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The Persistence of Sleep Disturbance in Children Evaluated for Autism Spectrum Disorders: Predictive Factors and the Impact of Co-occurring Diagnoses

Celeste Elana Flachsbart

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Celeste Elana Flachsbart

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Celeste Elana Flachsbart

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George Fox University

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Approval

Signatures:

Mary Peterson PhD

Mary Peterson, Ph.D., Chair

Members:

Trevor A. Hall, Psy.D.

Wayne Adams

Date: 11·24·08

Wayne V. Adams, Ph.D.

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Celeste Elana Flachsbart
Graduate Student of Clinical Psychology at
George Fox University
Newberg, Oregon

Abstract

Mounting research suggests that children with autism spectrum disorders (ASDs) and other clinical diagnoses demonstrate a higher prevalence of sleep problems than typically-developing children. Additionally, sleep problems are related to a number of cognitive, emotional, and behavioral concerns in pediatric populations. Limited research exists comparing sleep problems in children with ASDs with sleep problems in other clinical populations, or exploring the length of these sleep problems.

The current study sought to explore the development and improvement of sleep problems over one year, as well as predictors to help identify children at high risk for persistent sleep problem. Impact of age, cognitive functioning, adaptive functioning, behavioral functioning, and number of co-occurring diagnoses were explored as predictors, and comparisons between clinical groups were made. Participants were 150 children referred for evaluation for ASDs in a hospital-based ASD assessment clinic. Measures of sleep, cognitive ability, developmental functioning, adaptive behavior, and

behavioral functioning were administered in addition to other routine components of the multidisciplinary ASD assessment. The sleep measure was again administered one year later, with 49 participants responding.

Results indicated that children with ASD did not demonstrate sleep problems at a higher prevalence than other clinically-referred children, but both children with ASD and other clinically-referred children demonstrated prevalence rates at least twice that of a previously-reported typically-developing population. Additionally, unlike typically-developing children, sleep problems were persistent over time, showing little decline one year later. Finally, the primary predictor of sleep problems across sleep-subdomains and age-groups was daytime behavior problems. These findings lend importance to the assessment and active treatment of sleep problems across clinically-referred populations, particularly for those children with elevated daytime behavioral problems.

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Chapter 1

Introduction

There has been increasing interest in sleep disturbance in children with autism, with a number of studies exploring a heightened rate of sleep problems in children with autism as compared to typically-developing children, as well as differences in sleep characteristics and the impact of sleep problems on other areas of functioning.

Prevalence of Sleep Disturbance in Children with Autism Spectrum Disorders

Comparisons of sleep disturbance between typically-developing children and children with autism spectrum disorders (ASD) reveal wide agreement that sleep disturbance is more prevalent in the latter population (Cotton & Richdale, 2006; Devincent, Gadow, Delosh, & Geller, 2007; Didden & Sigafoos, 2001; Hoffmann, Sweeney, Gilliam, & Lopez-Wagner, 2006; Richdale, 2004; Williams, Sears, & Allard, 2004). Richdale and Prior (1995) completed one of the first studies examining prevalence of sleep disturbance in children with ASD. Using parent report, it was determined that 44.4% of the children with ASD had a sleep disturbance compared to 26.9% of the control group, which was made up of age- and IQ-matched children recruited from primary schools. Patzold, Richdale, & Tonge et al. (1998) replicated this study, finding 63.2% of the children with autism to have sleep problems as compared to 22.9% of the control group. Prevalence rates around 54% for sleep disturbance in children with ASD have been

reported in a number of studies (Wiggs & Stores, 2004; Honomichl, Goodlin-Jones, Burnham, Gaylor, & Anders, 2002; Hering, Epstein, Elroy, Iancu, & Zelnick, 1999). However, prevalence estimates of sleep disturbance in children with ASD have been measured as high as 86% (Liu, Hubbard, Fabes, & Adam, 2006). The differences in these measured rates are likely due to differences in methodology, with broader questions such as, "Does your child have a sleep problem?" yielding higher rates than more objective questions, such as frequencies of specific sleep problems.

A number of researchers have hypothesized that the cause of this increased rate of sleep disturbance in children with ASD is attributable to differences in the role of circadian timing, biological rhythms, and the cortisol and melatonin rhythms (Patzold et al., 1998; Richdale, 1999; Richdale, 2004; Richdale & Prior, 1992, Richdale & Prior, 1995; Stores & Wiggs, 1998). In addition, there is evidence that sleep disturbances in ASD are multifactorial with neurochemical, psychiatric, and behavioral causes implicated (Honomichl et al., 2002; Malow et al, 2006).

While a number of studies have examined comparisons of sleep disturbance in children with ASD with that in typically-developing populations, there is a paucity of research around comparing sleep disturbances in children with ASDs to sleep disturbances in children with other psychiatric disorders. Accordingly, researchers have suggested that a closer look at the impact of co-occurring diagnoses and coexisting conditions on sleep disturbance is warranted (Hoffman et al., 2006).

Sleep Disturbances in Other Psychiatric Disorders

Before examining the impact of co-occurring disorders with ASD on sleep disturbance, examining the amount of sleep disturbance in other psychiatric disorders is merited. There has been research focused on other diagnostic groups indicating elevated rates of sleep disturbance in

children with ADHD (Corkum, Panton, Ironside, MacPherson, & Williams, 2008; Corkum, Tannock, & Moldofsky, 1998; Cortese, Konofal, Yateman, Mouren, & Lecendreux, 2006; Golan, Shahar, Ravid, & Pillar, 2004; Kirov, Kinkelbur, Banaschewski, & Rothenberger, 2007), tic disorders (Kirov et al.), intellectual disabilities (Piazza, Fisher, & Kahng, 1996; Stores, 1992), anxiety and depression (Chorney, Detweiler, Morris, & Kuhn, 2008; Gregory & Eley, 2005; Hill, 1994), and chronic pain (Chambers, Corkum, & Rusak, 2008; Long, Krishnamurthy, & Palermo, 2008). Further, research in adult populations indicate elevated amounts of sleep disturbance in adults with schizophrenia (Chouinard, Poulin, Stip, & Godbout, 2004; Jaffe, Markov, & Doghramji, 2006) and PTSD (Habukawa, Uchimura, Maeda, Kotorii, & Maeda, 2007; Kim & Dimsdale, 2007; Kobayashi, Boarts, & Delahanty, 2007; Lamarche & De Koninck, 2007).

For children with ADHD, specific findings indicate effects of co-occurring diagnoses and stimulant medications that heighten sleep disturbance (Mick, Biederman, Jetton, & Faraone, 2000). However, other studies suggested that although there were clinically significant effects of stimulant medications on total sleep time and sleep onset delay as measured by physiological measures and a sleep diary, sleep questionnaires did not pick up on the differences (Corkum et al, 2008). Also, Kirov et al. (2007) examined unmedicated children with ADHD and found increases in rapid eye movement (REM) sleep. Other studies indicated increased daytime sleepiness and increased movements in sleep for children with ADHD (Corkum et al, 1998; Cortese et al., 2006; Golan et al., 2004). In children with tic disorders, Kirov et al. found lower sleep efficiency and elevated arousal index in sleep. Next, children with intellectual disabilities and comorbid severe behavior disorders have been measured to have sleep disturbance prevalence rates of up to 88%, with less total sleep and increased sleep onset delay and night waking as compared to typically-developing peers (Piazza et al, 1996). Regarding anxiety and

depression, anxiety has been associated with increased bedtime resistance, sleep anxiety, and nightmares (Gregory & Eley, 2005) and depression has been associated with decreased REM latency (Hill, 1994). Overall findings of a review indicate a significant overlap between anxiety, depression, and sleep disturbance in children (Chorney et al., 2008). Finally, Long et al (2008) measured the clinical sleep disturbance prevalence rate in children with chronic pain to be at 53%.

The above findings indicate that sleep disturbance is widely associated with a number of psychiatric diagnoses in children, with prevalence rates being significantly higher than in non-clinical populations. While ASD evidences similarly high rates of sleep disturbance, little research has been done to compare sleep disturbance in children with autism to that in children with other psychiatric disorders to help provide clarity into the likely multifactorial cause of these sleep disturbances.

Sleep Characteristics in Children with Autism Spectrum Disorders

In addition to the increased prevalence rates of sleep disturbance in children with ASD, characteristic differences in sleep and sleep disturbance have been explored between children with ASD and typically developing children. A number of studies have identified difficulty getting to sleep, including bedtime resistance and sleep-onset delay as primary sleep disturbances in children with ASD (Allik, Larsson, & Smedje, 2006; Cotton & Richdale, 2006; Hoffman et al., 2006; Honomichl et al., 2002; Malow et al., 2006; Richdale & Prior, 1995; Williams et al, 2004). Next, night wakings are commonly noted to be both more frequent and longer lasting in children with ASD as compared to typically-developing children (Cotton & Richdale; Hering et al., 1999; Hoffman et al.; Honomichl et al.; Williams et al). Additionally, sleep duration has been reported to be shorter in children with ASD (Hering et al.; Hoffman et al.; Malow et al.; Takase,

Taira, & Sasaki, 1998), and co-sleeping has been reported to be more common (Cotton & Richdale; Williams et al.). Other, less common findings in studies of children with ASD include earlier waking (Hering et al.), increased daytime sleepiness (Allik et al.), and increased disoriented waking (Schreck & Mulick, 2000).

In one study examining bedtime resistance more specifically, qualitative differences were noted in bedtime routines and night waking between typically developing children and children with ASD (Patzold et al., 1998). Interestingly, bedtime routines for children with ASD often included unique additional demands such as parents holding the child, lying down with the child, sitting beside the child's bed, all family members going to bed at the same time, or positioning the blinds and curtains in a particular way.

Further examinations of night waking found that while awake, children with ASD were more likely to engage in a disruptive behavior such as screaming, talking to self, singing, playing and running around, while the children in the control group used the restroom or moved into the parent's bed. Furthermore, once awake, children with ASD took longer to get back to sleep (Patzold et al., 1998). While the etiology of these characteristic differences has not been widely studied, Wiggs and Stores (2004) hypothesized part of the differences in ASD children's reactions to wakefulness to be due to sensory-related issues, such as hearing noises more prominently, needing to be wrapped tightly in blankets, or preferring no contact with blankets at all.

