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Article

Construction and Validation of a Measure of Children's Sleep Difficulties: The Nighttime Behaviors Questionnaire for Children – Parent-Reported (NBQC-P)

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ABSTRACT

Background/Objective: Sleep problems in children impair their quality of life and that of their families. However, existing psychometric tools have certain limitations, highlighting the need to develop new measures to assess specific behaviors. This study aimed to develop a new measure to assess sleep difficulties, the Nighttime Behavior Questionnaire for Children – Parent-reported (NBQC-P), and to evaluate its psychometric properties. **Method:** Parents of 386 children aged 3 to 8 years (52.3% boys) completed the NBQC-P along with measures of abilities in the dark, nighttime fears, and anxiety. **Results:** After the removal of some items due to low communalities and cross-loadings, Exploratory Factor Analysis yielded a three-factor solution with 13 items. This structure was subsequently tested in Confirmatory Factor Analysis, demonstrating acceptable fit indices. The questionnaire covers three dimensions: Need for company to sleep, Problems during the night, and Problems when going to sleep. Internal consistency was good for the first dimension and acceptable for the others. Concurrent and discriminant validity were assessed with other constructs. Configural, metric, scalar and latent mean measurement invariance was established for gender and age. **Discussion:** Despite some limitations, the NBQC-P is a valid and reliable tool for assessing overt sleep difficulties commonly present in children.

Construcción y Validación de una Medida de Dificultades del Seño en Niños y Niñas: El Nighttime Behaviors Questionnaire for Children – Parent-Reported (NBQC-P)

Palabras clave:
Hábitos de sueño
Propiedades psicométricas
Compañía para dormir
Inicio del sueño
Despertares nocturnos

ABSTRACT

Antecedentes/Objetivos: Los problemas de sueño en los niños afectan su calidad de vida y de sus familias. Sin embargo, las herramientas psicométricas existentes presentan ciertas limitaciones. Este estudio tuvo como objetivo desarrollar el Cuestionario de Comportamientos Nocturnos para Niños – Informado por los Padres (NBQC-P), y evaluar sus propiedades psicométricas. **Método:** Los padres de 386 niños de entre 3 y 8 años (52,3% niños) completaron el NBQC-P junto con medidas de habilidades en la oscuridad, miedos nocturnos y ansiedad. **Resultados:** Tras la eliminación de algunos ítems debido a bajas comunalidades y cargas cruzadas, el Análisis Factorial Exploratorio arrojó una solución de tres factores con 13 ítems. Esta estructura fue probada con Análisis Factorial Confirmatorio, con ajuste aceptable. El cuestionario abarca tres dimensiones: Necesidad de compañía para dormir, Problemas durante la noche y Problemas al irse a dormir. La consistencia interna fue buena para la primera dimensión y aceptable para las demás. La validez concurrente y discriminante se evaluó con otros constructos. Se estableció invarianza configural, métrica, escalar y de medias latentes para género y edad. **Discusión:** A pesar de algunas limitaciones, el NBQC-P es una herramienta válida y fiable para evaluar dificultades manifiestas del sueño comúnmente presentes en niños.

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Introduction

Adequate sleep, in terms of duration, quality, and regularity, is important for children's physical health and proper cognitive, social-emotional and behavioral functioning (Schlieber & Han, 2021). According to a recent meta-review, short sleep duration is shown to be a predictor of the development of anxiety and depression symptoms and poor school performance (Matricciani et al., 2019). Children with persistent sleep problems show greater internalized and externalized problems, as well as ADHD (Hoyniak et al., 2020; Liu, Ji, Pitt et al., 2022; Williamson et al., 2021). In addition, sleep difficulties in children impact their families, affecting their parents' quality of sleep, pre-sleep activation, and mood (Varma et al., 2020).

Although there is a lack of consensus, the concept of sleep quality in children refers to the set of sleep continuity and architecture, sleepiness, and daytime behaviors (Liu, Ji, Rovit et al., 2022). According to the International Classification of Sleep Disorders (ICSD-3; American Academy of Sleep Medicine [AASM], 2014), a child's insomnia or difficulty falling or staying asleep may be due to two factors. First, sleep-onset associations cause dependence on specific stimuli, without which the child cannot fall asleep. These stimuli can be objects or environmental conditions, such as the company of their relatives. The second cause is limit-setting issues, which refer to the child's reluctance to go to sleep at bedtime, as well as stalling behaviors such as asking for something before going to sleep. Both factors cause the child to fall asleep later or to wake up during the night, with behaviors such as crying or coming into the parents' room (Owens & Moore, 2017). Sleep-onset associations and limit-setting issues may be due to anxiety or fears of sleeping alone, darkness, or nightmares (AASM, 2014). In children with pathological night fears, behaviors such as requiring company to sleep and wandering around the house at night have been described, as well as poor sleep quality, leading to daytime sleepiness and interference (Ducasse & Denis, 2015; Gordon et al., 2007). Moreover, in children with anxiety problems, parents report fears of going to sleep and the need for company during sleep time, as well as nightmares and night awakenings (Silvestri & Aricò, 2017).

As reflected in the scientific literature, sleep problems in childhood are linked to several factors, such as the parents' behavior and the developmental moment of the child. Parents, who are responsible for establishing their children's sleep routines (Schlieber & Han, 2021), may reinforce the sleep-onset associations with their presence during their child's sleep time and the limit-setting issues if they do not act appropriately and consistently (AASM, 2014; Owens & Moore, 2017). On the other hand, regarding the child's age, Williamson et al. (2021) investigated the evolutionary trajectory of different sleep-related behaviors. While at 4-7 years, difficulties in sleeping alone and night awakenings are the most frequent problems, these tend to decrease at 8-9 years, when difficulties in going to sleep gain prominence. In the study of Falch-Madsen et al. (2020), 1 in 5 participants met the criteria for insomnia at least once between 4 and 14 years. Both studies show an increase with age of sleep-onset problems up to age 10 and a progressive decrease in night awakenings. Moreover, Falch-Madsen et al. (2020) highlighted that, during childhood, insomnia diagnosis was more frequent in boys, whereas Fang et al. (2023) observed more sleep-onset difficulties and night awakenings in girls.

Measures of sleep difficulties can be objective or subjective. Objective measures assess sleep-wake states and stages, through polysomnography and actigraphy. Subjective measures can be self-reported or parent-reported, and encompass questionnaires and scales, which are recommended due to cost-effectiveness and ease of use (Liu, Ji, Rovit et al., 2022). Two notable parent-reported instruments for the child population are the Children's Sleep Habits Questionnaire (CHSQ; Owens et al., 2000) and the Sleep Disturbance Scale for Children (SDSC; Bruni et al., 1996). The CSHQ assesses resistance to go to sleep, 20-minute delay in falling asleep, sleep duration, anxiety about sleeping in the dark and alone, the presence of night awakenings, parasomnias, sleep-disordered breathing, and daytime sleepiness. In the Spanish version, for children aged 4 to 7 years, Lucas-de la Cruz et al. (2016) obtained Cronbach's alpha coefficients ranging from .60 to .81, as well as moderate concurrent validity with actigraphy. Also, the SDSC jointly evaluates sleep onset and maintenance difficulties, sleep breathing disorders, disorders of arousal or nightmares, sleep-wake transition disorders, excessive somnolence, and sleep hyperhidrosis. In their original study (Bruni et al., 1996), an internal consistency of .71 was obtained in clinical patients and of .79 in the general population, as well as high correlations between factors.

Existing measures assess a wide range of sleep characteristics and problems, from difficulties initiating and maintaining sleep to breathing disorders and parasomnias. In some cases, the initial clinical interview may indicate that some problems –such as breathing disorders, parasomnias, or other behaviors related to neurological disturbances– are not present in the child, or the research may not be aimed to these. Covering a wide range of sleep-related constructs may lead to less detailed assessment of each, which could limit the tool's usefulness in certain clinical or research contexts. Thus, it may be important to have several questionnaires and scales available to assess various components of sleep problems. For some purposes, it may be particularly important to assess sleep routines, such as sleep company and limit-setting issues; avoidance behaviors related to sleep-onset associations; sleep quality, including behaviors that affect it; as well as nighttime awakening behaviors, which are not addressed in detail by the available measures despite being common in childhood insomnia at an early age (Williamson et al., 2021). Therefore, assessing specific behaviors during nighttime awakenings is important to implement behavioral interventions in the clinical setting (Owens & Moore, 2017). To increase the availability of child sleep measures, this study had two purposes: 1) to develop the Nighttime Behavior Questionnaire for Children – Parent-reported (NBQC-P), designed to assess the relevant behavioral indicators mentioned above, and 2) to examine its psychometric properties –including structural, concurrent and discriminant validity, as well as internal consistency and measurement invariance according to gender and age– in children aged 3 to 8 years within the Spanish context.

Method

Participants

A total of 386 children's informants participated in the study (see sociodemographic characteristics in Table 1). The children's mean age was 5.59 years (SD = 1.64), with boys comprising slightly more than half of the sample (52.3%, n = 202). The

majority of the children were not receiving any psychological treatment (90.9%, n = 351), were born in Spain (97.2%, n = 375) and lived with both parents in the same household. Informants were on average 39.13 years old (SD = 6.22) and most of them were mothers or female legal guardians (90.4%, n = 349), were married, had a Bachelor's degree, and were employed full-time. The sample was randomly splitted in half to conduct Exploratory Factor Analysis (subsample 1, n = 193) and Confirmatory Factor Analysis (subsample 2, n = 193). Both subsamples showed no statistically significant differences in sex, with a χ^2 (1, n = 386) of 1.76 (p = .19), age (Mann-Whitney's U = 19411, p = .47), or scores in the factors of the final version of the NBQC-P: F1 (Mann-Whitney's U = 17547, p = .32), F2 (Mann-Whitney's U = 17857, p = .48) and F3 (Mann-Whitney's U = 19478, p = .43). For EFA, sample size exceeding minimum standards, i.e., larger than 100 and with a participant-item ratio of 9:1 (Carpenter, 2018; Ferrando et al., 2022). For CFA, considering a GFI = .90 for null hypothesis and GFI = .95 for alternative hypothesis, post-hoc statistical power was of .94 (MacCallum & Hong, 1997).

Instruments

Sociodemographic information was reported by parents or legal guardians about their children (gender, age, with whom they lived, and whether they were receiving psychological treatment) and themselves (gender, age, marital status, studies, employment status, and monthly family income). Moreover, the following parent-reported measures were administered.

- Nighttime Behavior Questionnaire for Children – Parent-reported (NBQC-P). The measure assesses a variety of children's sleep difficulties, including sleep routines, nighttime awakenings, sleep quality, and avoidance behaviors. Items present a 5-point-Likert scale (0 = Never or almost never [*Nunca o casi nunca*]; 1 = Not often [*Pocas veces*]; 2 = Sometimes [*Algunas veces*]; 3 = Often [*Muchas veces*]; 4 = Always or almost always [*Siempre o casi siempre*]). The process of development and decision-making will be discussed in this article.

- What My Child Can Do At Night – Parent Form (WICDAN-P; Coffman, 1987). This questionnaire assesses 11 items of children's abilities during nighttime situations that involve darkness (e.g., At bedtime, my child can lie in bed alone in their bedroom in the dark for at least two minutes). It has been used in the clinical context for treating fear of the dark. The items are rated on a 3-point scale indicating the ability to complete each task (0 = No; 1 = Yes, but with difficulty or hesitation; 2 = Yes, easily). Thus, a higher score indicates better skills to cope with darkness and less sleep difficulties. The Spanish version of the WICDAN-P (Amorós-Reche et al., 2024) showed good model fit indices with a one-factor structure and excellent internal consistency (ordinal α = .91, categorical ω = .87).

- Parent version of the Nighttime Fears Scale (NFS-P; Orgilés et al., 2024). This scale assesses 21 items about nighttime fears (e.g., A thief enters your home when you are sleeping), grouped into four dimensions: Nighttime Features and distressing experiences, Loss or separation from the family, Imaginary Stimuli, and Real Stimuli. The items are rated on a 5-point Likert scale, ranging from 0 (*Not at all*) to 4 (*A lot*). A higher score indicates a higher intensity of each kind of fear. The NFS-P shows good psychometric properties, with alphas ranging from .90 to .95 and good convergent and divergent validity.

- Preschool Anxiety Scale (Spence et al., 2001). This scale assesses 21 items of anxiety symptoms in preschoolers (e.g., Has difficulty stopping him/herself from worrying), grouped into the following dimensions: Separation Anxiety (3 items), Physical Injury Fears (3 items), Generalized Anxiety (4 items), Social Anxiety (5 items), and Obsessive-Compulsive Disorder (5 items). The items are rated on a 4-point Likert scale ranging from 0 (*Never*) to 3 (*Always*). A higher score indicates a greater frequence and/or variety of anxiety symptoms. The Spanish version (Orgilés et al., 2018) shows evidence of convergent validity and reliability.

Table 1

Description of the sample

Characteristics	*n* (%)
Child's age	
3 years	54 (14.0)
4 years	60 (15.5)
5 years	67 (17.4)
6 years	78 (20.2)
7 years	63 (16.3)
8 years	64 (16.6)
Adult relatives with whom the child lives most of the time	
With both parents in the same house	344 (89.1)
With both parents in alternating houses	19 (4.9)
With one parent	11 (2.8)
With one parent and grandparent(s)	6 (1.6)
With one parent and their new partner	5 (1.3)
Foster family	1 (0.3)
Marital status of the reference parent or legal guardian	
Married	287 (74.4)
Live-in partner	51 (13.2)
Civil partner	5 (1.3)
Divorced or separated	23 (5.9)
Single	19 (4.9)
Widower	1 (0.3)
Studies of the reference parent or legal guardian	
Basic	29 (7.5)
Secondary or vocational training	100 (25.9)
Bachelor's degree	183 (47.4)
Master's degree or PhD	74 (19.2)
Employment status of the reference parent or legal guardian	
Full-time employee	225 (58.2)
Part-time employee	62 (16.1)
Self-employed	39 (10.1)
Permanent seasonal contract	1 (0.3)
Unemployed	43 (11.1)
Homemaker	7 (1.8)
Work leave	6 (1.6)
Student	2 (0.5)
Pensioner	1 (0.3)
Monthly family income	
Up to €499	3 (0.8)
€500 - €999	14 (3.6)
€1000 - €1999	83 (21.5)
€2000 - €2999	94 (24.4)
€3000 - €4999	97 (25.1)
€5000 or more	22 (5.7)
No reply	73 (18.9)

