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Measurement of Developmental and Behavioral Concerns in Toddlers with Tuberous Sclerosis Complex

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Abstract

Background: The TAND (Tuberous Sclerosis Complex [TSC]-Associated Neuropsychiatric Disorders) Checklist was developed as a clinical screener for neurodevelopmental disorders in TSC. Most studies have described patterns in older children and adults. This study sought to better understand behavioral concerns as measured by the TAND Checklist in young children with TSC.

Methods: We examined patterns of caregiver responses to the TAND Checklist in 90 toddlers with TSC (12 to 23 months $n = 60$; 24 to 36 months $n = 30$) through data collected during baseline visits across two TSC early intervention studies.

Results: Over 90% of caregivers reported at least one behavioral concern related to TAND. The number of concerns increased with age. Delayed language was the most frequently reported concern across ages (12 to 23 months: 58.3%, 24 to 36 months: 86.7%). Questions related to behavioral concerns were largely relevant in this age range, but questions in other areas, such as neuropsychological or academic function, were not.

Conclusions: TAND symptoms are very common in toddlers with TSC, and these symptoms may increase with age. The TAND Checklist is a useful tool for identifying behavioral concerns efficiently, but several items and sections are not suited to younger children. Results support the development of an abbreviated form of the TAND Checklist for toddlers.

Keywords

Behavioral Concerns; Tuberous Sclerosis Complex; TAND; TAND Checklist; Toddlers

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Introduction

Tuberous sclerosis complex (TSC) is a genetic disorder caused by mutations in the TSC1 or TSC2 gene, which code for regulatory proteins involved in cell growth and division.[1] The TSC phenotype often involves associated neuropsychiatric disorders (TSC Associated Neuropsychiatric Disorders [TAND]), and neurological comorbidities, such as seizures, which can be difficult to control. There has been a growing clinical and research focus on TAND, both in terms of measurement and treatment, as TAND causes considerable morbidity for children and their families.[2] The TAND Checklist is a commonly used clinical tool designed to gather information on development and behavior in TSC.[3] This measure has been used to describe TAND in large cohorts of individuals with TSC, but it is much less studied in very early childhood.[4,5] As natural history studies and clinical trials increasingly focus on the early years and TSC clinicians aim to identify and intervene on TAND at earlier ages, it is important to understand how the TAND Checklist performs in the first years of life. Here, we seek to deepen our understanding of the utility of, and data obtained from, the TAND Checklist in early childhood by examining its characteristics in a cohort of toddlers with TSC enrolled in early intervention trials.

TAND, a term first developed by the TSC Neuropsychiatry Panel in 2012, spans several domains, including behavioral, psychiatric, intellectual, academic, neuropsychological, and psychosocial areas.[3] This panel developed the TAND Checklist to provide a clinically feasible and accessible tool to guide clinical conversations and decision making. It is composed of 10 major question areas, many of which require a simple yes/no response from a parent/caregiver. The tool was validated with input from professionals and caregivers, with some comparison with standardized measures (e.g., Strengths and Difficulties Questionnaire) suggesting good external validity.[6] Since the initial development of the TAND Checklist, it has been used widely in clinical and research contexts across a wide age range.

Several studies have utilized the TAND Checklist to identify groups of TAND-related behaviors in children and adults with TSC.[5,7-8] In the largest of these studies, Alperin et al.[5] identified the following seven factors based on data from individuals with TSC ranging in age from under 4 to over 40 years old: executive dysfunction, attention and concentration, autism spectrum disorder (ASD)-associated symptoms, problematic behaviors, hyperactivity and restlessness, mood, and scholastic. There has been some variability among studies regarding the specific items that hang together, based on method (cluster vs. factor analysis) and potentially due to differences in sample size and age composition. A challenge of this work may be related to the expected differences in the prominence or even relevance of various behaviors identified by the TAND Checklist related to age (e.g., academic concerns).

The current study presents baseline data from 12- to 36-month-old children with TSC who were enrolled in a behavioral intervention study. We had three main study aims: 1) describe the pattern of responses by age (12-23 months and 24-36 months) based on parent/caregiver report on the TAND Checklist, 2) assess internal consistency for factors identified by Alperin et al.[5] in this younger cohort, and 3) examine the degree to which select responses on the TAND Checklist correspond with results of available external measures.

Our overarching goal was to determine the utility of the TAND Checklist for toddlers and describe parent report of neurobehavioral concerns in toddlers with TSC that may be appropriate for clinical monitoring.