Impacts of Sleep Disturbance

Increased sleep disturbances have been found to impact a number of daytime behavioral functions across diagnostic groups and non-clinical populations. Sleep problems in non-clinical populations of children have been found to be associated with a variety of social, behavioral, and

cognitive difficulties. Some early studies identified sleep disturbance to be related to widespread behavioral difficulties in children such as poor concentration, temper tantrums, and being "hard to manage" (Zuckerman, Stevenson, & Bailey, 1987; Lozoff, Wolf, & Davis, 1985). More recent evidence also associates sleep disturbances with various disruptive symptoms and daytime behavior problems in children. For children aged 4-12, Stein, Mendelsohn, Obermeyer, Amromin, and Benca (2001) found sleep problems factor scores (parasomnias, enuresis/gags, tiredness, noisy sleep, and insomnia) to be highly correlated with externalizing (acting out behaviors) and internalizing (e.g. anxiety and depression) scores on the Child Behavior Checklist (CBCL; Achenbach, 1991, 1992), as well as the majority of CBCL factor scores. Similarly, Lavigne et al. (1999) demonstrated lower total amount of sleep to be associated with higher total behavior problems and higher externalizing behavior problems on the CBCL in preschoolers aged 2 to 5 years. As well as being associated with a number of social and behavioral impairments, inadequate sleep has also been associated with difficulties in cognitive and emotional functioning. Dahl (1998) reviews specific effects of inadequate sleep on daytime function, including difficulties with focused attention, irritability, emotional lability, and a low threshold for frustration and distress.

Within the ASD population specifically, sleep disturbance has been associated with more challenging behaviors, more severe levels of psychopathology, more excited and energetic daytime behavior, and abnormalities in social interaction and communication (Richdale, 2004). Malow et al. (2006) found children with ASD identified as poor sleepers had significantly higher T-scores on all scales of the CBCL, higher scores on affective problems, and lower reciprocal social interaction than both typically-developing children and children with ASD who were identified as good sleepers. Devincent et al. (2007) found sleep disturbance in children with

autism to be associated with more severe behavioral difficulties, particularly symptoms of ADHD and oppositional-defiant disorder.

Impact of sleep disturbance on ASD diagnostic variables has also been explored. Limoges, Mottron, Balduc, Berthiaume, & Godbout (2005) found an association between atypicalities of sleep and core diagnostic criteria of autism, including lower communication and social scores in children who experienced sleep disturbance. Schreck, Mulick, and Smith (2004) had similar results, correlating specific types of sleep disturbance with specific behavioral difficulties. Fewer hours of sleep predicted overall autism scores and social skills deficits. Stereotypic behavior was predicted by fewer hours of sleep per night and screaming during the night. Communication problems were predicted by sensitivity to environmental stimuli in the bedroom and screaming at night. Research on children with ASD has also indicated sleep disordered breathing to predict stereotyped behavior, social interaction problems, and overall level of autism as measured by the Gilliam Autism Rating Scale (GARS). Further, parasomnias were predictive of greater developmental disturbances in a sample of children with ASD (Hoffman et al., 2005).

Persistence of Sleep Disturbance

In addition to the increased behavioral disturbance associated with sleep disturbance, some sleep disturbance patterns, particularly in infancy and toddlerhood, have been found to be persistent over time. In examining persistence of sleep problems, Zuckerman et al. (1987) found that if sleep problems are present before the age of 8 months, they are more likely to also be present at 3 years of age (44%), indicating some level of persistence between infancy and toddlerhood. They also found that in toddlers and preschool-aged children, persistent sleep problems are associated with higher rates of temper tantrums and generally greater difficulty in

managing their behavior. This suggests that for those whose sleep problems are persistent, more severe behavioral problems are also present. However, more recent research exploring sleep disturbance in early childhood indicates that for typically-developing children, sleep disturbance ameliorates over time (Jenni, Fuhrer, Iglowstein, Molinari, & Largo, 2005; Mindell, Kuhn, Lewin, Meltzer, & Sadeh, 2006; Petit, Touchette, Tremblay, Boivin, & Montplaisir, 2007).

Research specific to the persistence of sleep disturbance in children with ASD is limited, but important in adding to our knowledge about the nature of the sleep disturbance and etiological factors. Further, the understanding of the developmental trajectory of sleep disturbance, or how the child's sleep disturbance is likely to change over time, has clinical utility in serving to predict whether a child's sleep pattern is likely to improve or decompensate over time. If a child's sleep pattern is not likely to improve, additional treatment interventions may need to be included that specifically target sleep disturbance.

Aims of Current Study

As sleep problems are more prevalent in children with psychiatric disorders, including ASD, and are widely correlated with many behavioral disturbances in children, exploring the development and improvement of sleep disturbances is important to identifying children at high risk for sleep disturbance and children in need of specific sleep assessment and active sleep intervention. The objectives of the present study were to (a) explore characteristics of sleep disturbance for children with ASD versus clinically-referred children with other psychiatric diagnoses, (b) explore how sleep disturbance changed over time for the aforementioned populations, and (c) identify characteristics that were predictive of change in sleep over time for the aforementioned populations. It was hypothesized that (a) sleep disturbance in children with ASD would be more prevalent and more persistent than in other clinically-referred children, and

(b) age, cognitive functioning, adaptive functioning, behavioral functioning, and a number of co-occurring diagnoses would be predictive of improvement in sleep disturbance, with children demonstrating higher functioning and lower impairment showing the most improvement.

Chapter 2

Method

Participants

Time 1. The mean age of the 150 children on whom Time 1 data were collected was 6.25 (SD = 2.43, range = 3-12 years). The participant sample included 53 females (35.4%) and 97 males (64.6%) Of the 140 participants who completed ethnicity data, 110 (73.3%) were Caucasian, 12 (8%) were Hispanic, 7 (4.7%) were African American, 6 (4%) were Asian/Pacific Islander, and 5 (3.3%) had ethnicity classified as "other." Overall, 57 children (38%) had a diagnosis of either Global Developmental Delay or Intellectual Disability. In terms of ASD diagnoses, 52 of the 150 participants (34.7%) qualified for an autism spectrum disorder (ASD) diagnosis. Within that spectrum, 37 children (24.7%) were diagnosed with Autistic disorder, 13 (8.7%) with PDD-NOS, and 2 (1.3%) with Asperger's disorder. The majority of the participants in the ASD group also had a co-occurring disorder; in contrast, the majority of the participants in the non-ASD group met criteria for only one diagnosis or less (see Table 1). Furthermore, there were differences between the ASD and non-ASD group regarding the type of co-occurring disorders (refer to Table 2 for specific diagnostic breakdown). There were no significant differences between participants and those who declined to participate in the research on the demographic or sleep measures collected.

All children were referred for evaluation for an ASD. They underwent a multidisciplinary team evaluation following the practice parameters as outlined by the Quality Standards Subcommittee of the American Academy of Neurology and the Child Neurology Society. Inclusion was limited to those who completed a Children's Sleep Habits Questionnaire (CSHQ) as part of their evaluation, and who were willing to participate in the research.

Table 1

Number of Time 1 Participants with Co-occurring Diagnoses

Number of Diagnoses	ASD (n, %)	Non-ASD (n, %)
0	0 (0)	17 (17.3)
1	17 (37.7)	55 (56.1)
2	34 (65.4)	23 (23.5)
3	1 (1.9)	3 (3.1)

Table 2

Number of Time 1 Participants in Specific Diagnostic Groups

Diagnosis	ASD (n)	Non-ASD (n)
Anxiety disorder	3	21
Adjustment disorder	1	6
GDD/ID	24	33
ADHD	0	21
Behavior disorder	5	24
Reactive attachment	1	2
Mood disorder	1	4

Note. GDD/ID = Global Developmental Delay/Intellectual Disability

Time 2. The mean age of the 49 children on whom Time 2 data were collected was 6.04 ± 2.27 years (range, 3-11 years). The participant sample included 21 females (42.9%) and 28 males (57.1%). The sample included 41 Caucasian children (83.7%), 5 Hispanic children (10.2%), 1 Asian/Pacific Islander child (2%), 0 African American children, and 2 children whose ethnicity was classified as "other" (4.1%). Overall, 16 children (32%) had a diagnosis of either Global

Developmental Delay or Intellectual Disability. Regarding ASD diagnoses at Time 2, 24 children (49%) had an Autism Spectrum Disorder (ASD) diagnosis (16 [32.7%] with Autistic disorder, 7 [14.3%] with PDD-NOS, and 1 [2%] with Asperger's disorder).

Of those who qualified for an ASD diagnosis, 16 children (66.7%) qualified for one other diagnosis. Of those who did not qualify for an ASD diagnosis, 4 children (16%) had no diagnosis, 15 (60%) had 1 diagnosis and 6 (24%) had 2 diagnoses. At Time 2, the mean age of participants declined by .21 years, but there were again no other significant differences between participants and those who declined Time 2 participation on the other demographic measures collected.

All ethical guidelines established by the American Psychological Association were followed. Parents or guardians of the participants were contacted prior to the study and written consent was gained for each participant involved in the research. Parents, guardians, and participants were informed that participation was voluntary and withdrawal from the study could occur at any time prior to data analysis.

Measures

Because this research was completed through a functioning autism clinic, various measures of cognitive, adaptive, and behavioral functioning were used, depending on the clinical needs of each child assessed. However, every child was assessed within each of those three domains. The adaptive and behavioral functioning measures were chosen based on age of the child. The cognitive and developmental measures were chosen based on age, approximated developmental level, need for a standardized cognitive test, and which tests the child was previously administered (typically through school-based services). For example, if a child was unable to complete a standardized cognitive test, they were administered developmental testing

such as the Mullen Scales of Early Learning. The Stanford-Binet, Fifth Edition, was the preferred standardized cognitive assessment, but the Wechsler Intelligence Scales for Children, Fourth Edition, and the Wechsler Preschool and Primary Scale of Intelligence would be used if the child had been previously assessed using that measure (for comparison purposes). The Wechsler Abbreviated Scale of Intelligence would be used if the child had previously completed a standardized cognitive assessment, and intelligence was found to be evenly developed and at least in the above-average range.

