$ were used to define statistical significance. Analyses were performed with IBM SPSS Statistics 23.

Results

Participant characteristics

Sociodemographic characteristics and mental health status of the participants are shown in Table 1. Most participants were male (91.1%). The sample had a mean age of 32.44 ± 10.53 (SD) years, ranging from 19 to 66 years. Most were of western European origin and single. A large proportion did not finish high school. Many participants were sentenced by the criminal court for a violent offence, such as (attempted) murder, manslaughter, or (aggravated) assault. The majority was diagnosed with antisocial personality disorder (26.8%), antisocial traits

Table 1. Descriptive characteristics of the study group (n = 112).

	n (%)
Sociodemographic characteristics	
Male gender	102 (91.1%)
Western European origin	102 (91.1%)
Marital status single	105 (93.5%)
No high school degree	45 (40.2%)
Index offence	
Aggressive offence with fatal consequences	2 (1.9%)
Aggressive offence without fatal consequences	48 (44.4%)
Sexual assault	22 (20.4%)
Arson	8 (7.4%)
Property offence with violence	11 (10.2%)
Property offence without violence	17 (15.7%)
Mental health status	
Antisocial personality disorder	30 (26.8%)
Personality disorder not otherwise specified with antisocial traits	67 (59.8%)
Borderline personality disorder	16 (14.3%)
Personality disorder not otherwise specified with borderline traits	34 (30.4%)
Substance abuse disorder	85 (75.9%)
Psychotic disorder	16 (14.3%)
Autism spectrum disorder	11 (9.8%)
Any mood or anxiety disorder (including posttraumatic stress disorder)	17 (15.2%)
Mental retardation	10 (8.9%)

Note: Some participants are diagnosed with more than 1 disorder.

(59.8%), and/or borderline traits (30.4%), and a history of (comorbid) substance abuse disorder (alcohol 43.4%, drugs 50.9%). There was substantial overlap (20.4%) in personality diagnostics, for example, participants diagnosed with antisocial personality disorder with borderline traits, or personality disorder not otherwise specified with borderline and antisocial traits.

Sleep quality

Mean total PSQI score was 6.74 ± 4.56. On average, participants went to bed at 23:25 ± 1:00 h and rose at 07:27 ± 0:52 h, effectively sleeping for 06:57 ± 1:27 h, or 86.8% of the time spent in bed. Mean sleep latency was 38.26 ± 52.69 minutes. Over half of the participants (n = 60, 53.6%) had a total PSQI > 5, indicating poor sleep. The main complaint of the group of poor sleepers concerned difficulties falling asleep (73.3%). Several sleep disturbing factors were indicated by participants, with stress, worrying, and ruminating appearing most frequently. More than half of the participants that indicated poor sleep quality (53.3%) reported so despite of the regular use of sleep medication.

Sleep disorders

Mean score on the insomnia subscale was 2.17 ± 0.96. Twenty-five participants (22.3%) had a score ≥ 3 on the insomnia subscale, indicating chronic insomnia. Symptoms indicative of Restless Legs Syndrome (6.3%) and Sleep-Related Breathing Disorders (4.6%) were less prevalent. In the insomnia subgroup 84.0% reported restless sleep, 52.0% prominent daytime dysfunction, and 44.0% negative sleep conditioning (i.e., worrying about sleep and the consequences of poor sleep). Almost half (44.0%) of the insomniacs reported anxiety and/or depressive symptoms, with 40.0% being dissatisfied with their social and sexual relationships. Further, excessive daytime sleepiness and automatic behavior was prevalent in 28.0% and 20.0% respectively. Of the 60 participants indicating poor sleep quality on the PSQI, 25 (41.7%) suffer from chronic insomnia. Participants with and without insomnia are compared on sleep characteristics and total PSQI score in Table 2, showing that insomnia was mainly due to serious problems falling asleep, resulting in a much shorter total sleep duration.

Impulsivity

Self-reported total impulsivity score was 66.96 ± 12.08 (range 43–109). Scores on the three factor subscales Motor Impulsiveness, Attentional Impulsiveness, and Non-planning Impulsiveness were 23.47 ± 5.08, 17.21 ± 4.51, and 26.29 ± 4.97, respectively.

Relationship of sleep quality and chronic insomnia with impulsivity

Sleep quality was significantly associated with self-rated impulsivity (Table 3), with higher scores on the PSQI, and thus lower levels of sleep quality, being associated with higher impulsivity scores. None of the mentioned diagnostic covariates showed any relevant confounding or significant effect modification of this relationship, and were therefore excluded from the model. Further exploration of the association of PSQI score with second order factors of the BIS revealed that only the factor Attentional Impulsiveness, but not Motor Impulsiveness and Non-planning Impulsiveness, was significantly associated with sleep quality (F (21, 109) = 2.54, p = 0.001).

Table 2. Differences in mean sleep characteristics and total PSQI score in participants with and without insomnia (n = 112).

	SDL insomnia < 3	SDL insomnia ≥ 3
	87 (77.7%)	25 (22.3%)
Habitual bed time (hr:mm ± SD)	23:24 ± 0:54	23:28 ± 1:18
Sleep latency (hr:mm ± SD)	0:23 ± 0:22	1:31 ± 1:26***
Habitual waking time (hr:mm ± SD)	7:25 ± 0:43	7:35 ± 1:16
Total sleep duration (hr:mm ± SD)	07:17 ± 1:14	05:46 ± 1:34***
Sleep efficiency (% ± SD)	91.31 ± 10.90	71.17 ± 20.51***
Total PSQI score (mean ± SD)	5.02 ± 3.11	12.72 ± 3.66***

Note. Independent samples t-test, ***p < 0.001.
Abbreviations: PSQI, Pittsburgh Sleep Quality Index; SDL, Sleep Diagnosis List; SD, standard deviation; hh:mm, hours: minutes.

Table 3. Final models of multiple regression analysis of self-reported impulsivity (n = 112).

Independent variable	B	SE B	95% CI
Sleep quality (PSQI)	0.742**	0.243	0.261–1.223
Insomnia (SDL)	5.223***	1.089	3.065–7.382

Abbreviations: B, regression coefficient; SE B, standard error of regression coefficient; 95% CI, 95% confidence interval; PSQI, Pittsburgh Sleep Quality Index; SDL, Sleep Diagnosis List.
**$p < 0.01$, ***$p < 0.001$.

Chronic insomnia was significantly associated with subjective impulsivity, with higher SDL insomnia scores being associated with higher impulsivity rates (Table 3). As in the sleep quality model, none of the mentioned diagnostic covariates showed any relevant confounding or effect modification of this relationship, and were therefore excluded from the model. Further exploration of the association of SDL insomnia score with second order factors of the BIS revealed that the factor Attentional Impulsiveness, but not Motor Impulsiveness and Non-planning Impulsiveness, was significantly associated with insomnia (F (44, 67) = 2.03, $p = 0.004$).

Discussion

In the present study, we aimed to investigate the prevalence, types and severity of sleep disturbances in 112 forensic psychiatric inpatients with antisocial or borderline personality disorder or traits thereof. We examined the relationship between sleep quality, chronic insomnia, and subjective impulsivity. Over 50% of the patients were dissatisfied with their sleep, due to various problems particularly with respect to falling asleep. We found that 22.3% of the patients suffered from chronic insomnia as measured by the SDL, which was particularly characterized by major problems with sleep initiation, resulting in much shorter total sleep times. Both lower sleep quality and higher insomnia scores were significantly associated with greater impulsivity. As impulsivity is a multidimensional construct, the contribution of the three BIS-11 subscales to this relationship was further explored. This analysis revealed that both poor sleep quality and insomnia were significantly correlated with Attentional Impulsiveness, with subjects with greater insomnia or lower sleep quality reporting more difficulties with focusing and controlling their thoughts.

