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Modified Children's sleep habits questionnaire for behavioral sleep problems: A validation study☆

Karen A. Bonuck, PhD [a,*], Beth L. Goodlin-Jones, PhD [b], Clyde Schechter, MD [a], Judith Owens, MD, MPH [c]

[a] Department of Family and Social Medicine, Albert Einstein College of Medicine, 1300 Morris Park Avenue, Bronx, NY 10461
[b] Department of Psychiatry & Behavioral Sciences, UC Davis MIND Institute, Sacramento, CA 95817
[c] Department of Neurology, Harvard Medical School, 25 Shattuck Street, Boston, MA 02115

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ABSTRACT

Objectives: Behavioral sleep problems (BSPs) are prevalent and consequential in young children. There is a need for screening tools that identify BSPs—which are often rooted in the parent-young child relationship—and typically respond to behavior management. Such a tool would increase capacity to identify and treat BSPs. We sought to validate a short-form version of the widely used Children's Sleep Habits Questionnaire (SF-CSHQ) that omitted items that would not be responsive to behavioral strategies.
Methods: The original 33-item CSHQ elicits parent report of "behaviorally-based" and "medically-based" sleep items (eg, parasomnias and sleep disordered breathing). We conducted analyses to develop a SF-CSHQ that excludes its "medically-based" items, to determine (a) the SF-CSHQ threshold score corresponding to the full CSHQ clinical cut-off score (≥41), and (b) preliminary validity of this SF-CSHQ. Data were re-analyzed from the original data that established the CSHQ's psychometric properties in 4–10 year olds, and a second dataset that established its validity in 24–66 month olds.
Results: In both datasets, a threshold score of 30 had correlations of 0.90–0.94 with the original cut-off. This 23-item SF-CSHQ cut-off functioned as well as the full CSHQ cut-off in discriminating between children with vs without a parent-reported behavioral sleep problem, and with vs without prolonged sleep latency (per actigraphy).
Conclusion: We established preliminary validity of modified version of the widely-used CSHQ. This SF-CSHQ may be useful for widening screening and first-line guidance for behavioral sleep problems in young children, among professionals who are not sleep medicine specialists.

Introduction

Insufficient and poor quality sleep in young children adversely impact behavioral and cognitive function. Preschool age (3–5 years) is a peak time for sleep disturbances, when ≈25% of children have a behavioral sleep problem (BSP).[1,2] BSPs are problems falling or staying asleep, such as bedtime resistance, night-waking; they correspond to the "insomnia" diagnosis under the 2014 classification of sleep disorders.[3] (Previously, "sleep onset association" and "limit setting" types of behavioral insomnia were classified separately.[4]) Among children with neurodevelopmental disorders, prevalence is even higher, up to 80%.[5,6] BSPs impede development of executive function,[7] and may increase later need for special education. However, healthy sleep practices (eg, regular bedtime, bedtime routine), and behavioral interventions (eg, extinction) both promote healthy sleep[8] and address sleep problems.[9] In fact, most BSPs in young children do not require specialized attention[10]. Other sleep problems in young children—sleep-disordered breathing (SDB) and parasomnias—are not amenable to brief behavioral interventions. Parasomnias often resolve spontaneously with age,[11] while alternative gold-standard screening tools exist for SDB,[12–14] which is managed by weight loss, medications, and surgery.[15]

Given the prevalence of BSPs in early childhood and their responsiveness to behavioral interventions, there is a need for criterion-referenced screening tools.[10] Secondary prevention for mild BSPs could be accomplished by training a range of health professionals to deliver brief, behavioral interventions.[16] Positive effects are found when such interventions are delivered to parents by nurses and psychology trainees,[9,17] via the internet,[18–20] and via written materials.[21] Behavioral interventions are most effective in younger (vs older)

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* Corresponding author. Tel.: +1 718 430 4085.
E-mail address: karen.bonuck@einstein.yu.edu (K.A. Bonuck).

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children,[21] perhaps because they target parent–child interactions that contribute to the problem.[22]

The CSHQ is one of the most widely-used multi-dimensional tools used to screen for pediatric sleep problems. It was designed to reflect common clinical symptoms presenting in school-aged (4–10 years) children. Using a clinimetrics approach, ie, one based upon symptoms or clinical presentation,[23] the CSHQ includes 33 distinct items grouped into 8 subscales, based on face and content validity: bedtime resistance, sleep-onset delay, sleep duration, sleep anxiety, night-waking, parasomnias, SDB, and daytime sleepiness. Parents indicate the frequency of the sleep behavior during a typical week as 'Usually' [5–7 times/week], 'Sometimes' [2–4 times/week], or 'Rarely' [0–1 times/week]. Higher scores indicate worse sleep behaviors or problems. The CSHQ's validity was originally evaluated for two groups of 4–10 year olds: a community sample of elementary school children (n = 469), and a sleep disorders clinic sample of 154 children, including those with a BSP (n = 43), parasomnia (n = 45), or SDB (polysomnography [PSG] confirmed, n = 66). A total score≥ 41 discriminated the two samples with acceptable sensitivity (0.80) and specificity (0.72).[24] Further details are presented in Methods.

