

Running head: ASSESSMENT OF SLEEP IN SCHOOLS

Assessment of Sleep Problems in a School Setting or Private Practice

Marsha Luginbuehl, Ph.D.

President, Child Uplift, Inc.

&

Kathy L. Bradley-Klug, Ph.D.

University of South Florida

* This is a draft of a Book Chapter that appeared and can be located in a professional sleep medicine book using the following reference:

Luginbuehl, M.L. & Bradley-Klug, K.L. (2008). Assessment of Sleep Problems in a School Setting or Private Practice. In A. Ivanenko (Ed.) *Sleep and Psychiatric Disorders in Children and Adolescents*. New York: Informa Healthcare, 109-138.

* Please view the original book chapter in Ivanenko's book to obtain the Tables and Appendices of this chapter.

Address all correspondence concerning this manuscript to Marsha Luginbuehl, Ph.D., **Affiliation, address**. Email: Childuplift@aol.com

Assessment of Sleep Problems in a School Setting or Private Practice

Introduction

One out of every three elementary school age children suffers serious sleep problems (Mindell & Owens, 2003). While some of these sleep problems may disappear during childhood, 12 to 15% of all students may have a sleep problem impacting their daytime functioning that will not disappear without treatment (National Institute of Health, 2001). These sleep problems can impact the social, emotional, and academic performance of these children. Because sleep problems are not typically considered a possible cause for school-related issues such as poor academic performance or behavioral concerns, many children with sleep problems may never be identified or may be mislabeled. The focus of this chapter is to provide clinical professionals with an overview of the most current research regarding the link between sleep problems and educational outcomes for children and adolescents. Screening of sleep disorders is discussed within the context of a prevention to intervention continuum. The chapter will introduce clinical professionals to new instruments available for assessing children with suspected sleep disorders as part of their problem solving evaluation process. Finally, the importance of collaboration between school-based, community, and medical professionals is discussed with regard to identifying children with sleep problems and providing them with interventions that will allow them to experience positive educational outcomes.

Link between Sleep, Learning, and Behavior

Sleep problems in children can result in poor cognitive and academic performance (Montgomery-Downs, Crabtree, & Gozal, 2005) in addition to associated poor

performance on tasks measuring working memory (Steenari, 2003). For example, Gozal (1998) found a relationship between first-grade children identified with sleep-disordered breathing and their poor academic performance. Sleep deprivation alone limits overall cognitive efficiency (Mitru, Millrood, & Mateika, 2002). Specifically, inadequate sleep may lead to excessive daytime sleepiness which impacts one's overall functioning.

The impact of sleep problems also may be manifested by the child in the form of over-activity, noncompliance, oppositional behavior, and/or poor impulse control. Research has shown that a relationship exists between sleep disordered breathing, Periodic Limb Movement Disorder and symptoms of Attention-Deficit/Hyperactivity Disorder (ADHD; Chervin, Dillon, Basseti, Ganoczy, & Pitruich, 1997; Picchiatti et al., 1999). Additionally, a relationship has been shown between sleep disorders and challenging behavior/Conduct Disorder (Chervin et al., 2002). Specifically, Chervin found that bullying and other aggressive types of behaviors were generally two to three times more frequent among children at high risk for Sleep Disordered Breathing than among other children. Additionally, researchers have found that children with sleep problems experience reduced quality of life which also impacts psychological well-being (Crabtree, Ivanenko, O'Brien, & Gozal, 2003).

Recent research provides prevalence rates of sleep problems in pediatric populations and reports further evidence of the impact of these problems on educational outcomes. Witte (2006) investigated the relationship between children who were at-risk for sleep problems and their subsequent development in pre-academic and behavior skills. Eighty-six at-risk preschool children ranging in age from 3 to 5 years were screened as part of school district Child Find effort. Data were collected on the

children's sleep using the Sleep Disorders Inventory for Students – Child Form (SDIS-C; Luginbuehl, 2004), pre-academic skills, and internalizing and externalizing behaviors. Results demonstrated that 33% of the sample of children was rated as high risk in at least one category of sleep disorder on the SDIS-C. Additionally, another 10% of the sample scored in the cautionary range for a sleep disorder. There was a significant inverse relationship found between scores on the SDIS-C and pre-academic performance, indicating that children at-risk for a sleep disorder had fewer skills required for success in kindergarten (i.e., skills in language, motor, and conceptual knowledge). A significant relationship also was found between scores on the SDIS-C and scores measuring both internalizing and externalizing behavior problems.