Procedure

A pool of 21 items was developed in Spanish by four researchers (see Table 2), following behaviors described in the scientific literature (Ducasse & Denis, 2015; Gordon et al., 2007) and clinical expertise. Items were initially created following the theoretical dimensions: sleep routines (i.e., regular situational, company and temporal aspects), nighttime awakenings (i.e., behaviors displayed by the child when waking up during the night), sleep quality (i.e., sleep problems that impair the child's normal functioning), and avoidance behaviors (i.e., actions taken by children to evade situations related to sleeping or the negative emotions associated with them).

The items were presented in random order and, through an online questionnaire, three experts in clinical child psychology judged each item's representativeness of sleep habits, belonging to one dimension, comprehension, one-way interpretation, and clarity. The three last parameters were examined, making minor adjustments to the original items. While the experts rated all items as quite or very representative of sleep habits, they did not correctly identify the theoretical dimension for 9 out of the 20 items. This outcome suggested an alternative structure, which was later confirmed through EFA (refer to the Results section).

A study of nighttime fears, sleep habits, and anxiety in children was disseminated through contacts, social networks (WhatsApp, Facebook, Twitter, and Instagram), the research group's website, a local radio, and a provincial digital newspaper. The different measures, as well as informed consent and information about the study, were presented in a Google Form, which was open for one month – February 2023 –. All the measures were filled in anonymously by parents, reporting their children's behaviors. After completing the form, parents received general guidelines on children's nighttime fears, sleep routines, and anxiety. No financial incentives were offered to participants.

Data Analysis

RStudio software (version 2024.04.2+764) was used, with the 'psych', version 2.4.1 (Revelle, 2024), 'lavaan', version 0.6-18 (Rosseel, 2012) and 'semTools', version 0.5-6 (Jorgensen et al., 2022) packages. The original items 1, 17 and 19 were inversely recoded for both EFA and CFA. EFA was first conducted using subsample 1. Given the subsample size (n < 200), 5 response categories, and the skewness of the majority of items (17 out of 21) falling between -1 and 1, a linear model was selected following Ferrando et al. (2022). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were calculated; according to Carpenter (2018), the KMO value should be equal to or above .60, and Bartlett's test should be statistically significant. Parallel analysis was conducted to determine the number of factors to retain. Then, EFA was performed with the OLS factoring method, as recommended by the author of the R 'psych' package, due to its robustness to badly behaved matrices (Revelle, 2024). Oblimin rotation was employed based on the theoretical assumption that nighttime behaviors and difficulties are interrelated (Ferrando et al., 2022).

After EFA yielded a satisfactory 3-factor solution with 13 items (see the Results section), CFA was performed in the subsample 2 using the diagonal weight least squares (DWLS) estimator. This family of estimators was selected because of the detected floor effect in the items (with 9 out of 13 items with a median in or under the second category: "Not often"), following Viladrich et al. (2017). Considering the sample size of the present study, DWLS it is preferred over other related estimators (DiStefano & Morgan, 2014; Forero et al., 2009), and it does not assume any distribution of the variables (Mîndrilă, 2010). Model fit indices were obtained and interpreted as acceptable with the following criteria: SRMR < .09 in combination with RMSEA < .06; and CFI, GFI, and TLI > .95 (Hu & Bentler, 1999; Schreiber et al., 2006). Cronbach's alpha and McDonald's omega were obtained and interpreted following George and Mallery (2019): acceptable (> .70), good (> .80), or excellent (> .90).

For the total sample, item means, standard deviations and item-dimension correlations were calculated. Due to the non-normal distribution of the variables, to test concurrent and discriminant validity, Spearman's correlation was used and interpreted following Cohen (1988) and Arce et al. (2023): weak (> .10), moderate (> .30), large (> .50) and more than large (> .60). The Holm-Bonferroni correction method, using adjusted p-values, was applied to control for multiple comparisons when calculating

Table 2
Factor matrix

Dimension and items	F1	F2	F3	h^2
4. Sleeps in your or his/her siblings' bed because he/she is afraid.	**.85**	-.08	.05	.72
1. Sleeps alone in his/her bed*.	**.80**	-.05	-.13	.58
9. Is afraid of sleeping alone.	**.73**	.21	.08	.73
7. Needs the company of a family member to fall asleep.	**.54**	.10	.18	.46
3. Wakes up at night and gets up.	.10	**.67**	-.14	.43
5. Wakes up at night and calls you from his/her bed.	.05	**.60**	.01	.39
10. Wakes up at night and cries.	.00	**.54**	.19	.42
8. Has nightmares.	-.13	**.42**	.13	.21
13. When he/she wakes up at night, he/she goes back to sleep without any problem*.	.06	**.39**	.15	.26
11. Delays the moment of going to bed (for example, makes excuses).	.05	-.10	**.79**	.58
2. Has trouble falling asleep.	.03	.24	**.55**	.50
6. Before going to sleep, has tantrums (cries, yells, gets angry...).	-.13	.24	**.46**	.33
12. Calls you because he/she cannot sleep.	.21	.17	**.41**	.38
Variance	18%	15%	13%	

Note. h^2: Communality of the item.
Items marked with '*' are inversely recoded to calculate factor scores.