The prevalence of chronic insomnia in this forensic psychiatric population is much higher than that in the general population (22.3% versus 4%–10%). This might even be an underestimation considering the fact that the SDL covers a 6-month period, whereas other common diagnostic classifications are based on a 1 or 3 month duration criterion of insomnia. Our outcomes are in line with Kamphuis and colleagues,[33] who found that 50.0% of a forensic sample had a PSQI > 5, indicating dissatisfaction with sleep quality, and 19.8% suffered from chronic insomnia. Self-reported poor sleep quality, difficulties in sleep onset and frequent awakenings, in combination with marked abnormalities in actigraphic and polysomnographic recordings, were found in violent males with ASPD as compared to healthy subjects.[35] Compared to matched controls, a sample of male soldiers with ASPD also reported lower sleep quality and sleep efficiency, with a delay of sleep onset.[34] In borderline patients several studies show substantial sleep difficulties and impaired sleep quality in subjective reports, partially supported by objectively measured differences, as compared to controls.[59–61] In a large US national sample, 63% of participants with BPD reported sleeping problems, with an average duration of 19.9 weeks, leading to compromised self-care as well as social-emotional and cognitive functioning.[39] Also, poor sleep quality was significantly associated with symptoms of borderline personality disorder in an outpatient internal medicine sample.[62]

Associations of poor sleep and impulsivity have been reported previously, for example, in young offenders for whom sleep duration was negatively predicted by impulsivity.[32] In a forensic psychiatric inpatient sample, poor sleep quality and chronic insomnia were significantly associated with self-reported impulsivity.[45] Illustrative of the clinical impact is the fact that the occurrence of inpatient aggression was solely predicted by sleep parameters, and not by substance abuse or a diagnosis of cluster B personality disorder. A study in jail inmates showed a significant relation between symptoms of borderline personality disorder, including impulsivity, and sleep problems, even when controlling for depression and substance abuse.[63] Interestingly, poor sleep was positively correlated with impulsive symptoms of antisocial personality disorder, but this relation lost the level of statistical significance after controlling for depression and substance abuse in contrast to our observations.

We found no influence of several DSM diagnoses on the relationship between sleep problems and impulsivity, including substance abuse, mood disorders, or type of personality disorder. Theoretically, a connection between disrupted sleep and multiple psychiatric disorders is to be expected, but in our sample this does not affect the association with impulsivity. This suggests an independent pathway, rather independent of diagnostic category, in this group of forensic patients with personality disorders. A more dimensional approach to the specific psychopathology in personality disorders could shed more light on the intricate relationships of such dimensions, for example, impulsivity, to sleep disturbances.

Impulsivity is described as rapid and unplanned behavior with diminished regard to the consequences. Studies have consistently demonstrated that impulsivity is a multidimensional construct,[64,65] but have not been conclusive regarding the specific domains that together define this behavior, such as stimulus/response inhibition, decisional and motivational impulsivity. Because impulsivity is such a complex construct, exploration of the contribution of each of the BIS subscales might provide clues for further understanding its relationship with sleep. We found that the significant overall associations of sleep problems with impulsivity scores were mainly driven by a strong relationship with the subscale covering difficulties concentrating and restlessness. As sleep problems were mainly characterized by difficulties in self-reported sleep initiation, this finding might suggest a specific relation between sleep onset disturbances and certain aspects of impulsiveness, including racing thoughts or inability to pay attention and sit still for a prolonged amount of time. If so, problems falling asleep as well as the consequential reduction in total sleep duration could both contribute to and be augmented by Attentional Impulsiveness. As patients with ASPD and BPD are, by definition, expected to score consistently high on Motor Impulsiveness (e.g., "I do things without thinking") and Non-planning Impulsiveness (e.g., "I am more interested in the present than the future") items, it could be that these two areas, in contrast to Attentional Impulsiveness (e.g., "I have 'racing' thoughts"), are less likely to be directly related to sleep loss because of their more dispositional (trait) character. Further, the BIS-11 mixes items assessing general and specific aspects of behavior. Several of these specific items are not directly applicable to clinically admitted patients (e.g., going to plays or lectures, changing residencies and planning trips). This might compromise the established factor structure and deserves attention in further research in this as well as other inpatient populations.

