



## Original Article

# Psychometric properties and Dutch norm values of the Children's Sleep Habits Questionnaire in toddlers



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## ABSTRACT

**Objective:** The Children's Sleep Habits Questionnaire (CSHQ) was developed in the USA for children aged 4–10 years. The Dutch CSHQ has been validated for this age group, but not yet for toddlers. Furthermore, Dutch norm values for toddlers are unavailable. This study aimed to investigate the psychometric properties and collect norm values of the Dutch CSHQ in toddlers.

**Methods:** Data collection was conducted by Taylor Nelson Sofres Netherlands Institute for Public Opinion (TNS-NIPO), a Dutch market research agency. The TNS-NIPO provided access to the TNS-NIPO base, which comprises a panel of respondents who have indicated that they are willing to regularly participate in research. Parents of children aged 2–3 years were invited to complete the CSHQ. The CSHQ is a multidimensional questionnaire to detect sleep problems in children. It is a 33-item, one-week retrospective (parent-)proxy survey. A higher score indicates more sleep problems.

**Results:** The response rate was 61% ( $n = 201$ ). The original eight-factor structure did not fit well in this population and a more appropriate structure could not be achieved with explorative factor analyses. The mean total score was 41.9 (SD 5.6), and was higher (indicating more sleep problems) compared to Dutch school-aged children.

**Conclusions:** The one-dimensionality of the subscales of the CSHQ could not be confirmed in Dutch toddlers. Clinicians and researcher should be aware of the difficulty of reliably measuring sleep in this age group when using the CSHQ. For research purposes, it is therefore recommended to only use the total score.

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## 1. Introduction

Sleep disturbances are common in preschool-aged and school-aged children. Prevalence of sleep problems in children range from 20 to 45% [1–5]. Sleep behavior and sleep disturbances change during childhood development. Sleep duration not only decreases with increasing age, but types of common sleep disturbances also

differ during childhood. For example, nighttime fears and night awakenings are more common sleep problems in toddlers, while bedtime resistance and daytime sleepiness are more frequently reported in adolescents [1,2]. Psychological, sociocultural and medical factors are also known to influence sleep and sleep behavior. Lower socioeconomic status (SES) is associated with more sleep problems; this is due to exposure to environmental stressors, (parental) distress, and lifestyle aspects like TV-watching behavior, amongst others [6–12]. Furthermore, certain sleep problems are more common in children with comorbid disorders like attention-deficit hyperactivity disorder (ADHD) and autism spectrum disorders (ASD) [13,14]. Cultural differences are also found to influence sleep habits; in a previous Dutch study, differences in sleep were found between a Dutch population and American and Chinese populations [5]. Compared to Dutch children, significantly less

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sleep problems were reported in American children, whereas more sleep problems were reported in Chinese children [5,15,16]. Cultural differences, in what is considered normal or problematic sleep, contribute to the appraisal of sleep habits. Co-sleeping, for instance, is perceived as a normal sleep behavior in some cultures, while it is an abnormal sleep behavior in others; consequently, the prevalence of co-sleeping varies among different cultures [11,17]. Considering all of these aspects, data on sleep cannot easily be generalized among different populations.

Considering the importance of sleep for the well-being of children, valid and reliable sleep measurements with culturally appropriate norms are mandatory to adequately detect sleep problems. Sleep can be measured objectively, with actigraphy and polysomnography, and subjectively through questionnaires. Both methods provide complementary information regarding child sleep [18]. Objective measures provide quantitative sleep parameters based on bed and wake times, such as: sleep duration, wake after sleep onset and sleep efficiency. In contrast, (proxy) questionnaires provide valuable qualitative and subjective information (eg, about daytime sleepiness, parasomnias and feeling rested in the morning) that cannot be assessed with objective sleep measures and sleep diaries. Furthermore, they can explore environmental and behavioral dimensions that can influence sleep.