Spearman's correlations between the NBQC-P's dimensions and other variables. Furthermore, measurement invariance of the questionnaire across children's genders and age groups was tested, including configural invariance (equivalence of model form), metric invariance (of factor loadings), scalar invariance (of intercepts) and latent mean invariance (Cheung & Rensvold, 2002; Putnick & Bornstein, 2016). Variation in CFI (ΔCFI) between models, with a value < .01 for invariance, was used as primary criterion, since it is more recommended by previous simulation studies than ΔRMSEA and $\Delta\chi^2$ –which is sensitive to sample size– (Cheung & Rensvold, 2002; Meade et al., 2008), although these indices are reported. If measurement invariance was established, Mann-Whitney's *U* tests were conducted using the observed scores as dependent variables to compare groups. A 95% confidence level was used for all analyses.

Results

Exploratory Factor Analysis

First, KMO measure of sampling adequacy, with an overall MSA of .78, and Bartlett's test of sphericity, with a $\chi^2(210, n = 193)$ of 1.76 ($p < .001$), indicated that the data were suitable for conducting EFA. Parallel analysis suggested a six-factor structure. Following the procedure outlined by Samuels (2017) for item removal, the aim was to retain items with communalities above .20 and to ensure that each factor had at least three items with loadings over .30 and no cross-loadings. EFA was initially conducted with six factors, but item 21 was removed due to low communality, followed by item 8. One of the six factors had only one item with a loading over .30 and no cross-loadings, and the last two factors explained a reduced proportion of the variance, so a five-factor solution was tested. For the same reason, after removing item 20 due to low communality, a 4-factor solution was tested. However, the issue persisted, with the last factor explaining a small proportion of the variance. Consequently, a three-factor structure was proposed. Items 3, 13, and 17 were removed due to low communalities. Then, item 11 first, and item 7 later, were removed due to cross-loadings on different factors. This led to a satisfactory solution that was theoretically coherent. The first factor encompassed the need for the company of relatives to sleep, related to fear of sleeping alone; the second factor included problems during the night, such as night awakenings and nightmares; and the third factor was related to difficulties and reluctance in going to sleep and in sleep onset. This three-factor structure (see Table 2) was supported by parallel analysis. Item loadings on their primary factor exceeded .39, and communalities ranged from .21 to .73. The total variance explained by the structure was 46%.

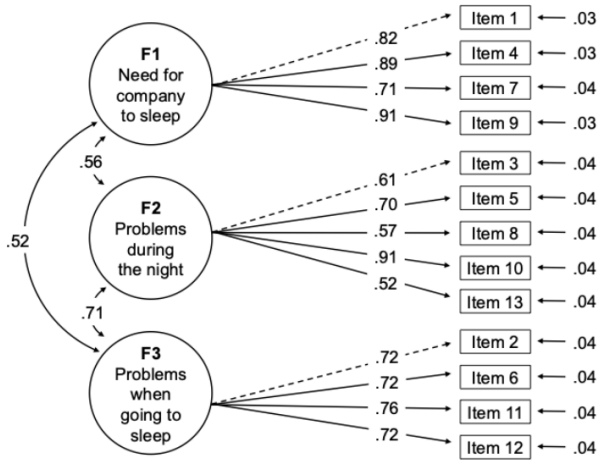
Confirmatory Factor Analysis, Reliability and Item-Dimension Correlations

CFA was conducted with subsample 2 to test the structure proposed by EFA on subsample 1. The model fit indices obtained were adequate: RMSEA = .057 [90% CI 0.035, 0.076], SRMR = .074, CFI = .989, TLI = .986, GFI = .983, with a χ^2 (62, $n = 193$) of 100.17 ($p = .002$). Figure 1 illustrates the three-factor CFA model, with factor loadings exceeding .52. Reliability was calculated, being good for Factor 1 (α = .85, ω = .88) and acceptable for Factor 2 (α = .73, ω = .77) and Factor 3 (α = .75, ω = .79).

Using the total sample (n = 386), means, standard deviations, and item-dimension correlations were calculated for all items (see Table 3). In the final version, item-dimension correlations exceeded .74 (item 7) for Factor 1, .56 (item 8) for Factor 2, and .54 (item 6) for Factor 3.

