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Nightmare Proneness Predicts Nightmare Frequency Incrementally Over Neuroticism and Distress

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Abstract

Introduction Previous research found that nightmare proneness, a purported disposition to experience frequent nightmares, accounted for nightmare frequency independent of neuroticism and distress. However, these findings may have been the result of reduced reliability and content validity of the measures. The current study aimed to replicate these findings using established, lengthier measures of neuroticism and distress.

Materials and Methods In the present cross-sectional study, 230 university students completed measures of nightmare frequency, nightmare proneness, neuroticism, and distress.

Results Regression models found that nightmare proneness incrementally predicted nightmare frequency above neuroticism and distress. Additional analyses indicated that neuroticism and distress indirectly predicted nightmare frequency through nightmare proneness, whereas nightmare proneness was not associated with nightmares through neuroticism or distress.

Conclusion Nightmare proneness was statistically separable from neuroticism and distress. The results and suggestions for future research to better understand the nightmare proneness variable are discussed.

Keywords
- nightmare Frequency
- neuroticism
- psychological distress
- nightmare proneness

Introduction

Nightmares are experienced frequently (i.e., weekly) by about 4% of the population[1] and are often followed by negative waking mood on days following nightmares.[2] Nightmare etiology, broadly, might be conceptualized in terms of a disposition-stress model in which some combination of dispositions for experiencing nightmares are activated by distress.[1,3] Several dispositions for nightmares have been identified such as exposure to trauma, "thin" psychological boundaries, sensory sensitivity, and lack of ego strength.[1,3–6] However, in a recent position paper 22 nightmare researchers highlighted the maladjustment marker described as trait affective distress (e.g., neuroticism and distress) as central in the development of frequent nightmares.[3]

In attempts to examine maladjustment markers specifically associated with nightmares, Kelly[7] proposed the nightmare proneness variable, described as a purported

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predisposition to experience frequent nightmares. Nightmare proneness was identified empirically by selecting items from a personality inventory that differentiated individuals reporting frequent nightmares and controls.[7] A variety of items were identified for nightmare proneness representing a reported awareness of somatic discomfort, dysphoria and mood lability, anxiety, and schizotypy, which reflect previously identified nightmare dispositions.[7,8] As such, rather than providing a new framework of nightmare etiology, a tentative conceptualization of nightmare proneness was developed integrating several previously suggested nightmare dispositions and processes such as vulnerability and dysregulation which beget nightmares during sleep states.[1,3,8] This approach has been partly supported through findings that vulnerability and dysregulation were related to nightmares indirectly through nightmare proneness.[9]

While it appears that nightmare proneness represents a mixture of previously identified dispositions predisposing individuals to nightmares, its relationship with existing nightmare models has not been adequately examined. At its core, nightmare proneness appears to include a factor of general psychical dysregulation (cognitive, perceptual, and emotional).[10] On an item level, the variable somewhat resembles a tendency towards "thin" psychological boundaries as described by Hartmann.[4] However, preliminary research found nightmare proneness accounted for nightmares above Hartmann's boundary concept.[11] Unfortunately, this finding was not examined thoroughly enough to understand its meaning.

One interesting finding thus far is that nightmare proneness both strongly correlates with, and accounts for nightmare frequency independent of, neuroticism and distress.[8,10] The reason for this is unclear. However, given the central nature of neuroticism and distress in the development of long-term nightmares,[3] this bears further research. It may be that this indicates nightmare proneness involves processes outside of neuroticism and distress. A simpler way to explain this observed statistical separateness is the limitations of the measurements used. Specifically, previous studies on this topic utilized relatively brief measures of neuroticism and distress.[8–11] Such measures might not fully capture the nuances of these concepts allowing variance in nightmares which should be attributed to neuroticism and/or distress to be attributed instead to nightmare proneness. If this is the case, previous findings of statistical separateness may have been methodological rather than substantial.

The purpose of the current study is to replicate and expand previous findings that nightmare proneness accounted for unique variance in nightmare frequency independent of briefer measures of neuroticism and distress. To do this we examine the extent to which nightmare proneness accounts for variance in nightmare frequency incremental of lengthier, established measures of neuroticism and distress. Based on previous findings the following hypotheses were formed:

(H1) Nightmare proneness would significantly correlate with nightmare frequency, neuroticism, and distress.