Ax (2006) investigated the prevalence of sleep problems/disorders in 216 second- and third-grade students attending a school district in the northeast. This study also investigated the relationship between students with and without symptoms of sleep disorders on the following variables: classroom behavior, academic achievement in reading and math, quality of life, and life satisfaction. Symptoms of sleep disorders were measured by parent completion of the SDIS-C. Symptoms of sleep disorders occurred in almost one-fifth (17%) of the sample. Results supported an overall difference in school behavior and reading between students with and without symptoms of sleep disorders. Students with symptoms of sleep disorders performed significantly worse in reading achievement and exhibited significantly more internalizing and externalizing behaviors than students without symptoms of sleep disorders. There were no significant differences found between the children with and without symptoms of sleep disorders on measures of quality of life and life satisfaction.

Similarly, a study conducted by Popkave (2007) with a clinic-referred sample of 104 children ages 2 to 5 years, found that a significant number of young children are at risk for at least one type of sleep disorder. In this study, 31% of the children were found to be at high-risk for at least one type of sleep disorder and an additional 10% were found to be at cautionary-risk for at least one sleep disorder. Young children displaying symptoms of a sleep disorder also were reported by parents as demonstrating higher rates of externalizing and internalizing behaviors.

Clearly, the research has established a relationship between sleep problems and difficulties with learning and behavior. Although a causal relationship has not been uncovered, the high incidence rate and negative effects of sleep problems/disorders on children's behaviors and academic performance warrants a thorough screening process to be used to identify and correct sleep problems before they significantly impair children's daytime functioning. Implementation of a comprehensive screening process in all schools and pediatric practices could ensure that the majority of children with sleep disorders are identified early and corrected.

Comprehensive Care for Children with Sleep Problems: Programming Across the Prevention-Intervention Continuum

Treatment of children with health issues has changed over the past 10 years. Historically, in the school setting targeted children were those who were already identified and school personnel took on the roles of problem-solving and intervention implementation (Power, DuPaul, Shapiro, & Parrish, 1995). A more contemporary approach focuses on prevention and intervention, incorporating a public health model that includes all children. The emphasis is on building resources to help all children and

solving problems before they become critical (Power, DuPaul, Shapiro, & Kazak, 2003). This more contemporary approach results in an expanded model that addresses a continuum of need

Applying this more contemporary approach to pediatric sleep disorders, school personnel and professionals in private practice need to take on a more proactive role in the prevention of sleep problems. The Institute of Medicine (IOM; 1994) categorical framework of prevention can be applied to sleep disorders (see Table 1). For example, at the level of *universal prevention*, strategies are applied to all populations in an effort to prevent the development of sleep problems. Within this level of prevention, school personnel may screen all children entering kindergarten for sleep problems. Those children who appear at-risk for sleep problems would be targeted for further assessment and intervention development. At the *selective prevention* level, a subset of children who may be at risk for a sleep disorder due to membership in a particular group (i.e., students with identified learning and behavior problems) would be targeted for screening. Finally, the *indicated prevention* level is for students who do not meet diagnostic criteria for a sleep disorder but who are displaying characteristics of a sleep disorder such as falling asleep in class, frequent tardies or trancies, and experimentation with drugs or alcohol.

School personnel should continue the more traditional role of providing interventions for those students already identified with sleep problems or disorders. However, the focus on prevention serves to screen for sleep problems and disorders, and target students before the disorder significantly negatively impacts the development of academic and behavior skills.

Clearly, screening and assessment for sleep disorders is necessary within the school setting. The following section will review published screening and assessment tools for sleep disorders appropriate for children and adolescents. Each instrument is reviewed with respect to its psychometric properties and.....The purpose of this chapter is not to recommend a particular instrument, but to offer to the reader an objective overview of measures so that an informed decision can be made as to what measure will serve to provide the information needed about a particular child.

Phase I Screening

It is critical that all pediatric professionals recognize the major warning signs of a possible pediatric sleep disorder and ask parents the right questions to identify these problems. It is not enough to ask parents if their child has trouble sleeping because more than half the parents who have a child with a sleep disorder will answer this question “No” (Luginbuehl, 2004). Inquiries about a child exhibiting excessive daytime sleepiness (EDS), difficulty falling asleep, or frequent nighttime awakenings are better and may identify about 25-30% of the children with sleep problems/disorders, but these questions alone are still insufficient. Young children with sleep disorders rarely exhibit EDS unless they have a more serious sleep disorder or early onset narcolepsy (Luginbuehl, 2004). Due to the high incidence rate of sleep problems/disorders in children with learning, behavior, or emotional problems, professionals should ask the parents of all of these children some poignant questions regarding their sleep habits. In Phase I, the professional only needs to ask 5-to-10 questions to pinpoint some of the red flags (characteristics) of the major pediatric sleep disorders that impair children’s daytime performance: (1) Obstructive Sleep Apnea Syndrome (OSAS), (2) Periodic

Limb Movement Disorder (PLMD); (3) Restless Legs Syndrome (RLS); (4) Behavioral Insomnia of Childhood (BIC); (5) Delayed Sleep Phase Syndrome (DSPS); and (6) Narcolepsy. By asking these initial questions, the professional will rule-out a sleep disorder in approximately 60-75% of the children/youth they screen. If parents respond in the affirmative to some of these initial questions, then the professional should proceed to Phase II, which would involve a more in depth sleep screening inventory.

