

SCIENTIFIC INVESTIGATIONS

## Nightmare Distress Questionnaire: associated factors

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**Study Objectives:** The diagnosis of a nightmare disorder is based on clinically significant distress caused by the nightmares, eg, sleep or mood disturbances during the day. The question what factors might be associated with nightmare distress in addition to nightmares frequency is not well studied.

**Methods:** Overall, 1,474 persons (893 women, 581 men) completed an online survey. Nightmare distress was measured with the Nightmare Distress Questionnaire.

**Results:** The findings indicated that nightmare distress, measured by the Nightmare Distress Questionnaire, correlated with a variety of factors in addition to nightmare frequency: neuroticism, female sex, low education, extraversion, low agreeableness, and sensation seeking. Moreover, the percentage of replicative trauma-related nightmares was also associated with higher nightmare distress.

**Conclusions:** A large variety of factors are associated with nightmare distress, a finding that is of clinical importance. The construct harm avoidance, however, was not helpful in explaining interindividual differences in nightmare distress. Furthermore, the relationship between nightmare distress and other factors, eg, education or agreeableness, is not yet understood.

**Keywords:** nightmare distress, nightmare frequency, neuroticism, openness to experience, agreeableness, harm avoidance, sensation seeking

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### BRIEF SUMMARY

**Current Knowledge/Study Rationale:** Distress caused by nightmares is essential in diagnosing a nightmare disorder (ICD-10 code: F51.5). So far, the factors associated with nightmare distress, in addition to nightmare frequency, are not well understood.

**Study Impact:** The findings of the current study clearly indicate that nightmare distress is associated with a variety of different factors, like nightmare frequency, neuroticism, percentage of replicative trauma-related nightmares, female sex, low education, extraversion, low agreeableness, and sensation seeking.

### INTRODUCTION

Nightmares are defined as repeated occurrences of extended, extremely dysphoric, and well-remembered dreams that usually involve threats to survival, security, or physical integrity.<sup>1</sup> To diagnose a nightmare disorder, the dream experience, or the sleep disturbance produced by awakening from it, must cause clinically significant distress, eg, mood disturbance due to persistence of nightmare affect or thinking about the nightmare, fear of sleep, and/or intrusive nightmare imagery. Belicki<sup>2</sup> developed the Nightmare Distress Questionnaire (NDQ) with 13 items to capture different aspects of nightmare distress, such as global distress, eg, “Do you have difficulties coping with nightmares?”; sleep problems, eg, “After you awaken from a nightmare, do you have difficulties falling back asleep?”; and “Do nightmares interfere with the quality of your sleep?”; effects on waking, eg, “Do nightmares affect your well-being?”; thoughts about seeking help, eg, “In the past year have you considered seeking professional help for your nightmares?”; and beliefs about nightmares, eg, “Do your nightmares foretell the future?” In 4 studies in student samples,<sup>2</sup> the internal

consistency (Cronbach’s alpha) of the NDQ ranged from  $r = .83$  to  $r = .88$ .

The most obvious factor associated with nightmare distress is, of course, nightmare frequency, ie, the more often nightmares occur, the more stressful the nightmare issue can be expected to be. However, Belicki<sup>2,3</sup> and subsequent studies<sup>4–7</sup> have shown that the correlation between nightmare frequency and distress is relatively small and ranges between  $r = .26$  and  $r = .44$ . Thus a large percentage of variance is still unexplained. This indicates that additional factors might affect nightmare distress. The findings that psychopathology measures are more strongly related to nightmare distress than to nightmare frequency<sup>3,8,9</sup> suggest that factors such as neuroticism are not only associated with heightened nightmare frequency<sup>10,11</sup> but also add to the distress nightmares are causing, ie, that these persons also worry a lot about their nightmares. A regression analysis in a population-based sample supported this idea that neuroticism is a strong predictor of nightmare distress even when nightmare frequency was also entered into the analysis, ie, is statistically controlled for.<sup>12</sup> Neuroticism is a broad concept, including emotional instability, increased likelihood to experience