Demographic Information. A questionnaire concerning the child's age, sex, race, and sleep-related demographics was completed by the parent/guardian (See Appendix A). Individual items were endorsed as "yes" or "no" regarding whether or not the following had occurred in the last year: changes in treatment, changes in medication, significant accidents, illnesses, or injuries, residential move, bedroom change, change in household composition.

Children's Sleep Habits Questionnaire- Abbreviated (CSHQ). Parents/guardians completed the CSHQ (Owens, Spirito, & McGuinn, 2000), a questionnaire validated for children ages 4-10 years. The CSHQ has been used to examine sleep behavior in children with a variety of conditions, including ASD (Goodlin-Jones, Sitnick, Tang, Liu, & Anders, 2008; Honomichl et al., 2002). The CSHQ is a retrospective 36-item parent questionnaire that asks parents/guardians to recall sleep behaviors that occurred over a typical recent week. Items are rated on a three-point scale, "usually" if the sleep behavior occurred 5-7 times per week, "sometimes" for 2-4 times per week, and "rarely" for zero to one time per week. Items are then rated "yes" or "no" on whether each behavior is a problem or not. The test demonstrates psychometric soundness with $\alpha = .68$ for the community sample, and $\alpha = .78$ for the sleep-referred clinical sample. Test-retest reliability is .62-.79, and discriminant validity is affirmed by significant differences between a

clinical sample and a control sample (Owens et al.). Eight subdomain scores are calculated (bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, night wakings, parasomnias, sleep disordered breathing, and daytime sleepiness), as well as a "total sleep problems" score.

Vineland Adaptive Behavior Scales - Second Edition, Survey Form (Vineland-II). The Vineland-II (Sparrow, Cicchetti, & Balla, 2005) was used to assess level of adaptive functioning in a number of domains, including communication (receptive, expressive, written), daily living skills (personal, domestic, community), socialization (interpersonal relationships, play and leisure time, coping skills), motor skills (fine, gross), and maladaptive behavior (internalizing, externalizing, other). These domains combine to form an Adaptive Behavioral Composite (ABC). The Vineland-II is for individuals from birth to 18 years, and uses a semi-structured interview to measure parent assessment of child functioning in adaptive functioning domains. It asks the parent(s) or caregiver(s) to respond to Likert-scale questions with scoring resulting in five subdomain scores and a total adaptive functioning score. Test-retest reliability on the Vineland-II is demonstrated with average domain reliabilities between .88 and .92. However, inter-interviewer reliability averages from .48 to .92 for ages 0-6 years, and .70 to .74 for older individuals. The test content is theoretically linked to target behaviors, and the Vineland-II is moderately to highly correlated with the Behavior Assessment System for Children, Second Edition (Reynolds & Kamphaus, 2004). The Vineland II was administered on children aged 3-5.

Adaptive Behavior Assessment System - Second Edition (ABAS-II). The ABAS-II (Harrison & Oakland, 2003) provides a complete assessment of adaptive skill functioning in all 10 areas of adaptive skills as specified by the American Association on Mental Retardation (AAMR) and the DSM–IV, including communication, community use, functional academics, home living, health and safety, leisure, self-care, self-direction, social, and work. Scores derived

for each area allow evaluators to assess areas of adaptive functioning in individuals between the ages of 5 and 89 years, determine individual strengths and weaknesses, and specify training goals. Additionally, the skill areas are grouped into three adaptive domains (conceptual, social, practical), which are further grouped to yield a Global Adaptive Composite (GAC). The ABAS-II is utilized with ability measures for the purpose of determining intellectual disabilities. Reliability coefficients across age groups range from .97-.99 for GAC, .91-.98 for adaptive domains, and .85-.97 for the skill areas. In terms of validity, the ABAS-II GAC correlates at .82 with the Vineland-II ABC. The ABAS-II was administered on children aged 6-12.

Stanford-Binet - Fifth Edition (SB5). The SB5 (Roid, 2003a) is an individually-administered, standardized measure of intellectual ability consisting of 16 subtests. These subtests divide into five factors (fluid reasoning, knowledge, quantitative reasoning, visual-spatial processing, and working memory), and two domains (verbal and nonverbal). A Full-Scale IQ (FSIQ) score is also obtained. Reliabilities for the SB5 are very high (Roid, 2003b). For the FSIQ, NVIQ, and VIQ, reliabilities range from .95 to .98. Reliabilities for the Factor Indexes range from .90 to .92. For the 10 subtests, reliabilities range from .84 to .89. Concurrent validity of the SB5 is demonstrated by high correlations with the WPPSI-R and WISC-III (FSIQ correlations of .83 and .84 respectively).

Wechsler Intelligence Scales for Children - Fourth Edition (WISC-IV). The WISC-IV (Wechsler, 2003) is an individually-administered, standardized measure of intellectual ability for ages 6 through 16 years, 11 months. It consists of 10 core subtests which divide into 4 composites (verbal comprehension, perceptual reasoning, working memory, and processing speed). These four composites combine to yield a Full-Scale IQ score. The four-factor structure was demonstrated to be stable across age groups and was tested against alternative models,

emerging as the best fit for the data (Williams, Weiss, & Rolfhus, 2003). The reliability coefficients for the WISC-IV composite scales range from .88 (processing speed) to .97 (full scale). Concurrent validity of the WISC-IV is demonstrated by correlations with the WISC-III. The Full-Scale IQ scores correlate at .89, VIQ-VCI at .87 and PIQ-PRI at .74.

Wechsler Preschool and Primary Scale of Intelligence - Third Edition (WPPSI-III). The WPPSI-III (Wechsler, 2002) is an individually-administered, standardized measure of intellectual ability for ages 2 years, 6 months (2:6) to 7:3. It is separated into two age bands, 2:6 to 3:11 (4 core subtests) and 4:0 to 7:3 (7 core subtests). These subtests divide into two factors (verbal and performance) which combine to provide a Full-Scale IQ score. The WPPSI-III is reported to have good reliability with internal consistency reliability coefficients from .94-.96 for VIQ, .89-.95 for PIQ, and .95-.97 for FSIQ (Wechsler, 2002b). Test-retest reliability provided stability coefficients for .87 for VIQ, .81 for PIQ, and .86 for FSIQ. Regarding validity, the WPPSI-III correlated with the WPPSI-R at .83 for the verbal composites, .68 for performance composites, and .82 for the full scales. It also correlated with the WISC-III at .78 for the verbal composites, .78 for VIQ and VCI, .74 for the performance scales, and .85 for the full scales.

Wechsler Abbreviated Scales of Intelligence (WASI). The WASI (The Psychological Corporation, 1999) is an individually-administered, standardized brief measure of intellectual ability that consists of four subtests from the WAIS-III that divide into two domains (verbal and performance). It also provides a full-scale IQ estimate, and was meant for use in clinical, psychoeducational, and research settings. It was designed for use with individuals aged from 6 to 89 years. WASI highly correlated with the WISC-III and WAIS-III (r = .87 and .92, respectively).

Mullen Scales of Early Learning (Mullen). The Mullen (Mullen, 1995) is a standardized developmental test for children 0–69 months of age, consisting of 124 items split into four subdomains: fine motor, visual reception, receptive language, and expressive language.

This instrument has demonstrated sufficient concurrent validity with other well-known developmental tests of language, motor, and cognitive development, the Early Learning Composite correlating at .70 with the Mental Developmental Index on the Bayley Scales of Infant Development, and individual cognitive scales correlating at a moderate level with the Bayley (Bradley-Johnson, 2001). Test-retest reliability is .82 to .85 for children 1 to 24 months of age, and inter-scorer reliability is also very high (.93 to .99). Finally, the Mullen Early Learning Composite demonstrates strong internal consistency (.83 to .95).

Child Behavior Checklist (CBCL). The CBCL (Achenbach, 1991; Achenbach, 1992) is a widely used measure of children's behavior problems yielding estimates of internalizing problems (e.g. anxiety, depression), externalizing problems (e.g. defiant, oppositional, overactive behaviors), and total behavior problems. With different forms for children aged 1½ to 5 years, and 6 to 18 years, it asks parents/guardians to respond to 112 items that are rated "not," "somewhat," or "very true." The CBCL was used for children aged 3-5.

Behavior Assessment System for Children - Second Edition (BASC-II). The BASC-2 (Reynolds & Kamphaus, 2004) is a broadband behavioral rating scale used to evaluate the behavior and self-perceptions of children and young adults aged 2 through 25 years to facilitate the differential diagnosis and educational classification of a variety of emotional and behavioral disorders of children. While self-report and teacher-report forms are also available, only parent-report forms were used for this study. The BASC-II lists behaviors that are rated regarding their frequency of occurrence on a four-point scale of frequency, ranging from "never" to "almost

always." The BASC-II teacher and parent ratings scales give eight clinical scales, three composite scales and two adaptive scales. The clinical scales, which measure levels of negative or undesirable behaviors as compared to same-aged peers, are hyperactivity, aggression, anxiety, depression, somatization, atypicality, withdrawal, attention problems, and learning problems. The composite scales are externalizing, internalizing, behavior symptoms index, and school problems. The adaptive scales, which measure levels of positive behaviors compared to same aged peers, are adaptability and social skills. The test also includes an "F-Index" which is a validity index regarding reporting style. Regarding internal consistency, BASC-II parent-report composites range from .90 to .95, and scales from .80 to .86. Test-retest reliability for composites ranged from .84 to .91 and for scales from .77 to .84. The BASC-II was used for children aged 6-12.