(H2) Nightmare proneness would incrementally predict independent variance in nightmare frequency above neuroticism and distress.

Materials and Methods

Participants

Participants included 230 students enrolled in undergraduate psychology courses at a university in the Western United States. Available sociodemographics of the sample are presented in ►**Table 1**. Because most of the sample indicated a Latinx background, a bivariate race variable was created (159 Latinx, 71 not Latinx) to examine possible racial differences.

Instruments

Nightmare Frequency

Nightmares were defined for participants as "unpleasant and clearly remembered dreams that awaken you; after waking, you quickly become alert." Nightmare frequency was measured using the item "I have nightmares often".[12] Participants responded using a scale from 0(Strongly disagree) to 4 (Strongly agree). The validity of the item has been supported.[12] Two-week retest reliability was estimated at 80.[13]

Nightmare Proneness

The 14-item Nightmare Proneness Scale[7] was used to assess nightmare proneness. Participants responded to each item using a scale from 1(Strongly disagree) to 7(Strongly agree). Higher total scores indicate more nightmare proneness. Validity has been supported.[8] Coefficient alpha in the current study was .87.

Table 1 Descriptive statistics of variables

Age (yr) – M ± SD	21.77 ± 5.92
Gender – *n* (%)	
Female	175 (76.1%)
Male	54 (23.6%)
Missing	1 (0.4%)
Race – *n* (%)	
Latinx	159 (69.1%)
White/Caucasians	33 (14.3%)
Asian	20 (8.7%)
"Other"	10 (4.3%)
African American	7 (3.0%)
Native American	1 (0.4%)
Measure – M ± SD	
Nightmare Frequency	01.38 ± 01.22
Neuroticism	95.26 ± 23.50
Distress	78.49 ± 56.44
Nightmare Proneness	47.38 ± 15.91

Neuroticism

Neuroticism was measured using the 48-item neuroticism scale of the Neuroticism Extraversion Openness Personality Inventory-Revised (NEO-PI-R).[14] Participants responded to each item about how they *generally* feel using a scale from 0 (Strongly disagree) to 4(Strongly agree). Higher total scores indicate more neuroticism. Extensive evidence of validity has been provided.[14] Coefficient alpha in the current study was .91.

Distress

The General Symptom Index (GSI) of the 90-item Symptom Checklist-Revised (SCL-90R)[15] was used to assess distress. The GSI includes total responses from all 90 items. Respondents indicated how much they were bothered by symptoms described by each item over the *past week* from 0(Not at all) to 4(Extremely). Higher scores indicate more distress. Extensive support for the validity of the GSI has been reported.[15] Coefficient alpha in the current study was .98.

Procedure

Participants were recruited from an undergraduate psychology student participant pool to complete a study on "Emotions and Sleep." Participants provided informed consent and completed the questionnaire online using Qualtrics. Nominal course credit was provided in exchange for participation. No time limit was imposed for questionnaire completion and no exclusionary criteria were used. This study was approved by the local research ethics committee.

Statistical Analyses

Analyses were conducted using SPSS 28 for Windows. Gender (male, female) and race (Latinx, not Latinx) differences were examined using *t*-tests. Pearson correlations were calculated to examine relationships with age. Also, Pearson correlations were calculated between all scale scores. Linear regression models were calculated using nightmare frequency as the criterion. Gender, race, and age were used as covariates and entered in Step 1. On Step 2 neuroticism and distress were entered. Nightmare proneness was loaded on Step 3. A second linear regression was calculated to examine variance in nightmare proneness accounted for by neuroticism and distress. Gender, race, and age were included in Step 1. Neuroticism and distress were entered in Step 2.

For exploratory purposes, the PROCESS 4.0 macro for SPSS[16] was used to examine indirect relationships; that is, if variables predicted nightmare frequency through a third variable. Bootstrapping with 10,000 resamples was used to examine parameter estimates to add sufficient variation for accuracy in models. PROCESS results are significant if zero is not included in the bias-corrected 95% confidence interval (CI) of indirect relationships.[17] Primary models and alternative models were examined to determine indirect relationships. The primary models examined if neuroticism and distress (while controlling each other) related to nightmare frequency through nightmare proneness. The alternative models examined if nightmare proneness was related to nightmare frequency through neuroticism and distress (while controlling each other). Gender, race, and age were used as control variables. Results were considered significant if $p < .05$ (two-tailed).