negative emotions, depressive mood, and difficulties to deal with everyday stressors.<sup>13</sup> Other related constructs, like ego-strength,<sup>14</sup> schizotypy,<sup>15</sup> and alexithymia,<sup>16</sup> have been studied in relationship to nightmares. Other variables like sensation seeking and harm avoidance that might help to explain interindividual differences in nightmare distress have not yet been studied systematically. Individuals with high sensation seeking enjoy thrilling experiences<sup>17</sup> and, thus, might be related to lower nightmare distress compared to individuals with low sensation seeking scores. Harm avoidance, on the other hand, characterizes persons with high levels of disliking and avoiding specific threats and danger<sup>18</sup>; if this person experiences dreadful nightmares, this should be accompanied with increased nightmare distress compared to persons with low harm avoidance.

Sex is also a factor that is associated with nightmare frequency, as women tend to report more nightmares than men<sup>19</sup> and also have higher nightmare distress.<sup>20–22</sup> Again, the association was still significant when nightmare frequency was statistically controlled for,<sup>12</sup> ie, sex has an additional effect on nightmare distress beyond the sex effect on nightmare frequency.

Another factor that is associated with nightmare distress independently from nightmare frequency is beliefs about nightmares, eg, “Nightmares contain clues to unconscious fears”, “Anyone who regularly has nightmares has experienced something bad in the past”, or “Nightmares can contain important messages.”<sup>23</sup> Interestingly, one statement of the NDQ, namely, “Do your nightmares foretell the future?”<sup>3</sup> can also be found in the 6-items beliefs regarding nightmare scale of Schredl et al<sup>23</sup>: “Nightmares predict the future.” It seems quite obvious that this kind of thinking can add to nightmare distress considerably.

To summarize, research has indicated 3 variables that are associated with nightmare distress in addition to nightmare frequency: neuroticism, sex, and specific beliefs about nightmares. The open question is whether there are additional factors that are associated with heightened nightmare distress.

The aim of this study was to replicate the findings that neuroticism and sex are associated with nightmare distress in addition to nightmare frequency and examine whether the trait variables sensation seeking and harm avoidance can explain additional variance of interindividual differences in nightmare distress. It was hypothesized that sensation seeking is related to lower nightmare distress, as persons with high levels of this trait enjoy thrilling experiences, whereas harm avoidance should be positively related to nightmare distress, as persons with high levels of this trait dislike and avoid specific threats and danger, ie, experiencing threats within nightmares should be related to heightened distress in these persons. In addition, as Levin and Nielsen<sup>11</sup> predicted, according to their nightmare typology, replicative, trauma-related nightmares are more distressing than idiopathic nightmares. We tested whether nightmare type adds independently to nightmare distress. In an exploratory fashion, the other 4 Big Five personality factors other than neuroticism were included in the nightmare distress analysis.

## METHODS

### Participants

Overall, 1,474 persons (893 women, 581 men) participated in the survey. Mean age of the sample was  $51.87 \pm 14.05$  years (range: 18 to 94 years). Educational level was distributed as follows: 0.27% had no degree, 12.69% had 9 years of schooling, 31.07% had O-level (middle degree, “Realschule”, about 10 years), 21.85% A-level (“Abitur”), 31.61% had obtained a university degree, and 2.51% had a doctorate.