Figure 1

Measurement model of the NBQC-P.



Note. Items are numbered according to the final version.

Measurement Invariance

With the entire sample, measurement invariance (configural, metric, scalar and of latent means) was tested on the final structure of NBQC between boys (n = 202) and girls (n = 184), and between children aged 3 to 5 years old (n = 181) and 6 to 8 years old (n = 205). As shown in Table 4, variations in CFI between configural, metric, scalar and latent means models were under .01, establishing measurement invariance and confirming that scores were comparable across genders and developmental stages. Between boys (F1 M = 8.39, SD = 5.28; F2 M = 6.93, SD = 4.30; F3 M = 4.71, SD = 3.61) and girls (F1 M = 7.73, SD = 5.30; F2 M = 6.59, SD = 4.43; F3 M = 4.88, SD = 3.71), differences in scores were not significant for F1 (U = 19852, p = .25), F2 (U = 19708, p = .30) nor F3 (U = 18133, p = .68). Between younger children (F1 M = 8.59, SD = 5.04; F2 M = 7.30, SD = 4.42; F3 M = 4.91, SD = 3.45) and older children (F1 M = 7.62, SD = 5.47; F2 M = 6.29, SD = 4.27; F3 M = 4.68, SD = 3.83), differences were significant for F2 (U = 21088, p = .02), but not for F1 (U = 20588, p = .06) nor F3 (U = 19716, p = .29).

Concurrent and discriminant validity

Table 5 presents Spearman's correlations between the factors of the final version of NBQC-P and various variables associated with nighttime fears, abilities in the dark, and anxiety. Abilities in the dark, measured by the WICDAN-P, showed negative correlations with the NBQC-P factors, with a very large correlation observed for F1 and moderate correlations for F2 and F3. The fear of nighttime features and distressing experiences, as well as the fear of imaginary stimuli, exhibited moderate correlations with F1 and F2, and nearly moderate correlations with F3. Additionally,

Table 3

Descriptive statistics of items included and not included in the final version and factors.

Factors in the final version and items	$No._0$ (Dim_0)	*M* (*SD*)	rho_{i-d}
F1. Need for company to sleep [Score range 0-16]		**8.08 (5.29)**	
1. Sleeps alone in his/her bed [*Duerme solo en su cama*]*.	1(SR)	2.43 (1.66)	-.83
4. Sleeps in your bed or his/her siblings' because he/she is afraid [*Duerme en vuestra cama o la de sus hermanos porque tiene miedo*].	5(AB)	1.66 (1.58)	.84
7. Needs the company of a family member to fall asleep [*Necesita la compañía de un familiar para quedarse dormido*].	10(SR)	2.65 (1.57)	.74
9. Is afraid of sleeping alone [*Le da miedo dormir solo*].	14(SR)	2.20 (1.60)	.87
F2. Problems during the night [Score range 0-20]		**6.77 (4.36)**	
3. Wakes up at night and gets up [*Se despierta por la noche y se levanta*].	4(NA)	1.65 (1.40)	.70
5. Wakes up at night and calls you from his/her bed [*Se despierta por la noche y os llama desde su cama*].	6(NA)	1.83 (1.46)	.76
8. Has nightmares [*Tiene pesadillas*].	12(SQ)	1.25 (0.97)	.56
10. Wakes up at night and cries [*Se despierta por la noche y llora*].	15(NA)	0.84 (1.18)	.70
13. When he/she wakes up at night, he/she goes back to sleep without any problem [*Cuando se despierta por la noche, se vuelve a dormir sin problemas*]*.	19(NA)	2.79 (1.31)	-.64
F3. Problems when going to sleep [Score range 0-16]		**4.79 (3.65)**	
2. Has trouble falling asleep [*Le cuesta quedarse dormido*].	2(SQ)	1.45 (1.20)	.78
6. Before going to sleep, has tantrums (cries, yells, gets angry...) [*Antes de ir a dormir, tiene rabietas (llora, grita, se enfada…)*].	9(AB)	0.51 (0.84)	.54
11. Delays the moment of going to bed (for example, makes excuses) [*Retrasa el momento de ir a la cama (por ejemplo, pone excusas)*].	16(AB)	1.38 (1.42)	.81
12. Calls you because he/she cannot sleep [*Os llama porque no se puede dormir*].	18(AB)	1.46 (1.37)	.73
Items not included in the final version			
Needs an object to fall asleep (for example, stuffed animal or pillow) [*Necesita un objeto para quedarse dormido (por ejemplo, peluche o almohada)*].	3(AB)	1.87 (1.67)	-
Sleeps less than recommended for his/her age [*Duerme menos de lo recomendable para su edad*].	7(SQ)	0.99 (1.13)	-
Falls asleep in other places (for example, the sofa) and then you take him/her to his/her bed [*Se duerme en otros lugares (por ejemplo, el sofá) y luego le lleváis a su cama*].	8(SR)	0.98 (1.22)	-
Wakes up at night and goes to your bed [*Se despierta por la noche y va a vuestra cama*].	11(NA)	1.75 (1.59)	-
Needs to sleep with a light source (lamp, corridor light...) [*Necesita dormir con una fuente de luz (lámpara, luz del pasillo…)*].	13(AB)	2.27 (1.75)	-
Goes to bed at the same time on weekdays [*Se acuesta a la misma hora entre semana*]*.	17(SR)	3.52 (0.85)	-
You notice he/she is tired or sleepy during the day [*Lo notas cansado o somnoliento durante el día*].	20(SQ)	0.74 (0.92)	-
Has trouble waking up in the morning [*Le cuesta despertarse por las mañanas*].	21(SQ)	1.66 (1.25)	-

