Original Research

Validity and Reliability of a Self-Report Likert-Type Measure of Nightmare Frequency

William E Kelly*

Department of Clinical Mental Health Counseling, Neumann University, Aston, PA, USA

Received: 01 Aug. 2022 Accepted: 30 Sep. 2022

Abstract

Background and Objective: Nightmare frequency is typically measured using interval and ordinal, but rarely Likert-type, scales. The current study aimed to examine the validity and reliability of a Likert-type measure of retrospective nightmare frequency.

Materials and Methods: Participants included a convenience sample of undergraduate students. They completed a recently developed Likert-type nightmare frequency item, an established Nightmare Frequency Scale, an estimate of nightmare frequency over the past week, and measures of hypothetically related variables including neuroticism, psychological distress, and trauma symptoms. Convergent and discriminant validity was evaluated through relationships between the Likert-type nightmare frequency item with other nightmare measures and hypothetically related variables. Reliability was estimated using a correction for attenuation approach designed to provide a conservative estimate of single-item reliability.

Results: The sample included 233 (119 female, 51.1%; 114 male, 48.9%) university students (mean age: 19.05 ± 1.91). The average convergent validity coefficient between the Likert-type nightmare frequency item and other nightmare measures ($r = 0.647$) was significantly different ($z = 5.45$, $P < 0.001$) from its average correlation coefficient with hypothetically related measures ($r = 0.256$). The single-item reliability coefficient was 0.722.

Conclusion: The reliability and convergent and discriminant validity of the Likert-type nightmare frequency item were supported.

Keywords: Nightmares; Dreams; Sleep; Psychometrics

Citation: Kelly WE. **Validity and Reliability of a Self-Report Likert-Type Measure of Nightmare Frequency.** J Sleep Sci 2022; 7(3-4): 75-79.

Introduction

Nightmares are relatively common sleep disturbances among children and adults (1, 2). Though diagnosis of nightmare disorder typically necessitates an interview and experts' judgment of nightmares and their consequences, screening and research measurement of nightmare frequency often relies on the use of single-item retrospective self-reports (2). While many such scales have been used, few have undergone psychometric scrutiny. An exception is Schredl's Nightmare Frequency Scale (3) which asks respondents to report the frequency of nightmares over the past several months (e.g., "never" to "several times a week"). One possible difficulty with this type of measure is the necessity to recall the number of nightmares over long periods.

One solution is the use of rating scales like the nightmare frequency item from Agargün et al.'s Van Dream Anxiety Scale (4). This type of measure assesses nightmare frequency over a specified time (e.g., the past month) using a rating scale of estimated nightmares (e.g., "never" to "often"). However, this measurement scheme also requires recalling nightmares and judgment in deciding what is meant by response options. Measures like Schredl's and Agargün et al.'s have been found to strongly interrelate (5).

Response options for most nightmare measures

***Corresponding author**: WE. Kelly, Department of Clinical Mental Health Counseling, Neumann University, Aston, PA, USA*
Tel/Fax: +1 6105585636
Email: kellyw@neumann.edu

Copyright © 2022 Iranian Sleep Medicine Society, and Tehran University of Medical Sciences. Published by Tehran University of Medical Sciences.

This work is licensed under a Creative Commons Attribution-Noncommercial 4.0 International license (https://creativecommons.org/licenses/by-nc/4.0/). Noncommercial uses of the work are permitted, provided the original work is properly cited.

reference frequencies of nightmare occurrences; rarely have they used Likert-type scales (i.e., "strongly disagree" to "strongly agree"). One recent measure piloted such a scale by asking respondents to indicate their agreement with the statement "I have nightmares often" (6), hereafter simply referred to as the nightmares often item (NOI). Responses to the NOI correlated (0.73) with an interval measure of nightmare frequency, and were slightly more sensitive to measures of neuroticism and emotional dysregulation relative to the interval measure (6). The study proposing the NOI, however, used a relatively small sample and included few established measures for validity, making its results inconclusive.

The current study's purpose was to examine the reliability and validity of the NOI as a measure of retrospective nightmare frequency. These results might be useful for clinicians and researchers desiring a brief, simple-to-understand measure of nightmares when they do not require specific numbers of nightmares. To examine validity, the paradigm of convergent and discriminant validity was chosen given its relatively common use and acceptance (7). Aside from other nightmare measures for convergent validity, the hypothetically related variables of neuroticism, psychological distress, and trauma reactions (2) were chosen to compare for discriminant validity. To examine reliability, an approach was undertaken that estimates a conservative minimum single-item reliability rather than the more variable retest reliability. It was hypothesized that using established criteria, the validity and reliability of the NOI as a measure of nightmare frequency would be supported.