### Research instruments

For assessing nightmare frequency, an 8-point rating scale was presented (“How often have you experienced nightmares recently [in the past several months]?”: 0 = never, 1 = less than once a year, 2 = about once a year, 3 = about 2 to 4 times a year, 4 = about once a month, 5 = 2 to 3 times a month, 6 = about once a week, 7 = several times a week). The scale included the following definition: “Nightmares are dreams with strong negative emotions that result in awakening from the dream. The dream plot can be recalled very vividly upon awakening.” The retest reliability of this scale is  $r = .765$ .<sup>7</sup> If nightmares were experienced during the past several months, the participants were asked to estimate the percentage of nightmares belonging to 3 categories: (1) almost exact repetitions of an experienced trauma, (2) related to an experienced trauma, eg, same emotion, but the nightmare also contains elements unrelated to trauma, and (3) nightmares are not related to a trauma. To help the participants to perform an estimate, the following instruction was provided: “Nightmares can have different contents. On the one hand, they can reflect extremely frightening or unpleasant experiences, often referred to as ‘trauma’. Examples include experiencing natural disasters, being victim of violence, serious car accidents, war experiences, life-threatening situations. On the other hand, there are nightmares that have no direct relation to reality, eg, being chased by a monster.” The percentages should add up to 100%. For the purpose of this paper, the percentage of replicative trauma-related nightmares was selected.

The NDQ<sup>2</sup> includes 13 items with a 5-point Likert response scale that covers a variety of nightmare-related problems, such as general nightmare distress, impact of nightmares on sleep, and impact of nightmares on daytime reality perception.<sup>4</sup> Most items range from 1 = never to 5 = always, eg, “Do you have difficulties coping with nightmares?”, whereas items like “Do nightmares interfere with the quality of your sleep?” should be rated from 1 = not at all to 5 = a great deal. The last item assessing the interest in nightmare therapy was coded as follows: 1 = not at all interested to 5 = extremely interested. The NDQ has been previously shown to have good reliability with Cronbach’s alphas ranging from  $r = .83$  to  $r = .88$ .<sup>2</sup> Due to a programming error, in the present study, the categories of items “Do nightmares interfere with the quality of your sleep?” and “Do nightmares affect your well-being?” ranged from 1 = never to 5 = always and not, as in the original, from 1 = not at all to 5 = a great deal.

The German Impulsive Sensation Seeking subscale of the Zuckerman-Kuhlman Questionnaire<sup>17</sup> includes 11 items involving being spontaneous and having the tendency to do things

that might involve some kind of thrill, eg, “I like to experience new and exciting things and sensations, even if they scare me a little” or “I would like to travel spontaneously without planning the exact route or schedule”. The answer format is a forced choice between “agree” and “disagree”. Zuckerman<sup>17</sup> reports an acceptable internal consistency of  $\alpha = .83$  for the German version.

For this study, the 26-item Harm Avoidance scale, a subscale of the Multidimensional Personality Questionnaire,<sup>24</sup> was selected. The scale includes 2 different answering formats. In the first format (9 items), a statement was presented and the participant could agree or disagree, eg, “I like or would like to dive into the water from a high diving board” or “I would enjoy exploring an old abandoned house at night”. The second format (17 items) includes 2 statements and the participant has to choose which of 2 situations described in the statements he would dislike more, eg, “A: Being on an airplane and the pilot says there are problems with the engine and that he might have to perform an emergency landing” or “B: To dig up potatoes in a field”. High scorers do not enjoy the excitement of adventure and danger and prefer safe activities even if those are tedious while low scorers like to engage in risky activities and adventures and may enjoy the excitement of dangerous emergency or disaster. Harkness et al<sup>18</sup> reported an internal consistency of  $\alpha = .87$  for the harm avoidance scale.

The Big Five personality factors were measured with the German version of the NEO-Five Factor Inventory-30 (NEO-FFI-30).<sup>25</sup> Neuroticism is characterized by emotional instability, increased likelihood to experience negative emotions like anxiety, depressive mood, and difficulties to deal with everyday stressors, whereas extraverted individuals seek social contacts, are outgoing, full of energy, and talkative.<sup>13</sup> People who score high on openness to experience are curious, inventive, and like to explore.<sup>25</sup> Agreeableness characterizes individuals who are friendly, cooperative, and compassionate to other persons, whereas individuals with high conscientiousness scores tend to be achievement-oriented, organized, and efficient but also lack spontaneity. The internal consistencies (Cronbach’s alpha) of the 5 scales of the 30-item version given by the test authors ranged from  $r = .67$  (openness to experience) to  $r = .81$  (neuroticism) and were comparable to those of the 60-item version of the NEO-FFI<sup>26</sup>

## Procedure

Within the [www.wisopanel.net](http://www.wisopanel.net) panel (an online panel), about 10,000 persons with an interest in online studies and with heterogenic demographic backgrounds are registered. During the process of registering they were informed about data protection policy and consented by completing the registration. The link of this study was sent via email to all registered persons, and participation was voluntary and unpaid. The participants completed an online survey between September 21, 2018 and October 1, 2018. The language of the survey was German, so 96.5% of the participants lived in Germany, 1.9% in Austria, 0.9% in Switzerland, and 0.7% in other countries.