Results

Available sample characteristics are presented in ►**Table 1**. A series of *t*-tests revealed individuals who self-identified as females significantly outscored self-identified males on nightmare frequency, neuroticism, distress, and nightmare proneness, t's > 2.98, p's $< .003$, d's $> .46$. There were no significant race differences for any measures, t's < 0.68, p's $> .495$, d's $< .10$. Age was significantly related to neuroticism, $r = -.15$, $p = .022$, but not other measures, r's $< -.09$, p's $> .17$.

All measures were significantly interrelated (►**Table 2**). Nightmare frequency was most strongly related to nightmare proneness. Interrelationships between neuroticism, distress, and nightmare proneness were all strong.

Regression models predicting nightmare proneness are presented in ►**Table 3**. On Step 1 sociodemographic variables accounted for a significant 6.4% of the variance in nightmare proneness. It appears that most of this variance was attributed to gender. On Step 2 neuroticism and distress combined to account for an additional 59.7% of the variance in nightmare proneness. Put another way, about 40.3% of the variance in nightmare proneness was statistically separate from neuroticism and distress. Of note, after accounting for neuroticism and distress, gender no longer significantly predicted nightmare proneness. Further, neuroticism and distress accounted for relatively equivalent amounts of variance in nightmare proneness.

Regression models predicting nightmare frequency are presented in ►**Table 4**. In Step 1 sociodemographic variables together accounted for a significant 5.0% variance in nightmare frequency. Again, most of this variance appears due to gender. In Step 2, neuroticism and distress added a significant 6.4% variance in nightmare frequency. In this step, gender, and distress independently predicted nightmare frequency. In Step 3 nightmare proneness accounted for a significant incremental 6.2% percent of the variance in nightmare frequency over all other variables. Gender continued to independently predict nightmare frequency. Otherwise, on this step, only nightmare proneness accounted for significant variance in nightmare frequency. The independent relationship between distress and nightmares which had been significant in Step 2 was almost negligible after adding nightmare proneness.

Table 2 Correlations between scales

Scale	1	2	3
1. Nightmare Frequency			
2. Neuroticism	.26		
3. Distress	.28	.68	
4. Nightmare Proneness	.39	.74	.75

Note: $N = 230$. All correlations significant at $p < .001$.

Table 3 Linear regression models predicting nightmare proneness

Variables	Model 1			Model 2		
	β	*t*	*p*	β	*t*	*p*
Age	-.10	1.53	.127	.00	0.00	1.000
Gender	.23	3.63	<.001	.03	0.82	.414
Race	-.03	0.49	.627	-.03	0.77	.442
Neuroticism				.41	7.40	<.001
Distress				.47	8.77	<.001
	$\triangle R^2 = .064$, $F = 5.12$, $p = .002$			$\triangle R^2 = .597$, $F = 196.72$, $p < .001$		

Note: Gender coded as 1 = male, 2 = female. Race coded as 0 = not Latinx, 1 = Latinx.

Table 4 Linear regression models predicting nightmare frequency

Variables	Model 1			Model 2			Model 3		
	β	*t*	*p*	β	*t*	*p*	β	*t*	*p*
Age	-.08	1.24	.217	-.05	0.83	.410	-.05	0.85	.394
Gender	.20	3.15	.002	.14	2.19	.029	.13	2.04	.043
Race	.05	0.71	.479	.04	0.70	.484	.06	0.94	.351
Neuroticism				.08	0.93	.352	-.09	0.95	.341
Distress				.20	2.28	.023	-.01	0.04	.970
Nightmare Proneness							.43	4.10	<.001
	$\triangle R^2 = .050$, $F = 3.99$, $p = .009$			$\triangle R^2 = .064$, $F = 8.04$, $p < .001$			$\triangle R^2 = .062$, $F = 16.78$, $p < .001$		

Note: Gender coded as 1 = male, 2 = female. Race coded as 0 = not Latinx, 1 = Latinx.