The Children's Sleep Habits Questionnaire (CSHQ), developed in the United States of America (USA) by Owens et al., is a widely used questionnaire with which sleep problems can be detected in children aged 4–10 years [4]. It is a multidimensional, one-week, retrospective (parent-) proxy survey [4,16]. It was designed as a screening tool with which sleep problems can be detected in children, and is based on common clinical symptom presentations of the most prevalent pediatric International Classification of Sleep Disorders diagnoses [4,16,19]. The internal consistency of the original eight subscales ranged from poor to acceptable, with Cronbach's alphas of 0.36–0.70, and test-retest reliability was acceptable with correlations ranging from 0.62 to 0.79. Discriminate validity was demonstrated with higher CSHQ scores in a clinical sample compared to a community sample. In the original population, structural validity was not assessed [16]. Although the original version was developed for children aged 4–10 years, the questionnaire is also often used in younger children, since an alternative is lacking for this age group [2,20]. The psychometric properties of the CSHQ have previously been assessed in Canadian and Chinese preschool-aged children [15,20]. In two additional studies, the psychometric properties of the CSHQ were evaluated in a Portuguese sample of preschool-aged and school-aged children and an American population of children aged 2–10 years with ASD [21,22]. The internal consistency of the original eight subscales ranged from poor to good in these four studies [15,20–22]. In the Chinese preschool-age population and the American sample of children with ASD, test-retest reliability was also assessed and correlation coefficients were moderate to good for the total score, as well as for all subscales [15,21]. Structural validity was assessed in all studies using factor analysis. In all four studies, the original structure was not maintained and a revised four-factor to eight-factor structure was suggested [15,20–22]. Further, discriminate validity was assessed in the Canadian preschool population; they reported higher scores on most of the subscales in a clinical population (children referred to outpatient mental health clinics) compared to a community population [20].

The Dutch version of the CSHQ has until now been validated in children aged 4–10 years, with moderate structural validity and internal consistency [23]. However, the CHSQ has not yet been validated in Dutch toddlers. Also, norm values are not yet available in this population, while different scores can be expected in toddlers, considering the change in sleep habits during childhood.

Therefore, the main objectives of this study were to determine the psychometric properties and to provide norm values of the Dutch CSHQ in children aged 2–3 years. As a secondary objective, this study aimed to determine whether the questionnaire is able to differentiate between problem sleepers and non-problem sleepers in this population.

## 2. Methods

### 2.1. Participants and procedures

Data collection was conducted as part of a large Dutch study aimed at establishing normative data for a set of questionnaires. In November 2014, parents of children aged 2–3 years who were fluent in Dutch were invited by e-mail to participate in the study. The CSHQ was completed online. The online data collection was conducted in cooperation with the Taylor Nelson Sofres Netherlands Institute for Public Opinion (TNS NIPO), which is a Dutch market research agency. The TNS NIPO provides access to respondents in the TNS NIPO base. The TNS NIPO base is a database with a panel of 55,000 respondents who have indicated to be willing to participate in TNS NIPO research on a regular basis. The TNS NIPO uses the software program 'DIANA' ([www.nipo-software.com](http://www.nipo-software.com)) for sampling and weighing procedures. The sample was stratified based on Dutch population figures regarding key demographics (age, sex, marital status and education). A stratified random sampling technique was used to minimize sample variance and to increase precision. In order to obtain 200 respondents based on an expected response rate of 60%, a stratified sample of 332 parents of children aged 2–3 years was drawn from the panel. Respondents received a minimal financial compensation based on the length of the questionnaires. The university's Institutional Review Board approved the study.

### 2.2. Measures

The abbreviated 33-item Dutch translation of the CSHQ was used in this study [4,5,16,23]. It consists of eight subscales: bedtime resistance (six items), sleep-onset delay (one item), sleep duration (three items), sleep anxiety (three items), night waking (three items), parasomnias (seven items), sleep disordered breathing (three items), and daytime sleepiness (eight items). The items "needs parent in the room to sleep" and "is afraid of sleeping alone" were included in the bedtime resistance subscale as well as in the sleep anxiety subscale. Parents were requested to indicate the frequency of each sleep behavior on average during the last typical week. A three-point scale was used, consisting of: usually (5–7 times a week), sometimes (2–4 times a week) or rarely (0–1 times a week), which was converted to a score ranging from one to three. In addition, for each item, parents were asked to indicate whether that item was perceived as a problem. A total score and subscale scores were calculated; a higher score indicated more sleep problems. Children were defined as problem sleepers if their parents endorsed at least one item as a problem for the total questionnaire as well as for the corresponding subscales [5]. Participants were required to complete each question before they were able to continue to the next question; therefore, no items were missing.

In order to assess the sociodemographic situation, general questions about the child's gender, age and family composition were included. Socioeconomic (SES) status was defined based on highest education level of the family's main wage earner, stratified according to the classification of the Nationaal Kompas [24]. This is an independent organization that publishes scientifically substantiated information about public health in the Netherlands [24]. The classification consists of four scales defined as: lowest educational

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