Statistical procedures were carried out with the SAS 9.4 software package for Windows. An ordinal regression was used for analyzing the effect of different predictors (the Big Five

**Table 1**—Nightmare frequency (n = 1,474).

Category	n	%
Several times a week	69	4.68
About once a week	105	7.12
Two or three times a month	156	10.58
About once a month	170	11.53
About two or four times a year	253	17.16
About once a year	149	10.11
Less than once a year	206	13.98
Never	366	24.83

personality factors, sensation seeking, and harm avoidance) on the nightmare frequency and nightmare distress controlled for age, sex, and education. The variables were entered simultaneously. Effect sizes were calculated according to Cohen.<sup>27</sup> As the distribution of the percentage of replicative trauma-related dreams was skewed toward respondents rarely having trauma-related dreams, the responses were categorized into 4 groups to obtain an ordinal scale for nonparametric analysis (0% → 0, 0.01–10% → 1, 10.01–40% → 2, and above 40% → 3).

## RESULTS

The nightmare frequency distribution is depicted in **Table 1**. About 12% of the participants reported that they had nightmares at least once a week, whereas 25% reported that they never experienced nightmares. In **Table 2**, means and standard deviations of the variables are presented. The NDQ mean is slightly lower compared to the value of  $32.3 \pm 10.5$  obtained in a student sample.<sup>3</sup> The percentage of replicative, trauma-related dreams is relatively small. No replicative dreams were reported by 58.66% of the participants, whereas 12.82% reported percentages of replicative dreams of 0.01–10%. For 17.15% of the participants, the percentage ranged between 10.01% and 40%; and 11.37% reported that more than 40% of their nightmares were replicative. Only 15 participants stated that all their nightmares were replicative and trauma related. The reliability indices of all scales were high (see **Table 2**). Sensation seeking correlated negatively with harm avoidance ( $r = -.439, P < .0001, n = 1,473$ ), but neither scale correlated with neuroticism (sensation seeking:  $r = .000, P = .9958, n = 1,474$ ; harm avoidance:  $r = .033, P = .2108, n = 1,473$ ).

The ordinal regression for nightmare frequency indicated that neuroticism was the most important factor explaining interindividual differences in nightmare frequency (see **Table 3**). Small effect sizes were found for openness to experience and conscientiousness, whereas extraversion and agreeableness were not related to nightmare frequency. Although sensation seeking was not related to nightmare frequency, higher harm avoidance was associated with lower nightmare frequency. In addition, there was a slight decline in nightmare frequency with age, and women tended to report nightmares slightly more often than men (see **Table 3**).

**Table 2**—Means and standard deviations of personality and nightmare variables (n = 1,474).

Variable	Mean ± SD	Reliability*
Neuroticism	1.51 ± 0.93	.872
Extroversion	2.05 ± 0.67	.735
Openness to experience	2.44 ± 0.78	.755
Agreeableness	2.83 ± 0.72	.755
Conscientiousness	2.93 ± 0.67	.793
Sensation seeking	4.19 ± 2.94	.810
Harm avoidance (n = 1,473)	18.84 ± 4.63	.806
Nightmare Distress Questionnaire (n = 1,108)	29.27 ± 9.95	.915
Percentage of replicative, trauma-related dreams (n = 1,108)	12.95 ± 22.16%	—

\*Cronbach's alpha.