The direction of the relationship between disturbed sleep and impulsive behavior and emotional dysregulation is still a matter of debate, but hypothesized to be bidirectional. Intentional sleep deprivation has been related to several forms of impulsivity, revealing negative effects on decision-making, risk-taking, and behavioral inhibition to negative stimuli.[42–44] These findings support an important effect of sleep loss on prefrontal cortical function, leading to failure of its regulatory capacity on behavioral inhibition and emotional responding.[66–68] Both structural and functional dysfunctions in prefrontal-limbic networks have been found in BPD[69] and APSD,[70] suggestive of enhanced vulnerability in the effect of sleep loss on impulse control in these patients.

Reversely, the negative consequences of impulsive behavior could result in elevated stress or hyperarousal, leading to disturbed sleep.[71] This, in turn, further deteriorates the ability to regulate emotions[44,72] and impulsive behavior during the day. In other words, self-control is negatively influenced by sleep loss, maintaining a vicious circle of unhealthy behaviors and poor sleep hygiene, resulting again in more serious sleep problems.[73]

Several limitations of the present study are noteworthy. First, the study was conducted with cross-sectional data. This restricts the possibilities of elaborating on temporal relationships between poor sleep and impulsive features. Another limitation is the absence of objective methods of assessing sleep quality and impulsivity, relying on self-reported complaints. However, although subjective reports of sleep and impulsivity have not always been shown to be reliably associated with objective measurements, they do directly represent patients' experience, which is a very relevant, even the most important, aspect of psychiatric practice. Insomnia is a clinical diagnosis, based on self-report, as are many other psychiatric disorders. The SDL, used in this study, provides a rather strict framework for assessing insomnia. Still, more objective measures, such as actigraphy, and specific neuropsychological tests, could be helpful to further clarify the relationship between sleep characteristics and subdomains of impulsivity. Third, all patients partaking in this study were clinically admitted to a forensic psychiatric hospital at the time, influencing their sleep characteristics. For example, the strict daily schedules within the ward, including sleeping and waking times, could both ameliorate or exacerbate sleep problems. Finally, data on participants not willing or able to partake in the project was not systematically collected. Although we consider a response rate of almost 60% in this group of complex psychiatric inpatients to be relatively high, some form of selection bias cannot be ruled out. The effects on the relationship between poor sleep and impulsivity are hard to predict, however, considering the multitude of reasons for nonparticipation (e.g., early transfer to another facility, severity of current psychotic or mood disorder, oppositional or paranoid features).

The most important recommendation deriving from the results of this study is that actively diagnosing and treating sleeping problems, especially chronic insomnia, would be worthwhile to consider as standard care of patients with antisocial or borderline personality traits. Not only is treatment of sleep disturbances expected to improve sleep quality and general mental and physical well-being, it may also have a significant impact on impulsive behavior and related health risks. Further, efficacy of treatment of personality disorders itself may be enhanced if sleep problems are explicitly addressed. The

finding that problems in sleep onset are the predominant complaint in this patient group provides a possibility for more targeted treatment of specific facets of insomnia. Cognitive and Behavioral Therapy for Insomnia (CBT-I) is currently recommended as the first line of treatment for insomnia.[74] It has been shown to be an effective intervention in patients with several comorbid psychiatric disorders,[75] for not only improving insomnia but also the comorbid disorder.[76] The fact that a large proportion of poor sleepers in our study used sleep medication, apparently not with the desired effect, supports the use of behavioral interventions. Studies on the efficacy of CBT-I in (forensic) patients with antisocial or borderline personality disorder or traits are still lacking, and would be of great value considering the possible effect of this intervention on psychopathology.

Conclusions

Poor sleep, including chronic insomnia, is common in forensic inpatients with antisocial or borderline personality disorders or traits thereof. Moreover, these sleep problems are significantly related to self-reported impulsivity. We recommend active screening and treatment for insomnia, particularly in this group. This could not only improve sleep quality and general treatment outcomes, but may also have impact on impulsivity-related health risks by increasing self-control. Future research should be directed both to a more extensive understanding of the relationship between poor sleep and several domains of impulsivity as well as to results of interventions directly addressing sleep on both sleep and impulsive behavior.

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