Note. $No._0$ = Number of the item in the original version; $Dim._0$ = Dimension in the original version: SR = Sleep routines; SQ = Sleep quality; AB = Avoidance behaviors; NA = Nighttime awakenings. Items' scores range from 0 to 4. *M* = Mean; *SD* = Standard deviation; rhoi-d = Item-dimension Spearman's correlation. Items marked with '*' are inversely recoded to calculate factor scores.

Table 4

Measurement invariance of the NBQC-P

	CFI	RMSEA	χ^2	df	ΔCFI	ΔRMSEA	$\Delta\chi^2$
Gender							
Configural	.986	.062	215.99	124	-	-	-
Metric	.983	.065	241.59	134	.002	.003	25.60
Scalar	.985	.054	264.62	170	.002	.011	23.03
Latent means	.983	.058	284.56	173	.003	.004	19.94
Age group							
Configural	.987	.063	218.40	124	-	-	-
Metric	.980	.074	274.37	134	.006	.011	55.97
Scalar	.976	.073	345.00	170	.005	.001	70.63
Latent means	.968	.083	403.98	173	.008	.010	58.98

Table 5

Spearman's correlations (p-values) between NBQC-P factors and other variables.

	F1: Need for company to sleep	F2: Problems during the night	F3: Problems when going to sleep
F2: Problems during the night	**.40 (< .001)**		
F3: Problems when going to sleep	**.42 (< .001)**	**.49 (< .001)**	
WICDAN-P - Abilities in the dark	**-.70 (< .001)**	**-.47 (< .001)**	**-.36 (< .001)**
NFS-P - Fear of nighttime features and distressing experiences	**.42 (< .001)**	**.46 (< .001)**	**.29 (< .001)**
NFS-P - Fear of loss or separation from the family	**.18 (.007)**	**.16 (.027)**	**.16 (.027)**
NFS-P - Fear of imaginary stimuli	**.30 (< .001)**	**.33 (< .001)**	**.25 (< .001)**
NFS-P - Fear of real stimuli	**.20 (.003)**	**.17 (.016)**	**.18 (.009)**
PAS - Separation anxiety	.15 (.124)	**.18 (.011)**	**.17 (.018)**
PAS - Generalized anxiety	.13 (.111)	.13 (.104)	**.26 (< .001)**
PAS - Obsessive-compulsive disorder	.09 (.528)	.13 (.124)	**.18 (.009)**
PAS - Physical injury fears	.13 (.124)	.09 (.528)	**.16 (.026)**
PAS - Social anxiety	.05 (.653)	.07 (.653)	.14 (.096)

Note. F1, F2, F3: Factors of the NBQC-P; WICDAN-P: What I Can Do At Night – Parent form; NFS-P: Parent version of the Nighttime Fears Scale; PAS: Preschool Anxiety Scale. Significant correlations (*p*-adjusted values with the Holm-Bonferroni method < .05) are flagged in bold.

a nearly moderate correlation was found between F3 and generalized anxiety. Other relationships analyzed were either low or nonsignificant.

Discussion

Sleep-related difficulties are related to poorer quality of life and mental health of children (Hoyniak et al., 2020; Liu, Ji, Pitt et al., 2022; Matricciani et al., 2019; Schlieber & Han, 2021; Williamson et al., 2021) and their families (Varma et al., 2020). This study aimed to develop and empirically validate the psychometric properties of a new measure designed to assess problematic nighttime behaviors in a community sample of parents of children aged 3 to 8 within the Spanish context. Following the removal of certain items from the original version, EFA yielded a three-factor solution, which demonstrated good model fit in the CFA. Thus, the final version of the Nighttime Behavior Questionnaire for Children – Parent-reported, encompasses three groups of behaviors: Need for company to sleep (F1), Problems during the night (F2) and Problems when going to sleep (F3). The first group is related to sleep-onset associations and the third to limit-setting issues (AASM, 2014) addressing an existing gap in the assessment of specific sleep avoidance behaviors. The second group includes sleep interruptions like nightmares and nighttime awakenings, a problem for which the NBQC-P offers more detailed behaviors than other measures.