The regression analysis for the NDQ is also presented in **Table 3**. Before computing the regression analysis with all variables entered simultaneously, we computed regression analysis with sensation seeking and harm avoidance as single factors controlling for age, sex, education, and nightmare frequency. Higher scores of sensation seeking (standardized estimate = -0.1520, *t* = 6.1, *P* < .0001, *d* = 0.413) and lower scores of harm avoidance (standardized estimate = -0.0683, *t* = -2.7, *P* = .0074, *d* = 0.238) were associated with higher nightmare distress. In the overall model, only sensation seeking but not harm avoidance was still significant (see **Table 3**). The strongest predictor of NDQ scores was nightmare frequency followed by neuroticism. Interestingly, extraversion and agreeableness were also related to nightmare distress. Whereas age was not related to the NDQ score, lower education was associated with higher NDQ scores and women tend to

report more nightmare distress than men, keeping in mind that these effects were controlled for all other variables entered simultaneously into the regression analysis.

The last regression analysis that was performed included the nightmare type (replicative and trauma related) in addition to all variables depicted in **Table 3**. The *R*<sup>2</sup> increased from .4375 to .4735 with a medium effect of nightmare type (standardized estimate = 0.2035, *t* = 8.7, *P* < .0001, *d* = 0.525) without altering the standardized regression coefficient of the other variable very much. That is, if nightmares are replicative and trauma related, this adds considerably to nightmare distress.

## DISCUSSION

The findings indicate that self-reported nightmare distress measured by the NDQ is associated with a variety of factors in addition to nightmare frequency: neuroticism, female sex, low education, extraversion, and low agreeableness. Opposite to what was predicted, high sensation seeking positively correlated with nightmare distress, whereas high harm avoidance did not correlate at all, although higher harm avoidance was associated with lower nightmare frequency. Whereas some factors like neuroticism provide empirical evidence for the neuro-cognitive model of nightmare etiology formulated by Levin and Nielsen,<sup>11</sup> the relationship between nightmare distress and other factors, eg, education or agreeableness, are not yet understood. Moreover, the finding that the percentage of replicative trauma-related nightmares is associated with higher nightmare distress also fits into Levin and Nielsen's typology of dreams conceptualizing the posttraumatic nightmare as the most intense form of dreaming.

From a methodological viewpoint it has to be noted that the present sample was not representative; the participants enlisted in the panel were asked to participate in a nightmare study and, thus, it is not surprising that the nightmare frequency in the

**Table 3**—Ordinal regression analyses for the nightmare frequency scales.

Variable	Nightmare Frequency*				Nightmare Distress Questionnaire†			
	SE	χ <sup>2</sup>	P	d	SE	t	P	d
Age	-.0613	4.8	.0287	-0.114	-.0170	-0.2	.4902	0.134
Sex	.0702	6.3	.0120	0.131	.0710	2.9	.0042	0.244
Education	.0388	2.1	.1429	0.076	-.1259	-5.4	< .0001	-0.358
Nightmare frequency					.4205	17.3	< .0001	1.068
Neuroticism	.4302	171.9	<.0001	0.727	.2968	10.5	<.0001	0.740
Extraversion	-.0141	0.2	.6343	-0.023	.0919	3.5	.0005	0.287
Openness to experience	.1666	36.9	<.0001	0.321	.0396	1.7	.0952	0.181
Agreeableness	-.0433	2.1	.1496	-0.076	-.1052	-4.0	<.0001	-0.314
Conscientiousness	.1136	14.4	.0001	0.199	.0291	1.1	.2603	0.159
Sensation seeking	.0253	0.6	.4272	0.040	.0944	3.3	.0010	0.291
Harm avoidance	-.0877	8.6	.0034	-0.153	-.0146	-0.6	.5807	-0.130
	n = 1,473, R <sup>2</sup> = .2089				n = 1,107, R <sup>2</sup> = .4375			

\*Ordinal regression, †parametric regression. d = effect size, SE = standardized estimates.