Materials and Methods

Participants

Children were enrolled in one of two early behavioral intervention studies, the JASPER Early Intervention Study for Tuberous Sclerosis (JETS: PI S Jeste)[9] or the TSC Remote Assessment and Intervention study (TRAIN: PI C Kasari).[10] Eligibility criteria included a confirmed clinical diagnosis of TSC, chronological age of 12 to 36 months, developmental level of at least 6 months, no plans for epilepsy surgery during the study period, and completion of the TAND Checklist at baseline. Participation occurred across two study sites in the United States (University of California Los Angeles [UCLA] and Boston Children's Hospital for JETS; UCLA only for TRAIN). Given the remote nature of the studies, families were recruited from across the United States and Canada through identification from medical record diagnosis, direct contact at TSC clinics, TSC Alliance postings, and word of mouth. Data reported here were collected as part of the baseline study visit. Demographic information is presented in Table 1 by age group.

Procedure

Once families expressed interest, they underwent an initial phone screening with the study coordinator. If eligible, they were scheduled for their baseline visit. For JETS, these visits typically were scheduled over two days and included direct testing of the child, EEG data collection, and a parent interview and questionnaires. For TRAIN, the assessments were fully remote. All study procedures were approved by the local Institutional Review Board and informed consent was provided by a parent/caregiver. The JETS study began in 2017 with 30 participants providing baseline data prior to the COVID-19 pandemic and 18 during the pandemic. All JETS participants completed in-person baseline visits, with modifications during the pandemic. TRAIN data collection began during the pandemic and is ongoing. TAND Checklist data were collected at a follow-up versus baseline assessment for six TRAIN participants who were missing the measure at baseline.

Measures

TAND Checklist.—The TAND Checklist is a freely available caregiver report measure that was developed to efficiently gather information on TAND symptoms and associated impacts in the context of clinical interactions.[3] There are 10 question areas that ask about: (1) developmental milestones, (2) current ability levels, (3) behavioral concerns, (4) psychiatric diagnoses, (5) intellectual ability, (6) academic challenges, (7) neuropsychological functioning, (8) psychosocial stressors, (9) family impact, and (10) priorities. In clinical settings, the TAND Checklist is commonly completed as an interview between clinician and caregiver. For this study, parents were sent an electronic version of the form to complete independently, as is common in research settings.

Vineland Adaptive Behavior Scales-Third Edition (Vineland-3).—The Vineland-3 is a norm-referenced measure of adaptive skills from infancy through adulthood.[11] The Vineland-3 caregiver interview was administered by a trained research associate at the baseline visit. This measure yields standardized scores in Communication, Daily Living Skills, Socialization, and Motor Skills, along with an Adaptive Behavior Composite (ABC) based upon the first three domains. The Vineland-3 can be collected in-person or remotely and was available in the JETS and TRAIN cohorts (n=87). A direct assessment of early cognitive ability (Mullen Scales of Early Learning [MSEL])[12] was available for a subset of the sample who completed in-person baseline assessments (n=49, all from JETS). MSEL Early Learning Composite scores were highly correlated with Vineland-3 ABC scores, r(48)=.78, p<.001, supporting our use of the Vineland-3 as a proxy of early cognitive ability.

Parenting Daily Hassles.—Parents rated the frequency and intensity of 20 common parenting-related stressors using 5-point Likert scales.[13] This measure was completed for JETS and TRAIN participants (n=88).

Analysis Plan

For Aim 1, rates of *yes*, *no*, and *no response* were calculated for Sections 3, 6, and 7 by age group (12-23 months, 24-36 months). Sections were selected to be in line with previous TAND Checklist studies. Chi-square tests examined differences in the frequency of reported concerns across age groups. Results are presented with and without correction for multiple comparisons (False Discovery Rate [FDR][14]). Quantitative responses to Section 9 (family impact; range from 0-10) were then analyzed.

For Aim 2, we calculated Cronbach's alpha for the factors identified in Alperin et al.[5] to measure internal consistency of these factors in this toddler cohort. We then analyzed age-related differences by factor using chi-square tests.

For Aim 3, we first examined whether Vineland-3 scores differed by TAND Checklist caregiver report of intellectual ability ("normal" range vs. mild-moderate/severe-profound) using t-tests. We then analyzed whether the level of difficulties reported on the TAND Checklist (Section 9) correlated with the Parenting Daily Hassles frequency scale.

Results

TAND Checklist Responses

Groups differed by gender (more boys in the older group) and maternal education (see Table 1). Other demographic variables did not differ by age group. Given differences in the proportion of males and females across age groups, we preliminarily examined gender differences in parent concerns. The total number of behavioral concerns in Section 3 did not differ by gender, t(88)=.76, p=.45. Individual behavioral concerns in Sections 3 and 7 also did not differ by gender, with the exception of eating difficulties (parents of females more likely to report, p=.002). Parents of males and females reported similar levels of family impact (Section 9), t(82)=1.16, p=.25.