Procedure

Time 1. Clinically-referred children for an autism evaluation were assessed in the OHSU-CDRC Autism Clinic on a variety of domains applicable to an autism diagnosis. Older children (age 6 and over) attended clinic for a full day (six hours). Accompanied by their parents/guardians, they completed a cognitive measure, developmental pediatric exam, parent interview, adaptive skills measure, behavioral measure, oral language measure (OWLS Listening Comprehension Scale and Oral Expression Scale), sensory profile, visual-motor integration measure, and autism specific measure (Autism Diagnostic Observation Schedule – General). Younger children (age 5 and under) attended clinic for a half-day, and were administered a cognitive measure, developmental pediatric exam, parent interview, adaptive skills measure, behavioral measure, and autism specific measure (Autism Diagnostic Observation Schedule - General, Autism Screening Instrument for Educational Planning- II). The CSHQ was also

administered to both groups. A team of multidisciplinary assessment specialists participated in the assessments, including a speech and language pathologist, a developmental pediatrician, an occupational therapist, and a psychologist. Feedback was generated the same day. All of this information was gathered into a de-identified clinical database. The present study analyzed selected data from this database.

Time 2. Using the data from the initial evaluations as Time 1, a one-year follow up with the CSHQ was sent out through the mail and completed at Time 2. Sleep-related demographics were also obtained and analyzed at Time 2.

Chapter 3

Results

Time 1

Descriptive statistics. Tables 3 and 4 provide the means, medians, and ranges for the sleep variables collected at Time 1 by diagnostic group.

Table 3

ASD Group Descriptive Statistics for Time 1 Sleep Scores

	N	Mean raw score (SD)	Median	Range
Bedtime resistance	51	8.80 (2.94)	8	6 - 17
Sleep onset delay	52	1.88 (.78)	2	1 - 3
Sleep duration	51	4.39 (1.70)	4	3 - 9
Sleep anxiety	49	6.10 (2.10)	6	4 - 12

	N	Mean raw score (SD)	Median	Range
Night wakings	51	4.35 (1.62)	4	3 - 9
Parasomnias	49	9.24 (2.04)	9	7 - 15
Sleep-disordered breathing	51	3.35 (.91)	3	3 - 7
Daytime sleepiness	48	12.33 (3.27)	12	8 - 21
Total sleep problems	43	47.72 (8.65)	46	34 - 70

Table 4

Non-ASD Group Descriptive Statistics for Time 1 Sleep Scores

	N	Mean raw score (SD)	Median	Range
Bedtime resistance	95	9.66 (3.52)	8	6-18
Sleep onset delay	97	1.84 (.81)	2	1-3
Sleep duration	95	4.47 (1.77)	4	3-9
Sleep anxiety	96	6.70 (2.07)	6	4-12

	N	Mean raw score (SD)	Median	Range
Night wakings	96	5.10 (1.81)	5	3-9
Parasomnias	93	10.22 (2.61)	10	7-19
Sleep-disordered breathing	96	3.50 (1.05)	3	3-9
Daytime sleepiness	92	13.32 (3.33)	13	8-23
Total sleep problems	89	51.88 (9.34)	50	36-81

Prevalence of sleep problems. Problem sleepers versus non-problem sleepers were defined as those participants who had at least one item endorsed by the parent (i.e. circled "yes") on a given CSHQ subdomain as a problem sleep behavior, similar to the method used by Owens, Spirito, McGuinn, and Nobile (2000). Within the ASD sample, 73.5% of the sample was identified as problem sleepers. Of the Non-ASD sample, 90.8% of the sample was identified as problem sleepers. Offered for comparison is the Owens et al. typically-developing sample which yielded a 37% prevalence rate using this same methodology of identifying problem sleepers.

Prevalence estimates were also obtained using the clinical cut-off total sleep problems score of 41 or higher. With this criterion, 88.4% of the ASD sample and 91% of the non-ASD sample were identified as problem sleepers.

Differences between diagnostic groups on sleep problems. Subdomain scores and the total sleep problems score were calculated as noted in Owens, Spirito, McGuinn, & Nobile (2000), summing the 1-3 ratings of frequency, reverse scoring where necessary, and omitting the repeated items for the total score. A MANOVA was used to examine the differences between the diagnostic groups (Autism, PDD-NOS, Asperger's, non-ASD) on the CSHQ subdomains and total score. No significant differences were noted between the diagnostic groups on any of the sleep scores.

Developmental comparison of sleep problems. Further analyses were completed to determine if there was a predictive relationship between cognitive level, developmental level, diagnostic factors and total sleep problems. Descriptive statistics for the developmental and cognitive groups are provided in Table 5. Correlations between diagnostic variables and sleep variables are presented in Table 6.

Table 5

Descriptive Statistics for the Developmental and Cognitive Groups

	N	Age in years mean (SD)	% Female
Dev. group	42	3.80 (.61)	47.6
Cog. group	94	7.19 (2.14)	28.7

Note. Dev. group = Developmental group, Cog. group = Cognitive group

Table 6

Correlations Between Diagnostic Variables and Sleep Variables

	Bed. resist.	SOD	Sleep dur.	Sleep anx.	Night wak.	Para-som-nias	SDB	Day. sleep.	Total sleep score
Cog. level	0.16	-0.09	0.15	0.2	0.06	0.04	-0.23	0.17	0.13
Dev. level	-0.02	-0.42	0.13	0.11	0.39	0.46*	0.01	-0.25	0.12
Adaptive functioning	0.16	-0.2	0.03	0.09	0.18	0.03	-0.06	0.06	0.1
Total behavioral problems	0.28*	0.32*	0.38*	0.24*	0.24*	0.45*	0.12	0.16	0.46*
# of diagnoses	-0.02	0.35	0.04	-0.1	0.05	0.17	0.24	0.03	0.12

Note. Cog. level = Cognitive level, Dev. level = Developmental level, Bed. res. = Bedtime resistance, SOD = Sleep-onset delay, Sleep dur. = Sleep duration, Sleep anx. = Sleep anxiety, Night wak. = Night waking, SDB = Sleep-disordered breathing, Day. sleep. = Daytime sleepiness. *$p < .05$

Multiple regression analyses were used to examine which diagnostic factors (Developmental level, cognitive functioning, adaptive functioning, behavioral problems) were predictive of total sleep problems at Time 1. The predictor variables were entered in a stepwise manner.

For the developmental group, total behavioral problems was the only significant predictor ($\beta = .68$, $t\,(37) = 5.66$, $p < .001$), predicting a significant proportion of variance in total sleep problems, ($R^2 = .46$, $F\,(1, 37) = 32.07$, $p < .001$). Adaptive and developmental levels were excluded due to low contribution to the total explained variance.

Similar analyses were conducted with the cognitive group. For this sample, total behavioral problems was again the only significant predictor ($\beta = .42$, $t\,(73) = 3.94$, $p < .001$), predicting a significant proportion of variance in total sleep problems, ($R^2 = .18$, $F\,(1, 73) = 15.536$, $p < .001$). Adaptive and cognitive levels were again excluded due to poor contribution to the total explained variance.

As significant differences were noted on sleep problems between diagnostic groups above, analyses were then conducted with the ASD and non-ASD groups separately. The groups were broken down by both diagnostic group and developmental vs. cognitive group. Total behavioral problems was the only significant predictor of sleep problems, except for in the ASD cognitive group, in which none of the predictors reached significance. Regression results are provided in Table 7.

Table 7

Regression Results for Total Behavioral Problems Predicting Total Sleep Problems by Diagnostic and Developmental vs. Cognitive Group

	ASD developmental group	Non-ASD developmental group	Non-ASD cognitive group
β	.73	.66	.42
df	16	19	52
t	4.25*	3.84*	3.36*
R^2	.53	.44	.18
df	1, 16	1, 19	1, 52
F	18.04*	14.76*	11.296*

Note. ASD cognitive group excluded from this table due to not reaching significance. *p = .001.

Differences between number of co-occurring diagnoses on sleep problems. To further explore factors influencing sleep problems, number of co-occurring diagnoses was examined. Specifically, a MANOVA was used to explore differences in sleep problems between participants with 0, 1, 2, and 3 diagnoses.

Results indicated significant differences between groups for sleep onset delay (F (3, 132) = 3.03, $p < .05$, η^2 =.07) and parasomnias (F(3, 132) = 4.07, $p < .01$, η^2 =.09). Post-hoc analyses using Tukey HSD indicated that for sleep onset delay, those with 0 diagnoses had the lowest scores, followed by 1, 2, and 3 diagnoses, in that order. Those with 2 diagnoses had significantly higher scores than those with 0. For parasomnias, those with 1 diagnosis had the lowest scores, followed by 2, 0 and 3 diagnoses, in that order. Those with 3 diagnoses had significantly higher scores than those with 1 or 2 diagnoses.

Mediation of the relations between number of psychiatric diagnoses and sleep problems by behavior problems. Mediation of the relationship between number of psychiatric diagnoses and total sleep problems by total behavior problems was tested (see Figure 1). The model testing mediation of relations between number of psychiatric diagnoses and total sleep problems by total behavior problems explained 26.2% of the variance in total sleep problems, F (2, 125) = 22.18, $p < .001$. The β for number of psychiatric diagnoses dropped from .54 to -.91. A Sobel test indicated that total behavior problems was a significant mediator ($p < .02$).

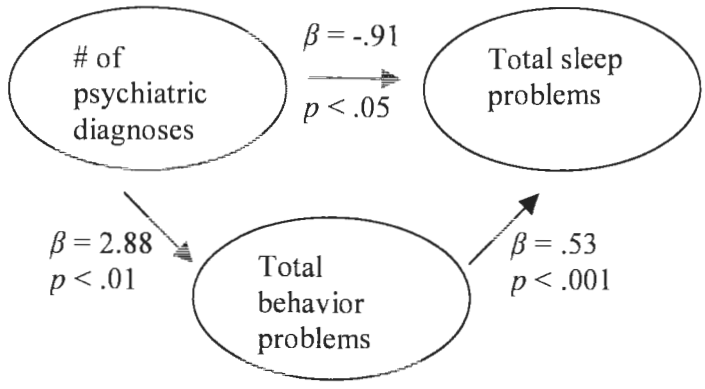

Figure 1. Mediation of the relations between number of psychiatric diagnoses and sleep problems by total behavior problems

Time 2

Descriptive statistics. Tables 8 and 9 provide the means, medians, and ranges for the sleep variables collected at Time 2 by diagnostic group.