Materials and Methods

Participants and procedures: This study used a cross-sectional design with a convenience sample of students enrolled in introductory psychology courses at a small university in the United States (US). Participants were recruited at the beginning of class meetings and completed "paper and pencil" questionnaires consisting of the measures described below in small group settings. Care was taken to administer questionnaires only on regular class days, not those with exams or quizzes. Participation was voluntary and no incentives were offered. No exclusionary criteria were used. Approval for the study was provided by the local Research Ethics Board of Robert Morris University, US, where data collection occurred (protocol number: 201709281573). Informed consent was gathered from participants and guidelines of the Declaration of Helsinki were followed.

Measures

NOI: Kelly et al.'s NOI ("I have nightmares often") ostensibly measures retrospective nightmare frequency (6). Participants responded to the item with a 5-point Likert scale: 0 (strongly disagree), 1 (disagree), 2 (neutral or not sure), 3 (agree), and 4 (strongly agree). Nightmares were defined for participants as "disturbing, clearly remembered dreams that awaken the sleeper." Preliminary evidence of validity (6) and a two-week retest reliability of 0.80 (8) have been reported.

Nightmare Frequency Scale: Schredl's Nightmare Frequency Scale is an established estimate of nightmare frequency (3). Using this scale, participant respond to "How often do you have nightmares?" using an 8-point scale from 0 (never) to 7 (several times a week). Again, the waking criterion was used to define nightmares. Validity (3, 5) and a four-week retest reliability of 0.75 have been reported (9).

Nightmare Frequency Questionnaire-past week: An item was selected from the Nightmare Frequency Questionnaire (10) asking respondents to indicate how many nightmares they experienced (0-14+) across the past week. Validity and a two-week retest reliability of 0.86 for this item have been reported (11).

Neuroticism: The 8-item Big Five Inventory (BFI) Neuroticism Scale (12) was used to measure trait neuroticism. Participants indicated their response with a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicate more neuroticism. Extensive support for validity has been demonstrated (12, 13). In the current sample, the coefficient alpha reliability coefficient was 0.85.

Psychological distress: Recent psychological distress was assessed with the 10-item abbreviated form of the Symptom Checklist-90-Revised (SCL-90R) (14). Participants indicated the extent to which they were bothered by symptoms of distress across the past week using a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely). Higher scores indicate more psychological distress. Evidence of validity has been provided (14). In the current sample, the coefficient alpha reliability coefficient was 0.87.

Trauma symptoms: Trauma symptoms were measured using the 6-item PTSD Checklist-

Civilian Short Form (PCL-C) (15). Participants responded with a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely) to describe the extent to which they have been bothered by reactions to a traumatic event. Higher scores suggest more severe trauma reactions. Support for validity of the instrument has been provided (15, 16). In the current sample, the coefficient alpha reliability coefficient was 0.85.

Statistical analysis: Convergent and discriminant validity was examined through relationships with other nightmare measures and hypothetically related variables using Pearson correlations. Reliability was estimated using a correction for attenuation approach designed to provide a conservative estimate of single-item reliability. A convergent validity coefficient was calculated by taking the average correlation between the NOI and the other two nightmare measures. A minimal threshold for adequate convergent validity was set at > 0.50 (17). A comparison coefficient was calculated by averaging correlations between the NOI and neuroticism, psychological distress, and trauma symptoms. Discriminant validity was examined using a z-test to compare the convergent and comparison coefficients. A significant z-test indicated adequate discriminant validity.

Single-item reliability of the NOI was examined using the correction for attenuation reliability technique (18, 19). This result provides a conservative estimate of reliability, that is, the estimated minimum proportion of variance of the target construct accounted for relative to error (19). To calculate reliability using this approach, the square root of the product of the NOI convergent correlation and the average established retest reliabilities of the Nightmare Frequency Scale and nightmare frequency over the past week (0.75 and 0.86, respectively, as presented in the "Measures" section) were calculated (18, 19). Reliability was considered satisfactory if the average coefficient was > 0.70 (20). Analyses were conducted using SPSS software (version 28, IBM Corporation, Armonk, NY, USA). Results were deemed statistically significant if $P < 0.05$ (two-tailed).

Ethics statement: This research was approved by the local Human Subjects Committee.

Results

Participants included 233 students enrolled in introductory psychology courses. Available characteristics of the sample and average scores on measures are presented in table 1.