See Table 2 for a summary of response data by section and age group. Section 3 of the TAND Checklist asked caregivers whether they have concerns about their child across 19 behaviors. Nearly all caregivers responded to these items, suggesting that this section is largely relevant for toddlers. The vast majority reported at least one behavioral concern (54 [90.0%] at 12-23 months, 28 [93.3%] at 24-36 months). The average number of concerns was higher at 24-36 months (M=7.13, SD=5.03) than at 12-23 months (M=4.32, SD=3.46), t(43.1)=−2.76, p=.008 (equal variances not assumed), with the total number of concerns increasing with child age, r(89)=.39, p<.001. The proportion of individual behavioral concerns tended to be higher in the older group, though rigidity was the only item to survive correction for multiple comparisons. Delayed language was the most frequently reported concern across both ages (12-23 months: 58.3%, 24-36 months: 86.7%). Other commonly reported concerns across both age groups included temper tantrums, restlessness, and sleep difficulties. Aggressive outbursts, hyperactivity, and difficulty paying attention were particularly frequently reported in the older group. Concerns related to anxiety and depressed mood were uncommon in this young cohort.

In Section 6, which reports on academic problems, most caregivers utilized the "N/A" option, while 21% skipped these items. Section 7, which asks caregivers to report on neuropsychological difficulties (e.g., memory, dual tasking), does not allow for an "N/A" response. One-fifth to one-third of caregivers did not provide a yes/no response to these items, suggesting that many did not feel these items were relevant for their child or were otherwise unsure of how to respond.

In terms of family impact, 84/90 (93.3%) families responded to the question in Section 9, with an overall mean score of 5.36 (SD=3.17) and responses spanning the full 0-10 range. Ratings did not differ by age group (12-23 months: M=4.98, SD=3.38; 24-36 months: M=6.19, SD=2.51), t(66.9)=−1.83, p=.07 (equal variances not assumed), and were not correlated with age, r(83)=.20, p=.07, although parents of older children tended to rate this item higher. Ratings of family impact were moderately correlated with the total number of identified problems in Section 3, r(83)=.35, p<.001.

Internal Consistency of Previously-Identified Factor Groupings

As in the previous study, the Attention/Concentration factor (Attention, Difficulties with Attention, Impulsivity, Multi-Tasking) showed the highest internal consistency in our sample, α=.83 (vs. .85 in Alperin et al.[5]; 26 excluded due to non-response). Also similar, Executive Dysfunction (Getting Disoriented, Memory, Visuo-Spatial Tasks, Executive Skills) showed the next highest inter-correlation, α=.78 (vs. .85 in Alperin et al.[5]; 32 excluded). The remaining factors had internal consistency levels slightly below the typical threshold of .70, although fewer children were excluded from analysis: ASD-Associated Symptoms (Repetitive Behaviors, Repeating Words, Rigid/Inflexible, Delayed Language, Poor Eye Contact), α=.62 (vs. .78 in Alperin et al.[5]; 3 excluded; α=.69 when Difficulty with Peers included), Problematic Behaviors (Temper Tantrums, Aggressive Outbursts, Self-Injury), α=.66 (vs. .76 in Alperin et al.[5]; 1 excluded), Hyperactivity/Restlessness (Restlessness, Overactive/Hyperactive), α=.62 (vs. .67 in Alperin et al.[5]; 4 excluded), and

Mood (Depressed Mood, Anxiety, Mood Swings, Extreme Shyness), α=.62 (vs. .74 in Alperin et al.[5]; 3 excluded). The Scholastic factor was not assessed given our young sample.

Parents of older children were more likely to report at least one concern related to Attention/ Concentration, $\chi^2(1)$=7.26, p=.007, Executive Dysfunction, $\chi^2(1)$=5.58, p=.018, and ASD-Associated Symptoms, $\chi^2(1)$=5.72, p=.017 (see Figure 1). There were no age differences identified in the other domains.

Comparison with External Measures

Section 5 of the TAND Checklist asks about parents' views of their child's intellectual ability. Most parents reported concerns about their child's intellectual ability (n=62 [68.9%]; 2 excluded for non-response), and 45.6% viewed their child as having mild-to-moderate (n=40) or severe-to-profound (n=1) intellectual disability (13 excluded for non-response). Children whose parents viewed their child as intellectually disabled had lower Vineland-3 ABC scores, $t(54.15)$=7.03, p<.001 (equal variances not assumed; "normal": M=88.57, SD=14.36; "intellectually disabled": M=69.63, SD=8.63; similar results found for smaller group [n=36] using MSEL scores, p=.002). Comparison of groupings based on Vineland-3 scores (average [86+], below average [70-85], low [<70]) revealed an association between parents' views of their child's ability, $\chi^2(2)$=29.69, p<.001, with parents of children with average or higher Vineland-3 scores very likely to view their child's intellectual ability as "normal" (95%). Likewise, children with low Vineland-3 scores were likely to be viewed by their parents as intellectually disabled (87%), while those in the below average range were more mixed (59.4% viewed as intellectually disabled). As an additional follow-up, we examined whether differences in perceived intellectual ability and measured developmental abilities corresponded with the total number of behavior problems reported in Section 3. Children with more reported behavioral concerns had lower developmental abilities on the Vineland-3, $r(86)$=.29, p=.007. More behavior problems were also reported in children with lower perceived intellectual abilities, $t(75)$=−3.35, p=.001 ("normal": M=3.94, SD=3.52; "intellectually disabled": M=7.07, SD=4.36).