The CHSQ is used in diverse community, general pediatric, and condition-specific populations. It was developed as a research tool; it has been employed in more than 300 research projects. It has been translated into at least 19 languages with adequate to good reliability and/or validity in Chinese,[25] Dutch,[26] Portugese,[27] and Spanish.[28] Notably, a recent paper employed the Spanish version as the gold standard for determining the validity of the shorter BEARS screener, in primary care practice.[29]

The current study aims to provide preliminary validity for a shortened version of the CSHQ (SF-CSHQ), exclusive of its parasomnia and SDB items. Such a tool would be specific to BSPs, thus identifying common sleep problems that are responsive to behavioral interventions delivered to (and administered by) parents. The 23-item SF-CSHQ evaluated in this study excludes its parasomnia (n = 7) and SDB (n = 3) items. A modified CSHQ excluding these items has been used by others,[30] and detected significant change after a BSP intervention.[30,31] However, researchers who employed this modified CSHQ did not establish validity of a clinical cut-off for it. Here, we aim to determine (a) the SF-CSHQ threshold score corresponding to the full CSHQ clinical cut-off score (≥41), and (b) preliminary validity of this SF-CSHQ.

Methods

We re-analyzed datasets from two studies that had utilized the CSHQ. The first (Owens) was the original study of community and sleep disorder clinic sample data, collected in 1997–1998, that validated the CSHQ in 4–10 year olds. Analyses presented here utilize data from the sleep disorder clinic sample.[24] The second dataset collected in 2003–2005 (Goodlin-Jones)[32] included, in addition to the full CSHQ, actigraphy, sleep log, and a single-item sleep measure for younger children, aged 24–66 months. Authors of both studies agreed to share these de-identified datasets for analysis.

Description of datasets

Owens

Total score internal consistency (α) for the community (.68) and sleep clinic (.78) samples was high using the criterion of 0.70.[33] For the bedtime resistance, sleep duration, sleep anxiety and daytime sleepiness scales, internal consistency was comparable in the community (0.63–0.70) and clinic (0.68–0.80) samples. The SDB subscale performed poorer in the community (0.51) vs clinic (0.93) sample as did the parasomnia subscale (community = 0.36, clinic = 0.56). In contrast, the night-waking subscale performed better in the community (0.54) vs the clinic (0.44) samples. Sleep onset delay (>20 minutes) was assessed from a single-item, thus no alpha was computed. Supporting the CSHQ's validity, the sleep clinic sample had higher (worse) scores on the total and all subscale scores, controlling for age and SES. Sensitivity and specificity were maximized using a cut-off score of ≥41 under the Receiver Operator Characteristic (ROC) curve.[24]

The CSHQ's development and psychometric properties have been examined by others. Of 57 pediatric sleep questionnaires analyzed, the CSHQ fulfilled 5 of 11 criteria for tool development; just two questionnaires fulfilled all steps.[12] Further, psychometric properties vary by population. In Dutch school age children, CSHQ internal consistencies ranged from 0.47–0.68, though test–retest and inter-observer reliabilities were good.[26] Among 2–5 year olds, a third of whom included early intervention or mental health program participants, subscale alphas ranged from 0.55–0.82, with, the parasomnia (0.69) and night-waking (0.68) subscales performing better than in the original community sample.[34]

Goodlin-Jones

We analyzed data from a study used to establish the full CSHQ's validity in young typically and non-typically developing children.[32] Families were recruited to a study about "sleep and waking patterns" (vs a study of sleep problems) from community settings and a neurodevelopmental disorders research registry.[35] Study participants reported on here include children who are typically developing (n = 73), with autism (n = 83), or with developmental delay without autism (n = 64). The sample's full CSHQ total score had high internal consistency, 0.82. Additional sleep data included: actigraphy, a sleep log, and a single-item global assessment. Children wore actigraphs for 7 days and nights, from which the following sleep variables were derived: sleep start time, total 24 hours sleep duration, night-waking duration, and night wake-up times. Actigraphy data were averaged over 1-week of observations. Parents recorded sleep start and wake-up times as well as night-waking and nap durations in sleep logs on days their child wore the actigraph. Finally, parents were asked "Does your child have a sleep problem at the current time? (Yes/No)." The CSHQ significantly correlated with actigraphy-derived sleep onset (0.48), night-waking duration (0.21), total 24 h sleep (0.25), awake time (0.62), and; discriminated parents reporting their child's sleep as problematic (Yes vs No).[32]

Statistical analyses

To determine the SF-CSHQ threshold score that corresponds to the full CSHQ clinical cut-off score (≥41) we calculated linear regressions of the reduced scores on the full scores in both datasets. We calculated the threshold for the SF-CSHQ by using the regression-predicted value when the full CSHQ equals 41. We report agreement between the percentage of positive screens obtained by the full and SF-CSHQ in both datasets, using the Cohen's Kappa (standard error [SE]).

Next, we examined the SF-CSHQ's ability to discriminate children with vs without a parent-reported sleep problem per a single-item global measure (Yes vs No), in Goodlin-Jones' data. Such single-item measures are associated with sleep problems (ie, onset, duration, night-waking),[36] sleep logs, the CSHQ,[37] and may correlate more highly with a child's mood and functioning than objective measures (eg, PSG, actigraphy).[37] On a population basis, they predict quality of life, learning and behavioral outcomes at school-entry.[38]

We calculated the global measure's sensitivity and specificity to discriminate the two groups of children, using the area under the Receiver Operating Characteristics (ROC) curve. Sensitivity and specificity refers to a test's ability to detect "true positives" and "true negatives," respectively. The area under the ROC curve describes the ability of a continuous measure to discriminate a dichotomous