Table 8

ASD Descriptive Statistics for Time 2 Sleep Scores

	N	Mean raw score (SD)	Median	Range
Bedtime resistance	25	8.04 (2.39)	7	6 - 15
Sleep onset delay	25	1.64 (.76)	1	1 - 3
	N	Mean raw score (SD)	Median	Range

Sleep duration	25	4.20 (1.58)	3	3 - 8
Sleep anxiety	24	6.33 (2.18)	5.5	4 - 10
Night wakings	25	4.80 (1.66)	4	3 - 8
Parasomnias	25	9.24 (1.90)	9	7 - 14
Sleep-disordered breathing	25	3.28 (.69)	3	3 - 6
Daytime sleepiness	25	13.28 (3.47)	13	9 - 22
Total sleep problems	24	48.04 (7.67)	46	36 - 63

Table 9

Non-ASD Descriptive Statistics for Time 2 Sleep Scores

	N	Mean raw score (SD)	Median	Range
Bedtime resistance	26	9.35 (2.99)	9	6 - 16
Sleep onset delay	27	1.52 (.70)	1	1 - 3
Sleep duration	27	4.11 (1.50)	3	3 - 7
Sleep anxiety	26	7.27 (2.13)	7	4 - 11
	N	Mean raw score (SD)	Median	Range

Night wakings	27	4.81 (1.69)	4	3 - 9
Parasomnias	26	10.88 (2.57)	10.5	7 - 16
Sleep-disordered breathing	27	3.93 (1.27)	3	3 - 7
Daytime sleepiness	27	14.11 (3.51)	14	8 - 21
Total sleep problems	25	52.68 (9.87)	48	41 - 75

Main effects and interaction of time and diagnosis on sleep. Total sleep problems and the nine subdomain sleep scores were subjected to a two-way repeated-measures ANOVA, having two levels of diagnosis (ASD, non-ASD), and two levels of time (initial assessment, one-year follow-up). Of the subdomains, only three main effects were statistically significant at the .05 significance level. Two of these main effects were for time; with an effect of time on bedtime resistance and on daytime sleepiness. Additionally, there was a main effect of diagnosis on parasomnias. For total sleep problems, neither the main effects or interaction effect were significant (see Table 10).

Specifically, the main effect of time on bedtime resistance was statistically significant, indicating that bedtime resistance was significantly lower at one-year follow-up (M = 8.96, SD = 2.92) than at initial assessment (M = 9.64, SD = 3.21), $F(1, 43) = 4.58$, $p = .04$, $\eta^2 = .11$. The main effect of time on daytime sleepiness was also statistically significant, indicating that daytime sleepiness was significantly higher at one-year follow-up (M = 13.67, SD = 3.65) than at

initial assessment (M = 12.82, SD = 3.37), $F(1, 43) = 4.85$, $p = .03$, $\eta^2 = .12$. Finally, the main effect of diagnosis on parasomnias was statistically significant, indicating that children not diagnosed with ASD had significantly higher scores on parasomnias (M = 11.02, SD = .43) than children who were diagnosed with an ASD (M = 9.21, SD = .46), $F(1, 43) = 8.29$, $p < .01$, $\eta^2 = .13$. Using a Bonferroni correction which yielded a significance level of .006, none of the effects were significant.

Table 10

Summary of Two-way Repeated-measures ANOVA Exploring Interaction of Diagnosis and Sleep Measurement over Time

		Df	*F*	*p*	η^2
Main effect of time	Bedtime resistance	1, 43	4.58	.04	.096
	Sleep onset delay	1, 43	1.09	.30	.02
	Sleep duration	1, 43	1.71	.198	.04
	Sleep anxiety	1, 43	.95	.34	.02
	Night wakings	1, 43	.33	.57	.008
	Parasomnias	1, 43	.42	.52	.01
	Sleep-disordered breathing	1, 43	1.54	.22	.04
		Df	*F*	*p*	η^2

	Daytime sleepiness	1, 43	4.85	.03	. 101
	Total sleep problems	1, 43	.17	.69	.004
Main effect of diagnosis	Bedtime Resistance	1, 43	3.73	.06	.08
	Sleep onset delay	1, 43	1.28	.26	.03
	Sleep duration	1, 43	.003	.96	<.001
	Sleep anxiety	1, 43	.96	.33	.02
	Night wakings	1, 43	.36	.55	.008
	Parasomnias	1, 43	8.29	.01	.16
	Sleep-disordered breathing	1, 43	3.99	.052	.09
	Daytime sleepiness	1, 43	.48	.49	.01
	Total sleep problems	1, 43	3.05	.09	.07
Interaction effect of time x diagnosis	Bedtime resistance	1, 43	1.87	.18	.04
	Sleep onset delay	1, 43	.17	.69	.004
	Sleep duration	1, 43	.44	.51	.01
	Sleep anxiety	1, 43	.29	.59	.007
	Night wakings	1, 43	1.29	.26	.03
	Parasomnias	1, 43	.09	.77	.002
	Sleep-disordered breathing	1, 43	.397	.53	.009
		Df	*F*	*p*	η^2

Daytime sleepiness	1, 43	.01	.93	<.001
Total sleep problems	1, 43	.31	.58	.007

Predictive factors for change scores. Multiple regression analyses were used to examine how age, cognitive/developmental functioning, adaptive functioning, behavioral problems, and number of psychiatric diagnoses predicted change scores for total sleep problems and the sleep problems subdomains. The predictor variables were entered in a stepwise manner. Tables 11 and 12 provide the means, medians, and ranges for the change scores used in this analysis.

For the developmental group, total behavioral problems was the only significant predictor for sleep duration (see Table 13), predicting a significant proportion of variance, ($R^2 = .35$, $F(1, 13) = 6.90$, $p < .05$). The other predictors were excluded due to poor contribution to the total explained variance. Next, developmental level was the only significant predictor for daytime sleepiness (see Table 13), predicting a significant proportion of variance, ($R^2 = .39$, $F(1, 13) = 8.35$, $p < .05$). The other predictors were excluded due to poor contribution to the total explained variance. There were no other significant predictors found for the sleep subdomains or total sleep problems.

Table 11

ASD Descriptive Statistics for Change Sleep Scores

	N	Mean raw score (SD)	Median	Range	Skewness (SE)
Bedtime resistance	25	-.28 (2.21)	0	-5 – 3	-.57 (.46)
Sleep onset delay	25	-.24 (.97)	0	- 2 – 2	.23 (.46)
Sleep duration	24	-.29 (1.88)	0	-4 – 3	-.14 (.47)
Sleep anxiety	23	.22 (2.50)	1	-5 – 4	-.46 (.48)
Night wakings	24	.29 (1.49)	0	-3 – 4	.06 (.47)
Parasomnias	23	.43 (2.79)	1	-8 – 6	-.78 (.48)
Sleep-disordered breathing	24	.08 (.88)	0	-2 – 3	1.08 (.47)*
Daytime sleepiness	23	.87 (2.28)	1	-5 – 6	-.33 (.48)
Total sleep problems	21	1.05 (8.05)	2	-14 – 16	.01 (.50)

* skewed distribution

Table 12

Non-ASD Descriptive Statistics for Change Sleep Scores

	N	Mean raw score (SD)	Median	Range	Skewness (SE)
Bedtime resistance	26	-1.04 (1.66)	-.5	-6 – 1	-1.24 (.46)*
Sleep onset delay	27	-.04 (.76)	0	-2 – 2	.06 (.45)
Sleep duration	27	-.59 (1.97)	0	-5 – 4	.10 (.45)
Sleep anxiety	26	.42 (1.79)	0	-3 – 4	.11 (.46)
Night wakings	27	-.11 (1.50)	0	-4 – 4	.13 (.45)
Parasomnias	26	.23 (1.77)	0	-3 – 3	-.10 (.46)
Sleep-disordered breathing	27	.26 (1.06)	0	-2 – 3	.27 (.45)
Daytime sleepiness	26	.96 (2.68)	1	-5 – 7	.15 (.46)
Total sleep problems	24	-.17 (6.50)	1	-12 – 11	-.18 (.47)

* skewed distribution

Table 13

Summary of Regression Analysis for Variables Predicting Change in Sleep Subscales for Developmental Group

Variables	*B*	*SE B*	*β*	df	*t*
TBP[a] predicted SD[b]	-.13	.05	.59	13	-2.63*
DEV[c] predicted DS[d]	.07	.03	.63	13	2.89*

[a] TBP = Total behavioral problems

[b] SD = Change in sleep duration

[c] DEV = Developmental level

[d] DS = Change in daytime sleepiness

* $p < .05$.

For the cognitive group, total behavioral problems significantly predicted sleep disordered breathing (see Table 14), predicting a significant proportion of variance, ($R^2 = .12$, $F(1, 27) = 5.80$, $p < .05$). The other predictors were excluded due to poor contribution to the total explained variance. Next, adaptive level and number of psychiatric diagnoses both significantly predicted night wakings (see Table 14), predicting a significant proportion of variance ($R^2 = .27$, $F(2, 26) = 4.864$, $p < .05$). There were no other significant predictors found for the sleep subdomains or total sleep problems.

Table 14

Summary of Regression Analysis for Variables Predicting Change in Sleep Subscales for Cognitive Group

Variables	*B*	*SE B*	*β*	df	*t*
TBP[a] predicted SDB[b]	-.06	.03	-.42	27	-2.41*
ADAP[c] predicted NW[d]	.04	.02	.40	26	2.36*
DIAG[e] predicted NW[d]	.84	.38	.37	26	2.20*

[a] TBP = Total behavioral problems

[b] SD = Change in sleep disordered breathing

[c] ADAP = adaptive level

[d] NW = Change in night wakings

[e] DIAG = Number of psychiatric diagnoses

* $p < .05$

Additionally, differences were explored between groups using sleep-related demographics reported from the last year (treatment change, medication change, significant accident, residential move, bedroom change, change in household composition) for changes in sleep problems. Specifically, independent samples *t*-tests were used to explore differences between demographic groups on changes in sleep problems. There were no significant differences between groups for treatment change, significant accident, or change in household composition on any of the sleep variables or total sleep problems. See Table 15 for significant results.