Owens and Dalzell (2005) recommend that pediatric professionals begin by screening all children between 2-and-12 years with a simple 5-question screening tool referred to as the BEARS. Mindell and Owens (2003) stated that it could also be used to screen adolescents through 18 years. This initial screener inquires about (1) **B**edtime problems such as going to bed or falling asleep, (2) **E**xcessive daytime sleepiness, (3) **A**wakenings during the night, (4) **R**egularity of bedtime and morning awakenings, and (5) **S**leep-related breathing problems or Snoring during sleep (see Appendix A). An initial research study (Owens & Dalzell, 2005) found that almost twice as many children's sleep problems were identified when the BEARS was used as a brief screener in a clinical setting than when it was left up to the pediatricians to ask questions on their own about sleep. However, less than a third of these pediatricians rated themselves as self-confident enough about sleep disorders to know how to evaluate a pediatric sleep disorder even if parents answered any of these questions in the affirmative, and only one quarter of them reported that they knew enough to treat sleep disorders. If this is true about the U.S. pediatricians, then it is less likely that school professionals or psychologists are going to know what to do unless they use a more comprehensive,

sophisticated screening instrument that gives them more diagnostic and treatment information.

Strengths of the BEARS: It is a quick, simple, and inexpensive (free) screener for pediatricians and other pediatric professionals. It provides information to help professionals screen children from 2-through-18 years and know if they should move to Phase II and use a more comprehensive, accurate sleep disorders screening inventory.

Weaknesses of the BEARS: It was designed and used by pediatricians and other medical professionals in Well Clinic Checks, but not for all pediatric professionals. However, it appears that any professional could use it due to its simplicity. It does not ask information about excessive leg movements or other movements in sleep and may miss children who have PLMD, RLS, or other parasomnias that are fairly common sleep disorders in children, some of which may cause or exacerbate some behavior problems in children. Furthermore, no validity or reliability studies have been done on the BEARS. It is only designed as a Phase I screener, but it does not give enough information to know with confidence if a child should be referred to a pediatric sleep specialist.

The Ten Item Sleep Screener (TISS; REF??) is another Phase I screener for pediatric and school professionals to use. It takes a small sampling of ten questions from the more comprehensive Sleep Disorders Inventory for Students (SDIS; Luginbuehl, 2004) and can be easily integrated into all pediatric, Child Find, and kindergarten screenings, as well as evaluations for special education and adolescent intake/enrollment questionnaires. Questions on the screening measure include the following: 1) Does the child/adolescent snore lightly or loudly at night?, 2) Does the child/adolescent exhibit

excessive daytime sleepiness?, and 3) Does child/adolescent get enough sleep at night compared to peers of the same age?

Strengths of the TISS: It is a quick and inexpensive (free) screener designed for use by all school and pediatric professionals working with children and adolescents. It provides information on the major pediatric sleep disorders, including PLMD and other parasomnias, to help professionals know if they should move to Phase II and use a more comprehensive, accurate sleep disorders screening inventory.

Weaknesses of the TISS: No validity or reliability studies have been done on the TISS. It is only designed as a Phase I screener, but does not give enough information to know with confidence if a child should be referred to a pediatric sleep specialist.

If parents answer “Yes” to any of the BEARS or the TISS questions, then the professional should proceed to Phase II screening, which is a more in-depth sleep screening capable of predicting more accurately if a child has a strong probability of sleep disorder and needs to be referred to a pediatric sleep specialist or treated by the professional.

Phase II Screening

The school or pediatric professional should proceed to Phase II screening for the 20-25 percent of the students whose parents have answered “yes” to one or more of the questions on the BEARS or the TISS in Phase I. This more comprehensive screening should enable the school or pediatric professional to determine with confidence one of three things about a child/youth’s sleep: (1) The child’s sleep is normal or typical of a child of the same age and s/he does not need to be referred for a comprehensive sleep evaluation; (2) the child/adolescent has significant sleep problems and/or a strong