The bootstrapped indirect relationships from the PROCESS models found that distress (b = .004, SE = .001, bias-corrected 95% CI [.002, .007]) and neuroticism (b = .009, SE = .003, bias-corrected 95% CI [.004, .014]) had significant indirect relationships with nightmare frequency through nightmare proneness after accounting for each other, gender, race, and age. Examining the alternative model, nightmare proneness did not significantly relate to nightmare frequency indirectly through either neuroticism (b = -.003, SE = .004, bias-corrected 95% CI [-.011, .003]) or distress (b = -.000, SE = .005, bias-corrected 95% CI [-.009, .008]) after accounting for each other, gender, race, and age.

Discussion

The current findings supported the hypotheses. Nightmare proneness was correlated with nightmare frequency, neuroticism, and distress. Further, it independently predicted nightmare frequency outside of longer, established measures of neuroticism, distress, and sociodemographics. Consistent with previous studies using briefer measures of distress and neuroticism[8,10] these results further establish that nightmare proneness is statistically separable from neuroticism and distress. The current study suggests previous findings that nightmare proneness and briefer measures of neuroticism/distress separately predict nightmares appear less likely a result of scale limitations (i.e., reliability and content validity) and more likely a result of other processes included in nightmare proneness.

Given that several dispositions appear to make individuals susceptible to nightmares, it may be that nightmares are an emergent phenomenon resulting from a combination of neuroticism and distress with other factors tapped by nightmare proneness. One possibility is the hypothesized concretization process through which vague distressing inner states are transformed into tangible nightmare imagery.[18,19] Additional research would be needed to examine this. Other possible explanations and contributors to nightmare proneness that should be examined systematically are trait sensory sensitivity[5] and Hartmann's boundary concept.[4] In these cases, nightmare proneness could reflect processes whereby individuals with thin boundaries have more sensory, and emotional sensitivity, and richer imaginative processes resulting in nightmares when overwhelmed. Alternatively, nightmare proneness may be tapping neurological processes involved in fear inoculation and consolidation of memories.[20] Finally, as noted previously, some items on the nightmare proneness measure appear to reflect psychosis-like phenomena.[7] As such, the relative contributions of schizotypy should be investigated as a component of nightmare proneness.

The large correlation between nightmare proneness and neuroticism/distress should be acknowledged. More than half of the variance in nightmare proneness was attributed to neuroticism and distress. While this is substantial, a large amount of nightmare proneness remained unaccounted for. Part of this remaining variance could be accounted for by measurement error. However, given the high reliabilities of the scales used, likely other explanations should be considered. In addition to those noted above, another possible explanation could be that nightmare proneness and neuroticism/distress share conceptual referents such as hyperarousal and vulnerability, both of which have been related to nightmares.[3,8,9] Moreover, results from the PROCESS models suggest that neuroticism and distress combine to influence nightmares through other processes included in nightmare proneness. What these are is not yet clear. However, it seems possible that, at the least, a broader dysregulation disposition is involved in addition to trait affective distress.[10]

Before generalizing the results, several limitations of the current study should be considered. For instance, we used a convenience sample of mostly young college students which may not represent the general population. Measurements were entirely self-reported and possible response confounds such as negative responding and social desirability were not controlled. Trauma, which has been found to influence occurrences of nightmares,[1,3] was not assessed in the current study opening the possibility that nightmare proneness merely represents trauma responses. However, this seems less likely considering that nightmare proneness incrementally predicts nightmares beyond trauma symptoms.[8] Finally, though race was controlled statistically in most of the current analyses, the sample was largely made up of individuals who self-identified as Latinx which, depending on the target population of interest, may not represent community samples as well.

Future research is needed to correct the limitations noted above. Further, it would be of interest to examine possible indirect influences of sensory sensitivity and memory consolidation in addition to nightmare proneness in the relationship between neuroticism/distress and nightmares. Additional studies using longitudinal methodology and community samples are needed to replicate and extend the implied directions of indirect relationships observed in this study.

In conclusion, the current study found that nightmare proneness incrementally accounted for nightmare frequency above established, reliable, and validated measures of neuroticism and distress. This suggests that, though strongly related to neuroticism and distress, nightmare proneness may contribute to nightmares through other processes. Additional research is needed to examine possible processes of nightmare proneness and account for the limitations of the current study. While nightmare proneness likely does not replace neuroticism and distress as influential in nightmares, it could provide additional context.

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Conflict of Interests
The authors have no conflicts of interest to declare.

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