The associations between the NBQC-P factors and other variables align with existing research. Fears related to nighttime features and distressing experiences, such as waking up in the dark or having nightmares, along with night-related imaginary stimuli (e.g., monsters), showed moderate correlations with sleep interruptions during the night (F2) (Kushnir & Sadeh, 2011) and the need for company to sleep (F1). However, these nighttime fears were less strongly associated with problems when going to sleep (F3), which could be due to either behavioral or emotional problems. Notably, the need for company to sleep (F1) was not significantly related to separation anxiety (PAS). However, separation anxiety has been found as a minor predictor of the number of nights sleeping alone and no predictor of sleep problems (El Rafihi-Ferreira et al., 2019), which would support the association found in the present study. This suggests that the need to sleep with parents or relatives may arise from different causes, such as nighttime fears, rather than anxiety due to separation from attachment figures. As nighttime fears and separation anxiety may require different intervention approaches, it may be therefore important to assess whether separation anxiety also occurs in other contexts beyond bedtime. Additionally, a higher score on the WICDAN-P, which focuses on autonomous coping with darkness, was very strongly related to a lower need for company to sleep (F1) and moderately related to less problems during the night (F2) and when going to sleep (F3). These relationships, along with the lower or non-significant correlations, provide evidence for the concurrent and discriminant validity of the NBQC-P dimensions with other related measures.

Moreover, configural, metric, scalar, and latent mean measurement invariance was established for both gender and age group. This allowed for comparisons across the dimensions of the NBQC-P between boys and girls, revealing no significant differences, contrasting with the gender-related disparities reported by other studies (Falch-Madsen et al., 2020; Fang et al., 2023). On the other hand, prior studies have documented a decrease in night awakenings with age, a trend that was also captured by the NBQC-P: younger children (aged 3 to 5) showed higher scores on problems during the night than older children (aged 6 to 8). Consistent with research, and despite a nonsignificant difference, a similar pattern was observed for the need for company to sleep (Falch-Madsen et al., 2020; Williamson et al., 2021). Furthermore, although these studies have found that difficulties in going to sleep are more frequent in older children, their samples included participants beyond the age range of our study, which may explain why differences were less evident in this dimension.

Regarding reliability, Factor 1 (Need for company to sleep) showed good internal consistency, while in Factors 2 (Problems during the night) and 3 (Problems when going to sleep), it was acceptable. Despite this, these two factors show higher internal consistency than the CHSQ's Night wakings and Bedtime resistance subscales in their validation samples (CHSQ; Lucas-de la Cruz et al., 2016; Owens et al., 2000). Furthermore, individual analysis of the items shows strong item-dimension correlations, as well as factor loadings. However, the items not included in the final version

also provide useful insights into the children's sleep difficulties, such as daytime sleepiness –which does not encompass a sufficient variety of behaviors to conform a dimension–. Moreover, experts classified all items as quite or very representative of sleep habits. Therefore, although statistical analyses show the adequacy of the three-factor structure with 13 items, in clinical settings the initial pool (of 21 items) may be administered to analyze the responses individually.

Beyond the non-correspondence of the planned structure to the reality of the data, this study presents other limitations, which open future lines of research. First, the non-probabilistic sampling method, despite being advantageous in terms of cost-effectiveness and carried out through broad dissemination, may not have led to a representative sample. Moreover, ethnicity and other socioeconomic variables have not been examined. Thus, this may limit the generalizability of the results to the broader population, particularly to groups whose characteristics are underrepresented. Furthermore, the vast majority of informants were mothers, which is consistent with previous literature (e.g., Fang et al., 2023; Williamson et al., 2021), but may introduce a gender bias in reporting. Therefore, future research should test the factor structure and other psychometric properties with larger samples, determined with different sampling methods, and including fathers to a larger extent. Another limitation refers to the absence of test-retest reliability, which limits the ability to draw conclusions about the temporal stability of the NBQC-P scores and their capability to detect changes in clinical and research settings. Moreover, there is limited evidence available of the relationships between sleep behaviors and the nighttime fears categorization according to the Nighttime Fears Scale (Orgilés et al., 2024). These aspects should be considered in future studies, as well as the use of objective measures, such as actigraphy.

Conclusion

In conclusion, despite these limitations, the Nighttime Behavior Questionnaire for Children – Parent-reported is a valid (with evidence of EFA-supported factor structure and CFA model fit, experts' judgment of items, and relationships with other criteria), gender- and age-invariant and reliable three-factor measure to assess nighttime difficulties. With this brief tool, parents can report the extent to which their children need to be accompanied when sleeping, the presence of nighttime disturbances and their reluctance to go to sleep. These are overt behaviors linked to the functioning of children and their families. Thus, the NBQC-P may be a valuable measure to detect cases of children with disturbed sleep, as well as to be included in an assessment protocol and to determine the results of an intervention.

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