probability of a major sleep disorder and needs to be referred, evaluated, and/or treated by a pediatric sleep specialist; (3) the child has significant sleep problems that probably can be corrected by a psychologist, psychiatrist, pediatrician, or school professional working together with the parent and child/youth to help him/her develop better sleep habits and sleep hygiene. For example, if a child appears to have Behavioral Insomnia of Childhood (BIC) or an adolescent appears to have Delayed Sleep Phase Syndrome (DSPS), both of which are primarily attributable to poor sleep habits/hygiene, then the professional can give the parents and child/adolescent a list of recommendations or work with them to decrease or correct their sleep problems. However, if there is a good probability that the child or adolescent has Obstructive Sleep Apnea Syndrome, Periodic Limb Movement Disorder, Restless Legs Syndrome, or Narcolepsy, then these children need to be referred to a pediatric sleep specialist to ensure the proper identification, treatment and correction of their sleep disorder. Any professional conducting sleep screenings must understand the symptoms of these pediatric sleep disorders and how each one must be treated differently (sometimes requiring referrals to different medical specialists), or use a sleep screening inventory that can guide them with fairly high accuracy (validity and reliability), and tell them when it is best practice to refer a child/youth to a pediatrician or a pediatric sleep specialist. Therefore, a more comprehensive screening instrument is required in Phase II, and there are several possibilities available.

Children's Sleep Habits Questionnaire (CSHQ) (see Appendix B)

Developer: Judith Owens, M.D.;

Setting: At three elementary schools and a Pediatric Sleep Disorders Clinic at Rhode Island Hospital, all in southeastern New England;

Participants: 623 Students Total: 469 children ages 4-through-10 years without sleep disorders (community sample) and 154 children diagnosed with a sleep disorder (clinical sample);

Demographics: The community and clinical samples did not differ by gender, but the community sample was significantly older and had a higher socioeconomic status (SES) than the clinical sample; both samples were predominantly white, middle-income English-speaking suburban families that did not reflect the 2000 U.S. Census demographics.

Questionnaire Qualities: The CSHQ is a 35-item parent questionnaire for children 4-through-10 years that is rated on a 3-point scale (“usually”, meaning behavior occurred 5-to-7 times per week; “sometimes”, or 2-to-4 times per week; “rarely”, or 0-to-1 time per week). It is available in English. The CHSQ yields a Total Score and eight sleep domain scores.

Sleep Problems Measured and Results: Using the CSHQ, it was possible to distinguish between the community sample and children with sleep disorder on each subscale ($p < 0.001$) and also using the total score ($p < 0.0001$). The CSHQ had an overall sensitivity of .80, meaning that 80% of the clinical group with sleep disorders would have been correctly identified, which is the major purpose of any sleep screening instrument. Children in the clinical sample who were diagnosed with a sleep problem/disorder scored significantly higher on that sleep scale than other sleep scales of the CSHQ using analysis of variance ($p < 0.0001$). When considering the quality of screening instruments, it is

important to note that desirable validity, internal consistency (reliability), and test-retest reliability coefficients are considered to be approximately .70 + and very good or high coefficients are .90+ (Crocker & Algina, 1986; Cronbach, 1951). Internal consistency for the total CSHQ was .68 for the community sample and .78 for the clinical sample. The eight subscales varied in quality according to their validity and reliability (internal consistency and test-retest reliability) scores:

1. Bedtime Resistance: Internal Consistency was .70 for the community sample and .83 for the clinical sample; Test-Retest Reliability was .68.
2. Sleep Duration: Internal consistency was .69 for the community sample and .80 for the clinical sample; Test-Retest Reliability was .40.
3. Parasomnia: Internal Consistency was .36 for the community sample and .56 for the clinical sample; Test-Retest Reliability was .62.
4. Sleep Disordered Breathing (SDB), which is an overall term that includes Obstructive Sleep Apnea Syndrome (OSAS), but also includes milder nighttime breathing disorders: Internal Consistency was .51 for the community sample and .93 for the clinical sample; Test-Retest Reliability was .69.
5. Night Wakings: Internal Consistency was .54 for the community sample and .44 for the clinical sample; Test-Retest Reliability was .63.
6. Daytime Sleepiness: Internal Consistency was .65 for the community sample and .70 for the clinical sample; Test-Retest was .65.
7. Sleep Anxiety: Internal Consistency was .63 for the community sample and .68 for the clinical sample; Test-Retest was .79.

8. Sleep Onset Delay: Internal Consistency – no scores obtained due to only one question for this scale; Test-Retest was .62.

Strengths: Developed by a leading pediatric sleep specialist. It has good ability to predict that a child has a sleep disorders (sensitivity) and distinguish the community sample from the clinical sample. It has adequate internal consistency reliability on the Bedtime Resistance subscale for both the community and clinical samples and adequate internal consistency for the clinical sample for Sleep Duration, Sleep Disordered Breathing, and Daytime Sleepiness, but not for the community sample. The CSHQ provides valuable information about bedtime behavior problems.