Table 1. Descriptive statistics of variables

Variable	Value
Age (year) (mean ± SD)	19.05 ± 1.91
Gender [n (%)]	
Female	119 (51.1)
Male	114 (48.9)
Ethnicity [n (%)]	
White/Caucasians	190 (81.5)
African American	20 (8.6)
Latinx	10 (4.3)
Arabian	6 (2.6)
Asian	2 (0.9)
Native American	1 (0.4)
"Other"	2 (0.9)
Unidentified	2 (0.9)
Measure (mean ± SD)	
NOI	0.79 ± 1.00
NFS	3.06 ± 1.89
NFQ-PW	0.91 ± 1.65
BFI-N	21.58 ± 6.64
SCL-10R	9.61 ± 8.10
PCL-6	12.92 ± 5.60

NOI: Nightmares often item; NFS: Nightmare Frequency Scale; NFQ-PW: Nightmare Frequency Questionnaire, past week; BFI-N: Big Five Inventory, Neuroticism Scale; SCL-10R: Symptom Checklist, 10 item Revised; PCL-6: PTSD Checklist, 6-item; SD: Standard deviation

All nightmare and related variables in this study were significantly correlated (Table 2). Nightmare measures were strongly interrelated. Similarly, neuroticism, psychological distress, and trauma symptoms were also strongly interrelated.

Table 2. Correlations between nightmares and hypothetically related instruments

Instrument	1	2	3	4	5	6
1. NOI	1.000					
2. NFS	0.678	1.000				
3. NFQ-PW	0.616	0.455	1.000			
4. BFI-N	0.241	0.194	0.261	1.000		
5. SCL-10R	0.250	0.212	0.332	0.592	1.000	
6. PCL-6	0.277	0.246	0.271	0.540	0.685	1.000

All correlations significant at $P < 0.01$

NOI: Nightmares often item; NFS: Nightmare Frequency Scale; NFQ-PW: Nightmare Frequency Questionnaire, past week; BFI-N: Big Five Inventory, Neuroticism Scale; SCL-10R: Symptom Checklist, 10 item Revised; PCL-6: PTSD Checklist, 6-item

The convergent validity coefficient for the NOI was 0.647. Considering the > 0.50 criteria noted previously, the convergent validity of the NOI was supported. The comparison coefficient (average correlation between the NOI and neuroticism, psychological distress, and trauma symptoms) was 0.256. The difference between convergent and comparative coefficients was significant ($z = 5.45$, $P < 0.001$), supporting discriminant validity.

Calculating the NOI's single-item reliability using the correction of the attenuation approach resulted in a reliability coefficient of 0.722. Considering the 0.70 criteria, the reliability of the NOI was supported.

Discussion

Using the psychometric criteria and methods described in this study, the validity and reliability of the NOI were supported. The NOI correlated strongly with other nightmare frequency scales and discriminated between nightmares and hypothetically related constructs. It should be noted that the reliability in the current study was somewhat lower than the retest reliability reported previously (8). However, given that the attenuation approach provides a conservative estimate of reliability, this is not unexpected (18, 19). Despite the conservative nature of the calculation, the NOI still exceeded the typical standards for adequate reliability (20).

Based on the current findings, the NOI can be used with some confidence that the measure taps self-reported nightmare frequency despite not having a response scale specifically referencing how often nightmares occur. This contributes to the existing literature by indicating that a Likert-type measure can function as an indicator of nightmare frequency. Indeed, the use of Likert-type scales may be useful for nightmare research because they are easier for participants to read and complete, and are generally thought to have good reliability and validity (21).

Consistent with the broader literature on nightmares, this study replicated relationships between nightmare frequency and neuroticism, psychological distress, and trauma (2, 3, 5, 11, 22). Moreover, as observed previously, nightmare frequency measures were strongly related to each other but only moderately related to other variables suggesting the existence of an independent nightmare construct (5). This is consistent with the idea that nightmares are separate phenomena rather than merely symptoms of maladjustment (23).

The strongest relationship for any nightmare measure in the current study and the hypothetically related variables was between recent psychological distress and nightmare frequency estimated over the past week. This could be partly due to the relative improvements in the accuracy of recent estimates compared to longer-term estimates (24). However, based on theory, this finding could also reflect that distress activates processes that create nightmares (2). Of note, the lowest correlation observed was between the Nightmare Frequency Scale and trait neuroticism. This was unexpected given that the Nightmare Frequency Scale is a trait-like measure that varies with levels of neuroticism (25). Additional research is needed to better understand this finding.

The current study has several limitations including its utilization of a cross-sectional design and use of a relatively homogeneous sample of young college students. Additionally, no measures were included to examine if this sample included individuals with other conditions that could have affected the results such as other sleep conditions. Future studies should include more representative community and clinical samples, measures of other sleep conditions, and perhaps estimates of nightmare distress and/or nightmare disorder. Moreover, longitudinal designs would be useful to examine which variables might influence NOI scores over time. Finally, it would be useful to include a prospective diary measure to examine the convergent validity of the NOI.

Conclusion

The NOI appears to be a relatively valid and reliable measure of self-reported retrospective nightmare frequency. It might be of use to researchers and clinicians who need a simple, easy-to-use, and understandable measure of nightmare frequency that does not require recall of specific numbers of nightmares.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

The author thanks Jordan Neusch for assistance in data collection.

