Title: Measurement of Sleep in School-Age Children with Down Syndrome

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Introduction: Sleep problems affect 31-54% of children with Down syndrome (DS), including obstructive sleep apnea and behavioral sleep problems that may include bedtime resistance, sleep onset delay, sleep anxiety, night waking, and parasomnias (Stores et al., 2013). Along with the diversity of sleep problems present in this population, a variety of methods are available for assessing sleep problems, with polysomnography (PSG) serving as the gold standard. However, PSG has limited availability in some regions, is cost-prohibitive for many research studies, children may not cooperate with the requirements of a PSG, and it does not allow for observations of sleep in a child’s natural environment (Hyde et al., 2007). Actigraphy is another popular method that has been shown to be reliable with PSG in the general population. Currently, minimal information is available on the reliability of these different methods among children with DS. Without understanding how these measures work among children with DS, and how they function in relation to parent-ratings of sleep in this population, our understanding of behavioral research is limited. The purpose of this study is to examine the reliability of different sleep measures, including PSG, actigraphy and parent reports of sleep among children with DS.

Method: Two samples of children with DS were examined. One group of participants were 29 children, ages 5-17 years (M=10.7, SD=4.1), who completed a one night PSG in the hospital sleep lab and simultaneously wore a Micromini Motionlogger Actigraph on their non-dominant wrist. The other group included 30 children with DS, ages 6-17 years (M=11.7, SD=2.7), who wore the actigraph at home for 7-nights. Parents completed nightly sleep diaries and the Children’s Sleep Habits Questionnaire (CSHQ).

Results: Correlations were used to assess the relationship between sleep as measured by PSG, actigraphy and parent-report. In the sleep lab, significant correlations were found for PSG and actigraphy measures of total sleep time (TST) (r=.74, p<.001), total wake time after sleep onset (WASO) (r=.52, p<.05), and sleep efficiency (r=.59, p<.01). There was no correlation between PSG and actigraphy on measures of time in bed (TIB) and the total wake episodes. All children in this study experienced episodes of obstructive hypopnea (shallow breathing and low oxygen levels) during sleep, while many others experienced episodes of central and obstructive apnea (no respiratory movement), 52.2% and 78.3% respectively. Over 7 nights’ sleep at home, no significant correlations were identified between any actigraphy measures of sleep and the CSHQ and its subscales. Analyses are ongoing to better understand parent reports of nightly sleep in relation to actigraphy to supplement our current proposal.

Discussion: Our data suggests that actigraphy is sensitive to measuring certain sleep constructs in children with DS in comparison to PSG. Poor correlations in measuring total wake episodes is consistent with the literature in older adults with intellectual disability (van de Wouw et al., 2012). Actigraphy was not related to parent reports of sleep. As the CSHQ has been demonstrated to have good reliability and validity, it is likely that omnibus parent reports of sleep problems are capturing behavioral concerns related to sleep and not the amount or quality of sleep (Esbensen & Hoffman, in press). Our findings contribute to understanding the measurement of sleep in DS, and has implications for outcome studies of sleep.

References/Citations: