Psychometric properties of a sleep questionnaire for use in individuals with intellectual disabilities

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ARTICLE INFO

ABSTRACT

We examined the psychometric properties of one part of the Sleep Questionnaire developed by Simonds and Parraga (SQ–SP; 1982), a questionnaire that is frequently used to explore sleep problems and behaviors related to sleep in individuals with intellectual disability (ID). The SQ–SP was completed for 345 individuals with ID (sleep clinic $n = 146$; control group $n = 103$; published studies $n = 68$; psychiatric clinic $n = 28$). Internal consistency was good (Cronbach's $\alpha = .80$) and test–retest reliability for the total SQ–SP score was also good (Spearman's rank correlation = .83, $p < .01$). Convergent validity was adequate ($r = .79$, $p < .001$) and concurrent validity was satisfactory ($r = .52$, $p < .001$). Exploratory factor analysis suggested a 5-factor structure (Snoring, Daytime sleepiness, Complaints related to sleep, Sleep apnea and Anxiety related to sleep). Internal consistency of the five factors ranged from modest (Cronbach's $\alpha = .57$) to good (Cronbach's $\alpha = .82$). Confirmatory factor analysis corroborated the 5-factor structure. The Composite Sleep Index, the total SQ–SP score and the factor scores on Daytime Sleepiness and Complaints related to sleep were able to differentiate the control group from the sleep clinic group. The SQ–SP appears to be a reliable and valid tool in assessing sleep and different types of sleep disturbance in individuals with ID.

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1. Introduction

Individuals with intellectual disability (ID) are at increased risk for developing sleep problems with reported prevalence rates from 15% to 85% of the samples (Didden & Sigafoos, 2001). Prevalence of sleep problems is usually assessed by questionnaires. Two important limitations of assessing prevalence rates by questionnaires have to be considered. First, different questionnaires with unknown psychometric properties in individuals with ID are used across studies and more

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than half of the studies do not use standardized questionnaires to collect data. Second, about half of the studies use questionnaires that lack information on different types of sleep disturbances and solely address complaints about sleep (e.g., settling problems, night waking problems, daytime sleepiness) and as a result almost no prevalence rates are presented of types of sleep disturbances which are mentioned in the *International Classification of Sleep Disorders 2nd edition* (*ICSD-2*; American Academy of Sleep Medicine – AASM, 2005). In the *ICSD-2* different types of sleep disturbances are subdivided in broad categories of sleep disorders such as Sleep Related Breathing Disorders, Circadian Rhythm Sleep Disorders, Parasomnias and Sleep Related Movement Disorders. Different types of sleep disturbances may reflect sleep disorders that could be the underlying cause of a presenting sleep problem (or complaint). Information on sleep disorders is necessary for treatment of a sleep problem (Wiggs & Stores, 2004).

Over the past decades several standardized questionnaires with items are based on the precursors of the *ICSD-2* (AASM, 2005) have been developed in the field of pediatric sleep research. Examples of these multidimensional questionnaires addressing sleep in school-aged children and adolescents are the Sleep Questionnaire by Simonds and Parraga (SQ–SP; 1982), the Children's Sleep Behavior Scale (CSBS; Fisher, Pauley, & McGuire, 1989), the Sleep Disturbance Scale for Children (SDSC; Bruni et al., 1996), the Children's Sleep Habits Questionnaire (CSHQ; Owens, Spirito, & McGuinn, 2000) and the Behavioral Evaluation of Disorders of sleep (BEDS; Schreck, Mulick, & Rojahn, 2003). However, the SQ–SP was adapted for use in individuals with ID by Wiggs and Stores (1996) and at present the SQ–SP is the most often used standardized sleep questionnaire in sleep studies in individuals with ID (Brylewski & Wiggs, 1998; Didden, Korzilius, Aperlo, Overloop, & Vries, 2002; Didden, Korzilius, Smits, & Curfs, 2004; Hunt & Stores, 1994; Johnson, Wiggs, Stores, & Huson, 2005; Maas et al., 2008, 2009; Quine, 2001; Stores, Stores, & Buckley, 1996). Other questionnaires were used less often in individuals with ID, such as the CSHQ (Annaz, Hill, Ashworth, Holley, & Karmiloff-Smith, 2011; Breau & Camfield, 2011; Carter, McCaughey, Annaz, & Hill, 2008; Ghanizadeh & Faghih, 2011; Kronk, Dahl, & Noll, 2009; MacCrosain & Byrne, 2009), the SDSC (Bruni et al., 2004; Hartshorne et al., 2009), the BEDS (Conant, Thibert, & Thiele, 2009; Walz, Beebe, & Byars, 2005) and the CSBS (Sarimski, 1996).

Psychometric properties including the structure of the SDSC and BEDS were well examined in samples of children and adolescents without ID (Spruyt & Gozal, 2011), but it is unknown if these results may be generalized to samples of individuals with ID. Psychometric properties of the SQ–SP were examined to a lesser extent and were reported across one sample of individuals without ID (Simonds & Parraga, 1982) and two samples of individuals with ID (Hunt & Stores, 1994; Stores, Stores, Fellows, & Buckley, 1998). Test–retest reliability (after two weeks) for each of the items of the SQ–SP was high ($r = .83–1.0$) and the questionnaire was assumed to have face validity for children and adolescents without ID (Simonds & Parraga, 1982). Information obtained with the SQ–SP was found to correspond very closely to information obtained with sleep diaries kept by parents of children with ID who had Tuberous Sclerosis (Hunt & Stores, 1994). As for the structure, Stores et al. (1998a) performed exploratory factor analysis on the results of the SQ–SP in children with ID who had Down's syndrome and obtained three significant sleep factors: (a) Sleep onset problems, (b) Sleep maintenance problems and (c) Disordered breathing during sleep. This 3-factor structure has not been confirmed in other samples of individuals with ID. In other studies (Johnson et al., 2005; Maas et al., 2008, 2009; Stores, Wiggs, & Campling, 1998) targeting individuals with and without ID several items of the SQ–SP were grouped together to reflect five types of sleep disturbance encountered in clinical practice: (a) Poor quality sleep, (b) Anxieties about sleep, (c) Parasomnias, (d) Disordered breathing during sleep, and (e) Early waking. Until present, this structure has not been explored nor confirmed by factor analysis.

The purpose of this study is to demonstrate the reliability and the validity of the SQ–SP. First, reliability of the SQ–SP was examined by exploring internal consistency and test–retest reliability after three–four weeks. Second, convergent validity was explored by correlating total scores on the SQ–SP with total scores on the SDSC and concurrent validity was explored by correlating total scores on the SQ–SP with Composite Sleep Index scores. Third, an exploratory and confirmatory factor analysis was performed to define the factor structure of the SQ–SP and to evaluate if these factors fit into the types of sleep disturbance encountered in clinical practice and/or the sleep disorders mentioned in the *ICSD-2* (AASM, 2005). Finally, we assessed the degree to which the SQ–SP detected differences between individuals with ID from a control group and individuals referred to a sleep clinic.

2. Methods

2.1. Participants

The SQ–SP was completed for 345 individuals with ID and was completed by parents or professional caregivers of: (a) individuals who consulted the sleep clinic for individuals with ID ($n = 146$, 76 male, mean age = 11 years and 1 months, SD = 10 years and 6 months, range: 1 year and 3 months–66 years and 0 months), (b) individuals from a control group who attended a special day care center, special school or adult activity center for individuals with ID ($n = 103$, 64 male, mean age = 12 years and 10 months, SD = 9 years and 9 months, range: 1 year and 0 months–55 years and 8 months), (c) participants of two published studies ($n = 68$, 26 male, mean age = 11 years and 6 months, SD = 8 years and 1 month, range: 1 year and 7 months–47 years and 9 months; Maas et al., 2008, 2009), and (d) individuals who consulted a psychiatric clinic for children and adolescents with ID ($n = 28$, 21 male, mean age = 11 years and 5 months, SD = 3 years and 7 months, range: 5 years and 5 months–22 years and 5 months) (see Section 2.3 for information about recruitment).

Of the 345 participants, 187 participants (54%) were male and their mean age was 11 years and 8 months (SD = 9 years and 5 months, range: 1 year and 0 months–66 years and 0 months). Most participants (91%, $n = 309$) lived at home with their