Table 15

Independent-samples T-tests Yielding Significant Differences Between Sleep-related Demographic Groups on Changes in Sleep Problems

Variable	df	t	Mean difference (yes – no)
	For sleep onset delay		
Medication change	50	-2.07*	-.48
Residential move	50	-2.28*	-.73
Bedroom change	50	-2.00 (p = .05)	-.54
	For night wakings		
Residential move	49	-2.32*	-1.28
	For daytime sleepiness		
Bedroom change	47	2.18*	1.68

* $p < .05$

Chapter 4

Discussion

Comparisons of sleep disturbance between typically developing children and children with ASD reveal wide agreement that sleep disturbance is more prevalent in the latter population, with prevalence rates twice as high, from 44% to 86%. In addition to the increased prevalence rates of sleep disturbance in children with ASD, characteristic differences in sleep and sleep disturbance have been explored between children with ASD and typically developing children. Because researchers have suggested that sleep disturbance is widely associated with a number of clinical diagnoses in children, a closer look at the impact of co-occurring diagnoses and coexisting conditions on sleep disturbance is warranted to help provide clarity into the likely multifactorial cause of these sleep disturbances.

These increased sleep disturbances have been found to impact a number of daytime behavioral functions across diagnostic groups and non-clinical populations. Sleep problems in non-clinical populations of children have been found to be associated with a variety of social, behavioral, and cognitive difficulties. Some early studies identified sleep disturbance to be related to widespread behavioral difficulties in children such as poor concentration, temper tantrums, and being "hard to manage." More recent evidence associates sleep disturbances with various disruptive symptoms and daytime behavior problems in children.

In addition to the increased behavioral disturbance associated with sleep disturbance, sleep disturbance patterns have been found to be persistent over time. This suggests that despite the high prevalence of sleep disturbance in children, it may be more than a developmental aberration, and for those whose sleep problems are persistent, more severe behavioral problems are also present. If a child's sleep pattern is not likely to improve, additional treatment interventions may need to be included that specifically target sleep disturbance.

As sleep problems are more prevalent in children with other clinical disorders, including ASD, and are widely correlated with many behavioral disturbances in children, the current study sought to explore the progression of sleep disturbances over one year, as well as predictors to help identify children at high risk for persistent sleep disturbance. Impact of age, cognitive functioning, adaptive functioning, behavioral functioning, and number of co-occurring diagnoses were explored as predictors, and comparisons between clinical groups were made. It was hypothesized that age, cognitive functioning, adaptive functioning, and behavioral functioning would be predictive of improvement in sleep habits, with children demonstrating higher functioning and lower impairment showing the most improvement.

Characteristics of Sleep Disturbance for Children with ASD versus other Clinically-referred Children

Prevalence of sleep problems in this sample of children referred for evaluation in an autism clinic ranged from 73.5% in the ASD group to 90.8% of the non-ASD group using acknowledgement of a single item as a sleep problem. These rates are much higher than in reports of typically developing children (as compared to Owens, Spirito, McGuinn & Nobile (2000) who used the CSHQ and the same operational definition to assess sleep problems in typically developing children, aged 4 to 11, and identified 37% of their sample to have sleep

problems). These results indicate a comparable relationship between ASD groups and other clinically-referred groups on sleep problems, with other clinically-referred groups evidencing more sleep problems. However, analyses indicated that differences between diagnostic groups on total sleep problems and sleep subcales were not statistically significant. When sleep problems were defined using a total sleep problems clinical cut-off score rather than acknowledgement of a single item as a sleep problem, the prevalence rate of sleep problems in children with ASD increased, lessening the difference in prevalence rates between ASD and other clinical populations. This suggests that parents of children with ASDs underreport whether sleep is a problem as compared to other clinical populations.

Predictors for Sleep Problems at Time 1

Among the predictor variables for the entire sample, total behavioral problems stood out as the only significant predictor for total sleep problems. Counter to the hypotheses, age, cognitive/developmental level, and adaptive level were not significant predictors of sleep problems, suggesting sleep problems to be pervasive across ages and levels of functioning in this clinical sample.

Given that few of the initially hypothesized predictors were significant, differences between numbers of psychiatric diagnoses on sleep problems were also explored. Results indicated that as the number of psychiatric diagnoses increased, sleep onset delay increased. There are also significant findings for parasomnias, as those with 1 psychiatric diagnosis had the lowest scores, followed by 2, 0, and 3 psychiatric diagnoses, in that order. Those with 3 diagnoses had significantly higher scores on parasomnias than those with 1 or 2 diagnoses. No other significant differences were found between number of psychiatric diagnoses on sleep problems.

Number of co-occurring diagnoses and total behavioral problems were then placed in a model testing total behavioral problems as a mediator of the relationship between number of co-occurring diagnoses and total sleep problems. Results indicated total behavioral problems to be a significant mediator, suggesting that any relationship between number of co-occurring diagnoses and total sleep problems was only through total behavioral problems as a mediator.

Changes in Sleep Over 1 Year

Next, the persistence of sleep problems was explored. Specifically, differences on sleep problems over time and by diagnostic groups indicated significant differences for bedtime resistance and daytime sleepiness over the course of the year. Bedtime resistance was lower at one-year follow up, but daytime sleepiness increased. There were no significant differences between Time 1 and Time 2 on total sleep problems or the other sleep subdomains, suggesting that aside from bedtime resistance, sleep problems appear to be persistent overall.

Next, there was a significant difference between ASD and non-ASD groups on parasomnias, with the non-ASD group having higher levels than the ASD group. There were no other differences between the diagnostic groups on sleep problems. In summary, these findings indicate that for both the ASD and non-ASD clinical samples, sleep problems are persistent over time, except for bedtime resistance which is likely to decrease over time. This pattern is different than that of typically-developing children described in previous research, which has found that typically-developing children experience sleep problems as developmental aberrations which ameliorate over time (Jenni et al., 2005; Mindell et. al, 2006; Petit et al., 2007).

Predictors of Change

Interestingly, and counter to hypotheses, none of the variables tested were significant predictors for change in total sleep problems. However, for the group of children who completed

a developmental assessment, total behavioral problems significantly predicted change in sleep duration, and developmental level significantly predicted change in daytime sleepiness. For the group of children who completed formal cognitive testing, total behavioral problems significantly predicted sleep disordered breathing. Further, night waking was significantly predicted by adaptive level and number of psychiatric diagnoses.

Finally, the demographic variables describing sleep-related changes in the last year (treatment change, medication change, significant accident, residential move, bedroom change, change in household composition) were explored to explain changes in sleep problems. Results indicated no significant differences between demographic groups on change in total sleep problems. However, those who had a medication change, residential move, or bedroom change had less improvement on sleep onset delay than those who did not. Further, those who had a residential move had less improvement on night waking than those who did not.

Implications

Overall, identifying clinically-referred children at high risk for persistent sleep problems proved to be somewhat elusive, with high overall levels of sleep problems in the population as a whole, and little change over time. Even for the subdomains in which change could be predicted, the change was around 1 point or less. While this change was statistically significant, the clinical significance of these findings further affirms the persistence of sleep problems over time in clinically-referred children. More generally, sleep problems in clinically-referred children were not found to significantly differ over the course of a one-year span of measurement. Thus, the seemingly persistent nature of sleep problems in the clinical population paired with the previously-researched negative impact of sleep problems on daytime functioning (Dahl, 1998; Devincent et al., 2007; Lavigne et al., 1999; Limoges et al., 2005; Lozoff et al., 1985; Malow et

al., 2006; Richdale, 2004; Schreck, Mulick, and Smith, 2004; Stein et al., 2001; Zuckerman et al., 1987) warrants active interventions for sleep problems in these populations.

These findings demonstrate the importance of the assessment and active treatment of sleep problems in clinically-referred populations. Because sleep problems in these populations are so highly prevalent, it is important both to assess for other clinical diagnoses for children with sleep problems, and to assess for sleep problems in children referred for other clinical diagnoses. Even further, it would be beneficial to screen for sleep problems in children with daytime behavioral problems, and vice versa. Clinical evaluations for both sleep problems and other clinical diagnoses could be a point of intervention for both areas of concern, and an opportunity to assess and intervene as needed.

Additionally, sleep problems are pervasive across diagnostic categories, with prevalence rates at least twice those of non-clinical populations. The presence of ASDs did not predict more sleep problems than in other diagnostic categories. Instead, behavioral problems was the most powerful indicator, suggesting that daytime dysregulation corresponds with nighttime dysregulation.

Limitations and Future Research

In terms of limitations of the current study, a primary limitation was lack of a typically-developing control group. As the entire sample was clinically-referred, most received a psychiatric diagnosis, and those who did not likely had other areas of disturbance or delay (speech and language, occupational therapy, genetic conditions). Use of a sibling control group would have yielded more controlled comparisons to a typically-developing sample. Further, better prediction of change over time could likely have been achieved with a wider variance of sleep disturbance.

Second, the CSHQ, the primary sleep measure used, demonstrates limited psychometric properties (citation), with somewhat low reliability and validity scores. While this measure appears to be a forefront questionnaire in current research, a questionnaire-style measure yielding more robust psychometric scores would be helpful in future research. Alternatively, it would be beneficial to use physiological measures of sleep, a periodic sleep diary, or more frequent administrations of the sleep questionnaire used to provide more detailed and objective tracking of the changes in sleep over the course of the year.

Next, the mean age of the participants decreased from Time 1 to Time 2 by .2 years, suggesting a drop out of older participants by Time 2. Thus, the longitudinal data yielded may be more helpful in terms of generalizability for children on the younger end of the age range included in this study.

Finally, more detailed tracking of medications taken (e.g. melatonin vs. stimulants) and treatments administered (both for sleep and behavior) could have allowed for better control for medication and treatment effects. Specifically, effects of medications with previously-researched opposite effects on sleep could have been split into separate categories. Further, "change" could more specifically be separated into beginning versus withdrawing from intervention.