Weaknesses: The CSHQ was normed and validated in only one sleep clinic and three schools in the nation with significant differences in age and SES between the community and clinical samples, and it does not reflect the 2000 U.S. Census demographics. Only one of the subscales (Bedtime Resistance) had an internal consistency alpha coefficient score $\geq .70$ for the community sample, which is somewhat problematic given that this chapter discusses screening community populations, and not clinical populations. Therefore, the CSHQ might be more appropriate for use by sleep specialists in a clinical setting. Only one subscale (Sleep Anxiety) had a test-retest reliability coefficient of $\geq .70$. The Sleep Onset Delay scale cannot constitute a scale because a scale should consist of a minimum of three items (Crocker & Algina, 1986). The Sleep-Disordered Breathing scale has the minimum requirement of three items, which may explain why the internal consistency for the community sample and test-retest reliability coefficients are lower than desirable for the SDB scale. Although the CSHQ gives valuable information about a variety of sleep problems, it does not provide non-sleep medicine professionals clear

scoring guidelines on the subscales to determine if a child has a high probability of some of the major pediatric sleep disorders (PLMD, RLS, Narcolepsy, or DSPS). This might cause uncertainty about referring a child, although it does ask a few questions pertaining to these disorders. It would be beneficial if it provided computer scoring software that simplified screening and ensured accurate scoring of large populations of children (i.e., for kindergarten or high school screenings). It does not provide a visual graph or report giving the parents and professionals understandable information about the sleep problems, how they can impact a child's daytime functioning if not corrected, or guidelines for referral, intervention, and treatment.

For Further Information: see Owens, Spirito, & McGuinn (2000) or contact: Judith A. Owens, MD, Dept. of Pediatrics/Ambulatory Pediatrics, Rhode Island Hospital, 593 Eddy Street, Potter Bldg., Suite 200, Providence, RI 02903. Phone: 401-444-8280; Email: owensleep@aol.com

Pediatric Sleep Questionnaire (PSQ)

(Appendix C)

Developer: Ronald Chervin, M.D.;

Setting: At three elementary schools and a Pediatric Sleep Disorders Clinic at Rhode Island Hospital, all in southeastern New England;

Participants: 623 Students Total: 469 children ages 4-through-10 years without sleep disorders (community sample) and 154 children diagnosed with a sleep disorder (clinical sample);

Demographics: The community and clinical samples did not differ by gender, but the community sample was significantly older and had a higher socioeconomic status (SES)

than the clinical sample; both samples were predominantly white, middle-income English-speaking suburban families that did not reflect the 2000 U.S. Census demographics.

Questionnaire Qualities: The CSHQ is a 35-item parent questionnaire for children 4-through-10 years that is rated on a 3-point scale (“usually”, meaning behavior occurred 5-to-7 times per week; “sometimes”, or 2-to-4 times per week; “rarely”, or 0-to-1 time per week). It is available in English. The CHSQ yields a Total Score and eight sleep domain scores.

Sleep Problems Measured and Results: Using the CSHQ, it was possible to distinguish between the community sample and children with sleep disorder on each subscale ($p < 0.001$) and also using the total score ($p < 0.0001$). The CSHQ had an overall sensitivity of .80, meaning that 80% of the clinical group with sleep disorders would have been correctly identified, which is the major purpose of any sleep screening instrument. Children in the clinical sample who were diagnosed with a sleep problem/disorder scored significantly higher on that sleep scale than other sleep scales of the CSHQ using analysis of variance ($p < 0.0001$). When considering the quality of screening instruments, it is important to note that desirable validity, internal consistency (reliability), and test-retest reliability coefficients are considered to be approximately .70 + and very good or high coefficients are .90+ (Crocker & Algina, 1986; Cronbach, 1951). Internal consistency for the total CSHQ was .68 for the community sample and .78 for the clinical sample. The eight subscales varied in quality according to their validity and reliability (internal consistency and test-retest reliability) scores:

1. Bedtime Resistance: Internal Consistency was .70 for the community sample and .83 for the clinical sample; Test-Retest Reliability was .68.
2. Sleep Duration: Internal consistency was .69 for the community sample and .80 for the clinical sample; Test-Retest Reliability was .40.
3. Parasomnia: Internal Consistency was .36 for the community sample and .56 for the clinical sample; Test-Retest Reliability was .62.
4. Sleep Disordered Breathing (SDB), which is an overall term that includes Obstructive Sleep Apnea Syndrome (OSAS), but also includes milder nighttime breathing disorders: Internal Consistency was .51 for the community sample and .93 for the clinical sample; Test-Retest Reliability was .69.
5. Night Wakings: Internal Consistency was .54 for the community sample and .44 for the clinical sample; Test-Retest Reliability was .63.
6. Daytime Sleepiness: Internal Consistency was .65 for the community sample and .70 for the clinical sample; Test-Retest was .65.
7. Sleep Anxiety: Internal Consistency was .63 for the community sample and .68 for the clinical sample; Test-Retest was .79.
8. Sleep Onset Delay: Internal Consistency – no scores obtained due to only one question for this scale; Test-Retest was .62.