References

1. Asgarian FS, Fallahzadeh H, Etesam F. Sleep habits among a group of Iranian school-aged children. J Sleep Sci 2018; 2: 81-5.
2. Levin R, Nielsen TA. Disturbed dreaming, posttraumatic stress disorder, and affect distress: A review and neurocognitive model. Psychol Bull 2007; 133: 482-528.
3. Schredl M. Effects of state and trait factors on nightmare frequency. Eur Arch Psychiatry Clin Neurosci 2003; 253: 241-7.
4. Agargün MY, Kara H, Bilici M, et al. The Van Dream Anxiety Scale: A subjective measure of dream anxiety in nightmare sufferers. Sleep and Hypnosis 1999; 1: 204-11.
5. Kelly WE, Mathe JR. Comparison of single- and multiple-item nightmare frequency measures. Int J Dream Res 2020; 13: 136-42.
6. Kelly WE, Mathe JR, Yu Q. Specific versus scaled estimates: A comparison of two approaches to measuring retrospective nightmare frequency. Int J Dream Res 2018; 11: 203-6.
7. Drummond RJ, Sheperis C, Jones KD. Assessment procedures for counselors and helping professionals. 9th ed. Boston, MA: Pearson; 2019.
8. Kelly W, Daughtry D. Gender differences in retrospective nightmare frequency among young adults: Effects of nightmare distress and affective distress. Int J Dream Res 2021; 14: 131-5.
9. Stumbrys T, Erlacher D, Schredl M. Reliability and stability of lucid dream and nightmare frequency scales. Int J Dream Res 2013; 6: 123-6.
10. Krakow B, Hollifield M, Schrader R, et al. A controlled study of imagery rehearsal for chronic nightmares in sexual assault survivors with PTSD: A preliminary report. J Trauma Stress 2000; 13: 589-609.
11. Krakow BJ, Melendrez DC, Johnston LG, et al. Sleep Dynamic Therapy for Cerro Grande Fire evacuees with posttraumatic stress symptoms: A preliminary report. J Clin Psychiatry 2002; 63: 673-84.
12. John OP, Srivastava S. The Big Five Trait taxonomy: History, measurement, and theoretical perspectives. In: Pervin A, John OP, editors. Handbook of personality: Theory and research. 2nd ed. New York, NY: Guilford Press; 1999. p. 102-38.
13. John OP, Naumann LP, Soto CJ. Paradigm shift to the integrative Big Five trait taxonomy: History, measurement, and conceptual issues. In: John OP, Robins RW, Pervin LA, editors. Handbook of personality: Theory and research. 3rd ed. New York, NY: The Guilford Press; 2008. p. 114-58.
14. Rosen CS, Drescher KD, Moos RH, et al. Six- and ten-item indexes of psychological distress based on the Symptom Checklist-90. Assessment 2000; 7: 103-11.
15. Lang AJ, Stein MB. An abbreviated PTSD checklist for use as a screening instrument in primary care. Behav Res Ther 2005; 43: 585-94.
16. Lang AJ, Wilkins K, Roy-Byrne PP, et al. Abbreviated PTSD Checklist (PCL) as a guide to clinical response. Gen Hosp Psychiatry 2012; 34: 332-8.
17. Abma IL, Rovers M, van der Wees PJ. Appraising convergent validity of patient-reported outcome measures in systematic reviews: constructing hypotheses and interpreting outcomes. BMC Res Notes 2016; 9: 226.
18. Wanous JP, Reichers AE, Hudy MJ. Overall job satisfaction: How good are single-item measures? J Appl Psychol 1997; 82: 247-52.
19. Wanous J, Hudy M. Single-item reliability: A replication and extension. Organ Res Methods 2001; 4: 361-75.
20. Nunnally JC. Psychometric theory. 2nd ed. New York, NY: McGraw-Hill; 1978.
21. Taherdoost H. What is the best response scale for survey and questionnaire design; Review of different lengths of Rating Scale / Attitude Scale / Likert Scale. Int J Acad Res Manag 2019; 8: 1-10.
22. Gieselmann A, Ait Aoudia M, Carr M, et al. Aetiology and treatment of nightmare disorder: State of the art and future perspectives. J Sleep Res 2019; 28: e12820.
23. Spoormaker VI, Schredl M, van den Bout J. Nightmares: From anxiety symptom to sleep disorder. Sleep Med Rev 2006; 10: 19-31.
24. Robert G, Zadra A. Measuring nightmare and bad dream frequency: impact of retrospective and prospective instruments. J Sleep Res 2008; 17: 132-9.
25. Schredl M, Goritz AS. Stability of nightmare frequency and its relation to neuroticism: A longitudinal study. J Sleep Res 2021; 30: e13126.