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Appendix A

Test Instruments and Questionnaires

)REGON
ALTH
SCIENCE
UNIVERSITY

n Program

)evelopment &
litation Center

de CDRC
)x 574 Portland, OR
)574
503-494-5898
)3-418-0785

e E. Flachsbart, MA
)logy Practicum Intern
a@ohsu.edu

A. Hall, PsyD
ed Psychologist
nt Professor of Pediatrics
r of CDRC
sychology Program
ohsu.edu

Dear Parent/Legal Guardian:

In cooperation with the Oregon Health & Science University Child Development and Rehabilitation Center (OHSU-CDRC) Autism Program, we are studying how sleeping problems change or maintain over time in children who have been evaluated in our Autism Clinic. This will help us understand how to better care for sleep problems in children who come through our clinic. On your child's day in clinic, you filled out a questionnaire regarding your child's sleep habits. As part of this project, we are planning to use the initial sleep questionnaire you filled out in clinic and also collect a 12 month follow-up. With your permission and willingness, we are hoping to collect a follow-up questionnaire on your child's sleep habits.

If you choose, your involvement in this project will include filling out a 45-item multiple choice questionnaire regarding your child's sleep habits, as well as 5 questions of general demographic information included in this packet. You will then return these items as well as this signed informed consent (please sign on the back) in the stamped and return-addressed envelope included in this packet. We have included a $5.00 gift card to Starbucks Coffee to thank you in advance for your participation. If you choose not to participate, you can return the packet to us in the enclosed envelope.

You and your child are welcome to ask any questions and discuss your reactions with our staff. We will be pleased to respond to any questions that you may have and to share information with you about the project. The confidentiality of the information you and your child provide will be closely guarded. No one outside of the research office will have access to this information; nor will any of this information be placed in his or her medical record. The information gathered will be kept in a locked file cabinet in the OHSU-CDRC that will only be accessed by our research staff.

If you should decide not to participate in this research, this will in no way affect other treatment or care at OHSU-CDRC. Also, if you and your child consent to participate in the research, this will not prevent later withdrawal from the research (until data entry) if you or your child should wish to do so. We do not anticipate that there will be adverse risks to you or your child as a result of participating in this study. Potential benefits include participating in a research study that could increase our understanding of how to screen for and help children who come through our clinic with sleeping problems. This program will not involve any costs to you, and the program does not pose risks or likelihood of injury.

If you have any questions, please contact us by email or telephone. If you have questions or concerns about your rights as a research participant, please email us at the addresses below or telephone us at (503) 494-5898. Thank you very much for your interest and cooperation!

Sincerely,

Celeste Flachsbart, M.A.
flachsba@ohsu.edu

Trevor Hall, Psy.D.
halltr@ohsu.edu

I have had an opportunity to ask any questions I had about this study.

_____ I agree to have my child participate in this research and I also agree to participate.

_____ I choose not to participate in this research.

_____ _____

Parent/Legal Guardian signature Date

Child's Sleep Habits
(Preschool and School-Aged)
(Abbreviated Version)

Coding _____

The following statements are about your child's sleep habits and possible difficulties with sleep. Think about the past week in your child's life when answering the questions. If last week was unusual for a specific reason (such as your child had an ear infection and did not sleep well or the TV set was broken), choose the most recent typical week. Answer USUALLY if something occurs **5 or more times** in a week, answer SOMETIMES if it occurs **2-4 times** in a week; answer RARELY if something occurs **never or 1 time** during a week. Also, please indicate whether or not the sleep habit is a problem by circling "Yes," "No," or "Not applicable (N/A)".

Bedtime

Write in child's bedtime. _____

		3 Usually (5-7)	2 Sometimes (2-4)	1 Rarely (0-1)	Problem?		
1)	Child goes to bed at the same time at night (R)	☐	☐	☐	Yes	No	N/A
2)	Child falls asleep within 20 minutes after going to bed (R)	☐	☐	☐	Yes	No	N/A
3)	Child falls asleep alone in own bed (R)	☐	☐	☐	Yes	No	N/A
4)	Child falls asleep in parent's or sibling's bed	☐	☐	☐	Yes	No	N/A
5)	Child needs parent in the room to fall asleep	☐	☐	☐	Yes	No	N/A
6)	Child struggles at bedtime (cries, refuses to stay in bed, etc.)	☐	☐	☐	Yes	No	N/A
7)	Child is afraid of sleeping in the dark	☐	☐	☐	Yes	No	N/A
8)	Child is afraid of sleep alone	☐	☐	☐	Yes	No	N/A

Sleep Behavior

Child's usual amount of sleep each day: _____ hours and _____ minutes
(combining nighttime sleep and naps)

		3 Usually (5-7)	2 Sometimes (2-4)	1 Rarely (0-1)	Problem?		
9)	Child sleeps too little	☐	☐	☐	Yes	No	N/A
10)	Child sleeps the right amount (R)	☐	☐	☐	Yes	No	N/A
11)	Child sleeps about the same amount each day (R)	☐	☐	☐	Yes	No	N/A
12)	Child wets the bed at night	☐	☐	☐	Yes	No	N/A
13)	Child talks during sleep	☐	☐	☐	Yes	No	N/A
14)	Child is restless and moves a lot during sleep	☐	☐	☐	Yes	No	N/A
15)	Child sleepwalks during the night	☐	☐	☐	Yes	No	N/A
16)	Child moves to someone else's bed during the night (parent, brother, sister, etc.)	☐	☐	☐	Yes	No	N/A
17)	Child grinds teeth during sleep (your dentist may have told you this)	☐	☐	☐	Yes	No	N/A
18)	Child snores loudly	☐	☐	☐	Yes	No	N/A

CSHQ Abbreviated

Coding

Sleep Behavior (continued)

	3 Usually (5-7)	2 Sometimes (2-4)	1 Rarely (0-1)	Problem?
19) Child seems to stop breathing during sleep	☐	☐	☐	Yes No N/A
20) Child snorts and/or gasps during sleep	☐	☐	☐	Yes No N/A
21) Child has trouble sleeping away from home (visiting relatives, vacation)	☐	☐	☐	Yes No N/A
22) Child awakens during night screaming, sweating, and inconsolable	☐	☐	☐	Yes No N/A
23) Child awakens alarmed by a frightening dream	☐	☐	☐	Yes No N/A

Waking During the Night

	3 Usually (5-7)	2 Sometimes (2-4)	1 Rarely (0-1)	Problem?
24) Child awakes once during the night	☐	☐	☐	Yes No N/A
25) Child awakes more than once during the night	☐	☐	☐	Yes No N/A

Write the number of minutes a night waking usually lasts: _____

Morning Waking/Daytime Sleepiness

Write in the time of day child usually wakes in the morning: _____

	3 Usually (5-7)	2 Sometimes (2-4)	1 Rarely (0-1)	Problem?
26) Child wakes up by him/herself (R)	☐	☐	☐	Yes No N/A
27) Child wakes up in negative mood	☐	☐	☐	Yes No N/A
28) Adults or siblings wake up child	☐	☐	☐	Yes No N/A
29) Child has difficulty getting out of bed in the morning	☐	☐	☐	Yes No N/A
30) Child takes a long time to become alert in the morning	☐	☐	☐	Yes No N/A
31) Child seems tired	☐	☐	☐	Yes No N/A

Child has appeared very sleepy or fallen asleep during the following (check all that apply):

	1 Not Sleepy	2 Very Sleepy	3 Falls Asleep
32) Watching TV	☐	☐	☐
33) Riding in car	☐	☐	☐

DEMOGRAPHICS

CHILD'S AGE: _____ years _____ months

CHILD'S GENDER: □ Female □ Male

CHILD'S RACE/ETHNICITY: (check all that apply)

□ Caucasian/White
□ African-American
□ Hispanic/Latino
□ Asian/Pacific Islander
□ Native American/Alaskan Native
□ Other: _____

PARENT SLEEP:

[For parent] In the last year, how many hours of sleep per 24-hour period did you get on average?: _____ hours

LIFESTYLE CHANGES:

Place a check next to any of the following lifestyle changes that have occurred for the child in the last year:

□ Changes in treatment
If yes, explain: _____
_____
_____

□ Change in medication
If yes, explain: _____
_____
_____

□ Significant accidents, illnesses, or injuries
If yes, explain: _____
_____
_____

□ Residential move
□ Bedroom change
□ Change in household composition [e.g. sibling birth, death of family member, divorce, remarriage, addition of step-siblings, etc.]

Appendix B

Curriculum Vita

CELESTE FLACHSBART

7409 NE SHALEEN ST • HILLSBORO, OR 97124 • PHONE (503) 989-9209
EMAIL cflachsbart05@georgefox.edu

CURRICULUM VITA

PROFESSIONAL INTERESTS

Developmental disabilities in children, behavioral pediatrics, assessment and test development, child and adolescent development, and stress and coping in adolescence.

EDUCATION

- 2007-current
  Student in a Doctor of Psychology Program
  Graduate School of Clinical Psychology (APA Accredited)
  George Fox University, Newberg OR
  Cumulative GPA 3.95
  Projected Graduation Date: 05/2010

- 2005 - 2007
  Master of Arts, Clinical Psychology
  Graduate School of Clinical Psychology (APA Accredited)
  George Fox University, Newberg OR
  Cumulative GPA 3.95

- 2001 - 2005
  Bachelor of Science, Psychology
  Oregon State University, Corvallis OR
  Cumulative GPA 3.79, Magna Cum Laude

HONORS

- 05/08
  Special Commendation Award
  Graduate Department of Clinical Psychology
  George Fox University, Newberg, OR

- 01/08 – 12/08
  Richter Scholar Grant Recipient
  "Persistence of Sleep Disturbance in Children with Autism Spectrum Disorders."
  George Fox University, Newberg, OR

- 01/07 – 12/07
  Richter Scholar Grant Recipient
  "Clinical Utility of a Multidisciplinary Autism Assessment Battery: Support for the Practice Parameters."
  George Fox University, Newberg, OR

SUPERVISED CLINICAL EXPERIENCE

- 07/08- present
  Child and Adolescent Therapy and Assessment
  Sundstrom Clinical Services, Clackamas, OR
  Supervisor: Kristin Valerius, Ph.D.