Strengths: Developed by a leading pediatric sleep specialist. It has good ability to predict that a child has a sleep disorders (sensitivity) and distinguish the community sample from the clinical sample. It has adequate internal consistency reliability on the Bedtime Resistance subscale for both the community and clinical samples and adequate internal consistency for the clinical sample for Sleep Duration, Sleep Disordered

Breathing, and Daytime Sleepiness, but not for the community sample. The CSHQ provides valuable information about bedtime behavior problems.

Weaknesses: The CSHQ was normed and validated in only one sleep clinic and three schools in the nation with significant differences in age and SES between the community and clinical samples, and it does not reflect the 2000 U.S. Census demographics. Only one of the subscales (Bedtime Resistance) had an internal consistency alpha coefficient score $\geq .70$ for the community sample, which is somewhat problematic given that this chapter discusses screening community populations, and not clinical populations. Therefore, the CSHQ might be more appropriate for use by sleep specialists in a clinical setting. Only one subscale (Sleep Anxiety) had a test-retest reliability coefficient of $\geq .70$. The Sleep Onset Delay scale cannot constitute a scale because a scale should consist of a minimum of three items (Crocker & Algina, 1986). The Sleep-Disordered Breathing scale has the minimum requirement of three items, which may explain why the internal consistency for the community sample and test-retest reliability coefficients are lower than desirable for the SDB scale. Although the CSHQ gives valuable information about a variety of sleep problems, it does not provide non-sleep medicine professionals clear scoring guidelines on the subscales to determine if a child has a high probability of some of the major pediatric sleep disorders (PLMD, RLS, Narcolepsy, or DSPS). This might cause uncertainty about referring a child, although it does ask a few questions pertaining to these disorders. It would be beneficial if it provided computer scoring software that simplified screening and ensured accurate scoring of large populations of children (i.e., for kindergarten or high school screenings). It does not provide a visual graph or report giving the parents and professionals understandable information about the sleep

problems, how they can impact a child's daytime functioning if not corrected, or guidelines for referral, intervention, and treatment.

Sleep Disorders Inventory for Students (SDIS)

(Appendix D)

Developer: Marsha Luginbuehl, PhD; assisted by W. McDowell Anderson, MD, George Batsche, EdD, Selim R. Benbadis, MD, Kathy L. Bradley-Klug, PhD, John Ferron, PhD, Trevor Stokes, PhD, University of South Florida

Setting: The SDIS was validated and standardized on children and adolescents from 45 schools, two private psychology practices, and seven pediatric sleep centers nationwide, six of which were nationally accredited (AASM).

Participants: There were 821 total children; 602 were in the school/community sample and had not undergone a sleep evaluation of any kind; 219 were in the clinical sample who were undergoing a comprehensive sleep evaluation at a sleep center or had already been diagnosed with a sleep disorder at a pediatric sleep center.

Demographics: The Main study samples of 595 children and their family demographics for ethnicity, SES, parents education, and primary language reflected the 2000 U.S. Census demographics, although it was not exactly the same.

Questionnaire Qualities: The SDIS has two inventories: (1) the SDIS-Children's Form has been developed for children from 2 years through 10 years and has 25 items measuring four sleep scales and 5 items measuring 5 parasomnias written on a broad 7-point likert scale, as well as 11 general health questions written in a 'yes' or 'no' format; and (2) the SDIS-Adolescent Form is for youth from 11 through 18 years and has 30 items measuring five sleep scales and 5 items measuring 5 parasomnias written on a

broad 7-point likert scale, as well as 11 general health questions written in a ‘yes’ or ‘no’ format. Both inventories are available in English or Spanish. Both the SDIS-C and SDIS-A also yield a total Sleep Disturbance Index. They also have computer scoring that produces a graph with standard T-scores, percentiles, and three sleep classifications (“Normal Sleep”, “Caution” range, and “High Risk” of a sleep disorder).

Sleep Problems Measured and Results: The SDIS had content validity of .94, predictive validity for the SDIS-C of .86 and .96 for the SDIS-A, and both the SDIS-C and SDIS-A had high construct or structural validity (Fit indices $>.90$). Overall Sensitivity for the SDIS-C was .82 and .81 for the SDIS-A. Overall Specificity for the SDIS-C was .91 and .95 for the SDIS-A. Internal consistency for the total SDIS-C was .91 and .92 for the total SDIS-A. Test-retest reliability for the total SDIS-C was .97 and .86 for the SDIS-A. The subscales of the SDIS-C and SDIS-A had the following validity and reliability coefficient scores:

1. Obstructive Sleep Apnea Syndrome (OSAS): Predictive validity was .72 for the SDIS-C and 1.0 for the SDIS-A; Sensitivity was .91 (91% correct in predicting OSAS when child had dx of OSAS) for the SDIS-C and 1.0 for the SDIS-A; Specificity for the SDIS-C was .62 and .92 for the SDIS-A; Internal consistency was .90 for the SDIS-C and .88 for the SDIS-A.
2. Periodic Limb Movement Disorder (PLMD)/Restless Legs Syndrome (RLS): Predictive validity was .77 for the SDIS-C and .78 for the SDIS-A; Sensitivity was .50 for the SDIS-C and .55 for the SDIS-A; Specificity for the SDIS-C was .93 and .91 for the SDIS-A; Internal consistency was .85 for the SDIS-C and .83 for the SDIS-A.