present German sample is considerably higher compared to representative German samples eliciting nightmare frequency with the same scale<sup>28</sup> or a comparable scale.<sup>29</sup> For example, about 12% of the participants reported nightmares once a week or more often, whereas in the German representative samples, the figure was about 2%. Nevertheless, the range in nightmare frequency is still large and, thus, enabled us to study factors associated with nightmare frequency and nightmare distress without the problem of restricted variance. Also high education was overrepresented in the sample compared to representative data,<sup>30</sup> however, range was sufficiently large to study the effects of education on nightmare variables. The means of the Big Five personality dimensions of the present study are comparable with the representative population sample of Körner et al,<sup>25</sup> with the exception of slightly higher values for openness to experience, which makes sense as the participants were interested in participating in all kinds of online studies. Unfortunately, we do not have any information regarding mental disorders, psychotropic medication, or trauma history. As these factors also affect nightmare frequency<sup>31–33</sup> and very likely nightmare distress, it would be helpful to include such measures in future studies. However, it has to be considered that the present sample was not a clinical sample but a population-based sample.

Within this study, global nightmare distress was measured to try to capture the criterion of overall clinically significant distress caused by nightmares relevant for diagnosing a nightmare disorder.<sup>1</sup> Levin and Fireman<sup>34</sup> used prospective measures for measuring distress of single nightmares and found strong correlation with psychopathology measures. However, Schredl et al<sup>35</sup> were not able to replicate this finding, even though the correlation with this single nightmare distress scale and the NDQ was moderate. It would be interesting to study the interrelation between distress caused by single nightmares, overall nightmare distress, and psychopathology in a more detailed way.

The factors that are associated with nightmare frequency, like neuroticism, openness to experience, and sex, are in line with previous research.<sup>10–12,19</sup> As in a previous study,<sup>12</sup> conscientiousness was related to nightmare frequency (small effect size). As conscientiousness is related to working hard, striving for achievement, and the propensity to control,<sup>13</sup> the waking-life experiences of such persons might be stressful and, thus, result in an increased nightmare frequency. Persons who scored high on harm avoidance, on the other hand, reported lower nightmare frequencies, ie, avoiding situations that might be thrilling or even dangerous would result in a lower frequency of thrill-related emotions in waking and, therefore, according to the continuity hypothesis of dreaming,<sup>36</sup> result in less stressful dreams, ie, less frequent nightmares.

The effect sizes of the factors associated with nightmare distress showed a wide range from very large (nightmare frequency) and large (neuroticism) to small (eg, sensation seeking) and very small (sex). Nevertheless, each factor is associated to nightmare distress separately, as the regression analysis controlled for all other variables that have been entered simultaneously. As reported previously,<sup>3,6,9,10,37</sup> in addition to nightmare frequency, neuroticism is the strongest factor affecting nightmare distress, even when nightmare frequency is statistically controlled.<sup>12</sup>

Kelly<sup>14</sup> highlighted the fact that neuroticism is a very broad concept and more descriptive than explanatory and suggested that the concept of “ego strength” is more suited to explaining interindividual differences in nightmare distress. Although ego strength was closely related to neuroticism (about  $r = .50$ ) in the regression analyses that included neuroticism and ego strength simultaneously, only ego strength was related to nightmare distress, ie, explaining the significant correlation between neuroticism and nightmare distress.<sup>14</sup> However, taking a closer look at the 18-item ego strength questionnaire indicates that this construct is likely composed of several traits, eg, “I brood a great deal” is linked to depression, “I find it hard to keep my mind on a task or job” can be linked to attention problems or even to attention deficit disorders, and “I feel unable to tell anyone all about myself” relates to lack of social support. The scale even includes a dream-related item “I dream frequently about things that are best kept to myself,” which might be related to dreaming about topics that are embarrassing to share, such as violent nightmares or erotic dreams. Therefore, it can be questioned whether the ego strength construct is helpful in explaining neuroticism. A very promising concept might be the trait of sensory processing sensitivity<sup>38</sup> as it is related to neuroticism and boundary thinness, factors that are connected with nightmare frequency and nightmare distress.<sup>10,12</sup> The characteristics of highly sensitive persons such as heightened emotional reactivity, deepened cognitive processing, environmental awareness, and being more easily overwhelmed fit in the description of those with nightmares.<sup>39</sup> Boundary thinness is also characterized by being sensitive but also by being creative and experiencing intense, close, but also stressful, social relationships<sup>39</sup> and is related to openness to experience.<sup>40</sup>

As neuroticism has also a genetic background,<sup>41</sup> it would be interesting to do genome-wide association studies with those with nightmares, because a large twin study<sup>42</sup> indicated a genetic basis for frequent nightmares. Another concept that is closely related to neuroticism is childhood trauma,<sup>43</sup> ie, longitudinal studies looking at the interaction between traumatic and abuse experiences and nightmare frequency and distress<sup>44</sup> would be helpful in clarifying this relationship. Low agreeableness characterized by being competitive and a general tendency not to trust others<sup>13</sup> is also associated with increased distress. One item of the NDQ, “Do you ever find yourself avoiding or disliking or fearing someone because they were in your nightmare?” does address this issue. Future studies also including nightmare content might be able to illuminate the relationship between low agreeableness and nightmare distress.

Harm avoidance was not related—while controlling for neuroticism and the other variables included in the regression analysis depicted in **Table 3**—to increased nightmare distress as predicted, and, opposite to what was predicted, sensation seeking even correlated positively with nightmare distress, although those persons like thrilling experiences in their waking life. One might hypothesize that the ability to regulate emotions, a trait that Levin and Nielsen<sup>11</sup> suggest to explain the sex difference in nightmare frequency, might play a role in the relationship between sensation seeking and nightmare distress. Why extraversion, in addition to sensation seeking and the other variables included in the regression analysis, is

related to increased nightmare distress is unclear and warrants future research.

In addition, low education, which was not related to nightmare frequency, was related to increased nightmare distress. As specific beliefs about nightmares, eg, nightmares can predict the future, are also associated with nightmare distress,<sup>23</sup> it would be interesting to investigate whether beliefs about nightmares might have a mediating role in the relationship between education and nightmare distress. On a broader scope, it would be very helpful to study how beliefs about nightmares are formed during childhood, adolescence, or even later.<sup>12</sup>

Lastly, the nightmare type was quite strongly associated with nightmare distress: replicative trauma-related nightmares were associated with higher distress (medium effect size), in agreement with previous research.<sup>12,45</sup> Although no diagnoses were elicited in this online survey, one might assume that the number of participants with a full-blown post-traumatic stress disorder is relatively small (only 15 participants had solely replicative nightmares). Regardless, it would be very interesting to conduct nightmare surveys in the general population by looking more closely at persons with replicative trauma-related nightmares, especially whether other post-traumatic stress disorder symptoms like flashbacks, overly negative thoughts and assumptions about oneself or the world, feeling isolated, and/or difficulty experiencing positive affect<sup>46</sup> are more present compared to those experiencing idiopathic nightmare.

To summarize, the findings of the present study clearly implicate nightmare distress as being associated with multiple factors varying in strength like nightmare frequency, neuroticism, sex, low agreeableness, education, high sensation seeking, and nightmare type. The construct harm avoidance, however, was not helpful in explaining interindividual differences in nightmare distress, whereas sensation seeking was related to nightmare distress, although, not in the expected way. Future studies should focus on the developmental aspects, eg, the underlying conditions of neuroticism and how specific beliefs about nightmares that are related to increased nightmare distress, such as nightmares predicting the future, are learned. This might help to understand the etiology of the nightmare disorder in more detailed way.

## ABBREVIATIONS

MPQ, Multidimensional Personality Questionnaire  
 NDQ, Nightmare Distress Questionnaire  
 NEO-FFI, NEO-Fünf-Faktoren-Inventar

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## DISCLOSURE STATEMENT

All authors have seen and approved this manuscript. Work for this study was performed at Central Institute of Mental Health, Mannheim, Germany.