  Duties included family and individual outpatient therapy and assessment with children aged 2-12 and adolescents with a variety of emotional and behavioral difficulties.

- 06/08 – 09/08
  Behavioral Pediatric Consultation
  The Children's Clinic- Tualatin, OR
  Supervisor: Kristin Valerius, Ph.D.

  Duties included behavioral health consultation with pediatricians, nurses, and families regarding emotional and behavioral difficulties in children presenting to their primary care provider.

- 09/07 – 06/08
  Multidisciplinary Assessment- Child Development/Autism
  Child Development and Rehabilitation Center, Oregon Health and Science University, Portland, OR
  Supervisor: Darryn Sikora, Ph.D.

  Duties included working in a multi-disciplinary team (psychologist, speech and language pathologist, occupational therapist, and developmental pediatrician) to diagnose children aged 2-17 (primarily ages 2-8) referred for Autism evaluation. Psychological testing battery included play-based, cognitive, and developmental measures, and reports also included behavioral and adaptive skill parent-report measures. In-person feedback to families was provided.

- 06/07 – present
  Behavioral Health Consultation
  Emergency Department
  Providence Newberg Hospital, Newberg, OR
  Supervisor: Mary Peterson, Ph.D.

  Duties included general behavioral health consultations for physicians and nurses in the emergency department, intensive care unit, and medical/surgery units. Duties also included suicide evaluation, risk assessment, pain consultation, and discharge planning. Weekly team review of cases and supervision provided.

- 08/06 – 08/07
  Adolescent Therapy and Assessment
  Clark County Juvenile Court, Vancouver, WA
  Supervisors: Shirley Shen, Ph.D., Christine Krause, Ph.D.

  Duties included individual and group therapy with adolescents in juvenile detention, comprehensive assessment, structured interviews, assisting in neurofeedback sessions, case conceptualization and case presentations. Weekly didactic and supervision provided.

- 08/05 - 08/06
  Pre-Practicum Therapy
  George Fox University, Newberg, OR
  Supervisor: Clark Campbell, Ph.D.

  Duties included weekly individual psychotherapy with undergraduate students, conducting intake interviews, treatment planning, and case presentations. Weekly group and individual supervision with videotape review provided.

OTHER CLINICAL EXPERIENCE

- 03/04-06/05
  On-Call Child and Adolescent Treatment Specialist
  Hawthorne Transition Center
  Children's Farm Home, Corvallis OR
  Supervisors: Adria Cornell, M.A. and Harold Leblanc, M.A.

  Direct care of 10-17 year old males with mental and behavioral disorders. Duties included milieu management, crisis intervention and de-escalation, participating in treatment planning meetings, writing up daily progress notes and behavioral observations, and facilitating DBT groups.

- 1/04-3/04
  Child and Adolescent Treatment Specialist Intern
  North Point Children's Program
  Children's Farm Home, Corvallis OR
  Supervisors: Jennifer Connor-Smith, Ph.D. and Kevin Stone, M.A.

  Direct care of 6-12 year old males and females with mental and behavioral disorders. Duties included milieu management, crisis intervention and de-escalation, writing up daily progress notes and behavioral observations, and facilitating groups.

RESEARCH EXPERIENCE

Publications

- Connor-Smith, J. & **Flachsbart, C.** (2007). Relations between personality and coping: A meta-analysis. *Journal of Personality and Social Psychology, 93*(6), 1080-1107.

- Hall, T., **Flachsbart, C.,** Harlow, S. & Adams, W. (In review). The Everyday Memory Survey (EMS): Psychometric properties of a standardized survey instrument. *Journal of the International Neuropsychological Society.*

- Hall, T., **Flachsbart, C.,** Dill, K., & Sikora, D. (In preparation). The Contributions of the Autism Diagnostic Observation Schedule, Vineland Adaptive Behavior Scales, Child Behavior Checklist, and Mullen Scales of Early Learning to the Diagnosis of Autism Spectrum Disorders.

- Connor-Smith, J., **Flachsbart, C.,** & Tompkins, T. (In preparation). Measuring coping in children using a video task and comparisons to physiological measures, self-report, and parent-report questionnaires.

- **Flachsbart, C.**, Peterson, M., Hall, T., & Adams, W. (In preparation). The Persistence of Sleep Disturbance in Children Evaluated for Autism Spectrum Disorders: Predictive Factors and the Impact of Co-Occurring Diagnoses.

Presentations

- Hall, T., **Flachsbart, C.**, Harlow, S. & Adams, W. (2008). *The Everyday Memory Survey (EMS): Psychometric Properties of a Standardized Survey Instrument.* Poster session presented at the annual meeting of the International Neuropsychological Society, Waikoloa, HI, February.

- Dill, K. & **Flachsbart, C.** (2007). *Clinical Utility of a Multidisciplinary Autism Assessment Battery: Support for the Practice Parameters.* Paper presented at the annual convention of the American Psychological Association, San Francisco, CA.

- **Flachsbart, C.**, Connor-Smith, J., Cellerini, K. (2005). *Responses to Stress: Coping Mediated Relations Between Temperament and Adjustment.* Poster session presented at the annual convention of the Western Psychological Association, Portland, OR, April.

Research Assistantships

- 3/07 – 12/07
  Autism Treatment Network- Autism Speaks
  "Clinical Coordinator & Family Consultant"
  Child Development Rehabilitation Center
  Oregon Health and Science University, Portland, OR

- 09/06 - 03/07
  Autism Program
  "Database Manager"
  Child Development and Rehabilitation Center
  Oregon Health and Science University, Portland, OR

- 08/04 - 06/05
  Stress and Coping Lab
  Psychology Department
  Oregon State University, Corvallis, OR

TEACHING EXPERIENCE

- 08/07 – present
  Lab Instructor and Guest Lecturer
  Cognitive and Intellectual Assessment
  Graduate Department of Clinical Psychology
  George Fox University, Newberg, OR

  Duties included teaching weekly labs on administering and interpreting various cognitive and intellectual assessments. Guest lecturer on "Intellectual and Developmental Disabilities."

- 01/08 – present
  Lab Instructor and Guest Lecturer
  Introduction to Statistics for the Behavioral Sciences
  Graduate Department of Clinical Psychology
  George Fox University, Newberg, OR

  Duties included teaching weekly labs on utilizing SPSS to complete various statistical procedures and data interpretation of multivariate statistics. Guest lecturer on "One-Way ANOVA."

SUPERVISION EXPERIENCE

- 08/08 – present
  Clinical Peer Supervisor
  Graduate Department of Clinical Psychology
  George Fox University, Newberg, OR

  Duties included developing a supervision model and completing weekly supervision with pre-master's level student in the department. Supervision issues covered included both skill development and professional development.

SELECTED RELEVANT COURSEWORK

Therapy/Interventions
Child and Adolescent Therapy and Assessment
Cognitive Behavioral Therapy
Psychodynamic Psychotherapy
Group Psychotherapy
Family/Couples Psychotherapy
Psychopharmacology

Assessment
Child and Adolescent Therapy and Assessment (as listed above)
Cognitive Assessment
Personality Assessment
Neuropsychological Assessment
Comprehensive Assessment

Other
Child and Adolescent Psychopathology
Health Psychology
Consultation, Education, and Program Evaluation
Consultation in the Educational Setting
Stress and Coping in Adolescence

SELECTED RELEVANT TRAININGS ATTENDED

- 05/13/2006 "Psychosocial Factors in Cancer: Research & Interventions," Jamie Levin-Edwards Psy.D., Oregon Psychological Association Annual Conference

- 05/13/2006 "Neurobiology, Attachment & Early Childhood Mental Health," David Willis M.D., Oregon Psychological Association Annual Conference

- 11/20/2006 "Motivational Interviewing," William Miller, Ph.D., Clinical Colloquium, George Fox University
- 03/09/2007 "Write Winning Grants- Grant Writers' Seminars and Workshops," Steve Russell, Ph.D., Oregon Health and Science University
- 08/2007 "It Takes a Village: Multidisciplinary Team Approach for Children with Autism," Jill Harris, Yvette Janvier, Ann Pate, Patricia West-Low, Robin Jacobs-Lowery, American Psychological Association Convention, San Francisco, CA
- 08/2007 "Effects of Early Psychosocial Adversity on Brain and Behavioral Development: Bucharest EI Project," Charles Nelson, American Psychological Association Convention, San Francisco, CA
- 08/2007 "Suicidality in Clients," Marsha Linehan, American Psychological Association Convention, San Francisco, CA
- 11/2007 "Risk Assessment," Elena Balduzzi, Ph.D. & Alex Milkey, Ph.D.
- 06/06/2008 "WAIS-IV: An Overview," Larry Weiss, Ph.D., Northwest Assessment Conference
- 06/06/2008 "Assessment of ADHD in Children, Teens, and Adults," Bruce Bracken, Ph.D., Northwest Assessment Conference

PROFESSIONAL AFFILIATION

- 01/05 – present
  Student Affiliate
  American Psychological Association
- 01/08 – present
  Member
  Division 53 Society of Clinical Child and Adolescent Psychology
  American Psychological Association
- 01/08 – present
  Member
  Division 54 Society of Pediatric Psychology
  American Psychological Association
- 01/07 – present
  Member
  Division 33 Intellectual and Developmental Disabilities
  American Psychological Association

UNIVERSITY INVOLVEMENT

- 09/08 – present
  Clinical Competency Revision Committee- Student Member
  Graduate Department of Clinical Psychology
  George Fox University, Newberg, OR

- 05/08 – present
  Student Council
  George Fox University, Newberg, OR

- 05/08 – present
  Statistics Consultant
  Graduate Department of Clinical Psychology
  George Fox University, Newberg, OR

- 06/06 – present
  Peer Mentor
  Graduate Department of Clinical Psychology
  George Fox University, Newberg, OR