3. Behavior Insomnia of Childhood (BIC) or Delayed Sleep Phase Syndrome (DSPS): Predictive validity was 1.0 for the SDIS-C and the SDIS-A; Sensitivity was 1.0 (100% accurate) for both the SDIS-C and SDIS-A although sample size was very small; Specificity for the SDIS-C was .98 and .98 for the SDIS-A; Internal consistency was .76 for the SDIS-C and .71 for the SDIS-A.
4. Excessive Daytime Sleepiness (EDS): Predictive validity was .80 for predicting Narcolepsy using the SDIS-C: EDS scale and 1.0 on the SDIS-A; Internal consistency was .84 for the SDIS-C and .83 for the SDIS-A.
5. Narcolepsy: This scale was only validated for the SDIS-A and had predictive validity 1.0; Sensitivity was .88 for the SDIS-A and Specificity was .97; Internal consistency was .92.

Strengths: Developed with the assistance of many leading pediatric sleep specialist and highly respected pediatric sleep centers. Both the SDIS-C and SDIS-A have good predictive validity that a child has a sleep disorders and good sensitivity for all subscales except the PLMD/RLS scales. It has adequate internal consistency reliability on the Bedtime Resistance subscale for both the community and clinical samples and adequate internal consistency for the clinical sample for Sleep Duration, Sleep Disordered Breathing, and Daytime Sleepiness, but not for the community sample. The CSHQ provides valuable information about bedtime behavior problems.

Weaknesses: The CSHQ was normed and validated in only one sleep clinic and three schools in the nation with significant differences in age and SES between the community and clinical samples, and it does not reflect the 2000 U.S. Census demographics. Only one of the subscales (Bedtime Resistance) had an internal consistency alpha coefficient

score $\geq .70$ for the community sample, which is somewhat problematic given that this chapter discusses screening community populations, and not clinical populations.

Therefore, the CSHQ might be more appropriate for use by sleep specialists in a clinical setting. Only one subscale (Sleep Anxiety) had a test-retest reliability coefficient of $\geq .70$.

The Sleep Onset Delay scale cannot constitute a scale because a scale should consist of a minimum of three items (Crocker & Algina, 1986). The Sleep-Disordered Breathing scale has the minimum requirement of three items, which may explain why the internal consistency for the community sample and test-retest reliability coefficients are lower than desirable for the SDB scale. Although the CSHQ gives valuable information about a variety of sleep problems, it does not provide non-sleep medicine professionals clear scoring guidelines on the subscales to determine if a child has a high probability of some of the major pediatric sleep disorders (PLMD, RLS, Narcolepsy, or DSPS). This might cause uncertainty about referring a child, although it does ask a few questions pertaining to these disorders. It would be beneficial if it provided computer scoring software that simplified screening and ensured accurate scoring of large populations of children (i.e., for kindergarten or high school screenings). It does not provide a visual graph or report giving the parents and professionals understandable information about the sleep problems, how they can impact a child's daytime functioning if not corrected, or guidelines for referral, intervention, and treatment.

For Further Information: ?????

Collaboration and Communication

Having the tools to screen for sleep disorders is only one part of the process in working with children to prevent and monitor the development of collateral problems. In

order to provide the most appropriate services for children and families with sleep problems, we must engage in a structured problem solving process that incorporates collaboration and communication among professionals.

Problem identification is the most important step of the problem solving process, followed by problem analysis which involves a comprehensive assessment of the child's individual's needs and factors within the ecology. Once a comprehensive assessment is completed, evidence-based interventions are selected based upon data collected. Finally, the child's response to intervention is determined through continuous monitoring of student progress. To effectively and efficiently collect all of the relevant information needed in the problem solving process required interdisciplinary collaboration. This includes communication among all of the individuals involved, including the child, family, pediatrician and/or sleep specialist, school psychologist, teachers, school nurse, and other professionals in the community working with the student.

Marsha – I'm not sure where to go from here – we are running out of space!!!!

Conclusion

References

- Ax, E. A. (2006). *Title*. Unpublished doctoral dissertation, University of South Florida, Tampa, Florida.
- Bradley-Klug, K. L., Grier, E. C., & Ax, E. E. (2006). Chronic illness. In G. G. Bear & K. M. Minke (Eds.), *Children's needs III: Development, prevention, and intervention* (pp.857-869). Bethesda, MD: National Association of School Psychologists.
- Chervin, R.D., Archbold, K.H., Dillon, J.E., Panahi, P., Pituch, K.J., Dahl, R.E., & Guilleminault, C. (2002). Inattention, hyperactivity, and symptoms of sleep-disordered breathing. *Pediatrics*, *109*, 449-456.
- Chervin, R.D., Dillon, J.E., Bassetti, C., Ganoczy, D.A., & Pituch, K.J. (1997). Symptoms of Sleep disorders, inattention, and hyperactivity in children. *Sleep*, *20(12)*, 1185-1192.
- Crabtree, V., Ivanenko, A., O'Brien, L., & Gozal, D. (2003). Periodic limb movement disorder of sleep in children. *Journal of Sleep Research*, *12*, 73-81.
- Gozal, D. (1998). Sleep-disordered breathing and school performance in children. *Pediatrics*, *102*, 616-620.
- Institute of Medicine. (1994). *Reducing risks for mental disorders: Frontiers for preventive intervention research*. Washington, DC: National Academy Press.
- Luginbuehl, M.L. (2004). The initial development and validation study of the Sleep Disorders Inventory for Students. *Dissertation Abstracts International Section A: Humanities & Social Sciences*, *64(12-A)*, pp. 4376.

- Luginbuehl, M. L., Bradley-Klug, K. L., Ferron, J., Anderson, W. M., & Benbadis, S. R. (2007). *Pediatric sleep disorders: Validation of the Sleep Disorders Inventory for Students*. Manuscript submitted for publication.
- Mindell, J.A. & Owens, J.A. (2003). *A Clinical Guide to Pediatric Sleep: Diagnosis and Management of Sleep Problems*. Philadelphia: Lippincott Williams & Wilkins.
- Mitru, G., Millrood, D. L., & Mateika, J. H. (2002). The impact of sleep on learning and behavior in adolescents. *Teachers College Record, 104*, 704-726.
- Montgomery-Downs, H. E., Crabtree, V. M, & Gozal, D. (2005). Cognition, sleep and respiration in at-risk children treated for obstructive sleep apnea.
- National Institute of Health (2001). *Wake Up America: A National Sleep Alert, Vol. 1*. Washington, DC, Government Printing Office, 1-76.
- Owens, J.A. & Dalzell, V. (2005). Use of the 'BEARS' sleep screening tool in a pediatric residents' continuity clinic: a pilot study. *Sleep Medicine, 6*, 63-69.
- Owens, J.A., Spirito, A., & McGuinn, M. (2000). The Children's Sleep Habits Questionnaire (CSHQ): Psychometric Properties of a Survey Instrument for School-Aged Children. *Sleep, 23*(8), 1043-1051.
- Picchietti, D.L., England, S.J., Walters, A.S., Willis, K., & Verrico, T. (1998). Periodic limb movement disorder and restless legs syndrome in children with Attention-Deficit Hyperactivity Disorder. *Journal of Child Neurology, 13*, 588-594.
- Popkave, K. M. (2007). The relationship between parent identified sleep problems, internalizing behaviors, externalizing behaviors, and adaptive functioning in a pediatric population. Unpublished educational specialist thesis, University of South Florida, Tampa, Florida.

- Power, T. J. (2006). Collaborative practices for managing children's chronic health needs. In L. Phelps (Ed.), *Chronic health-related disorders in children* (pp. 7-23). Washington, DC: American Psychological Association.
- Power, T. J., DuPaul, G. J., Shapiro, E. S., & Kazak, A. E. (2003). *Promoting children's health: Integrating school, family, and community*. New York: Guilford Press.
- Power, T. J., DuPaul, G. J., Shapiro, E. S., & Parrish, J. M. (1995). Pediatric school psychology: The emergence of a subspecialty. *School Psychology Review, 24*, 244-257.
- Steenari, M. (2003). Working memory and sleep in 6- to 13-year old children. *Journal of the American Academy of Child and Adolescent Psychiatry, 42*, 85-92.
- Witte, R. (200?). *The relationship between sleep disorders, behaviors, and pre-academic skills in pre-kindergarteners*. Unpublished educational specialist thesis, University of South Florida, Tampa, Florida.

Table 1

Levels of Prevention Related to Sleep Problems

Level of Prevention	Recommended for Screening
Universal	<ul style="list-style-type: none"> • All students entering kindergarten • Children referred for well child visits
Selective	<ul style="list-style-type: none"> • Children referred to Child Find Screenings • Students with learning problems • Students with behavior problems • Students described as lethargic, tired, or unmotivated to work
Indicated	<ul style="list-style-type: none"> • Middle and high school students with frequent tardies or truancies • All students with identified drug or alcohol problems