In Section 9, the correlation between ratings of family impact on the TAND Checklist and the Parenting Daily Hassles frequency scale did not reach significance, $r(83)$=.20, p=.07. Rather, the frequency of parenting hassles correlated strongly with the total number of behavioral concerns from Section 3, $r(87)$=.61, p<.001.

Discussion

The current study examined caregiver responses on the TAND Checklist in 12- to 36-month-old children with TSC. Our dual goal was to learn more about behavior problems during this age period, while investigating the utility of this measure in younger children. Consistent with previous studies,[5, 7-8] behavior problems that fall under the TAND umbrella were exceedingly common from very early in life. The number of behavior problems reported increased with age and was associated with ratings of family impact. Language delay was the most commonly reported concern, which is fitting given the rapid language development that occurs during the toddler years and the well-established incidence of language delay and autism in TSC.[15,16] This concern likely reflects parents' awareness of their child's emerging

language impairments. It is also possible that parents concerned about their child's language development are more likely to enroll in a clinical trial for autism.

Based on our analysis of parent response patterns, Section 3 (Behavioral Concerns) was found to be highly relevant for this age range, with very few missing responses recorded. As expected, responses to Section 6 (Academic Problems) included a mix of "N/A" and missing responses, as this section is not really appropriate for children under age 3. The results were more mixed for Section 7 (Neuropsychological Difficulties). While most parents responded to these items, a substantial minority skipped at least some of them, particularly in the younger group. We identified some age-related increases in the frequency of these concerns. However, the concepts described in this section are somewhat abstract, and many of the skills (e.g., multi-tasking) are not commonly expected during toddlerhood, making it difficult to interpret parental responses.

We also examined internal consistency of the factors identified in a previous study of children and adults with TSC[5] in our smaller, younger sample. Neuropsychological factors (Attention/Concentration, Executive Dysfunction) were internally consistent in our sample, though only a subset of participants had responses for these items, potentially introducing some bias. The other factors (e.g., Problematic Behaviors) fell slightly below the standards for internal consistency, suggesting potentially different relationship patterns among the items in younger children.

To understand the accuracy of parental responses on the TAND Checklist, we compared caregiver impressions of their child's intellectual ability and a measure of their developmental level (Vineland-3).[11] Generally, parental impressions aligned closely with the standardized measure, particularly when children were at the higher and lower ends of the developmental spectrum. Children with milder delays were more difficult for parents to categorize. These results suggest that this section provides useful information, while reinforcing the importance of direct developmental assessment in young children with TSC, as subtler deficits may be difficult for parents to identify.

Strengths and limitations

This study had several strengths, along with some limitations. We focused on toddlerhood, a developmental stage that has received tremendous attention in early intervention trials but has been understudied with regard to clinical characterization. While our sample size was not big enough to perform some types of analyses (e.g., factor analysis), it is relatively large for a study of a rare disorder in a focused age range. We also had other measures available (e.g., Vineland-3)[11] with which to compare results of the TAND Checklist. For feasibility within the research setting, we used the TAND Checklist in a non-standard parent report format, rather than as a clinician interview, as originally designed.[17] More recently, a self-report version has been developed, the TAND-SQ Checklist,[18] which can be used in future studies on this topic.

Our study was limited primarily by the fact that it was a secondary data analysis. As a result, we were constrained in our goal to validate the TAND Checklist using standardized measures. Future studies would benefit from a broader range of measures to use as

comparison (e.g., measures of behavior problems). Additionally, as the study was not designed to compare age groups, there were demographic differences between the younger and older children that necessitate some caution in interpreting age-related differences. As with many studies in TSC, our sample was limited in racial/ethnic and socioeconomic diversity, with a possible selection bias given that participating families had chosen to enroll in an early intervention trial for autism. A larger scale, community study of toddlers with TSC would inform the generalizability of these findings to a broader clinical population.

Clinical Implications

Results from this study support the utility of the TAND Checklist in children with TSC as young as 12 months old. Items related to behavioral concerns were particularly relevant for this young sample. Other sections, such as those focused on academic and neuropsychological concerns, were less relevant in this age range. These challenges do not undermine its use to guide clinical conversations with a medical provider. However, the TAND Checklist is increasingly used in clinical research studies in TSC, with the inclusion of questions not suited to a child's age potentially causing confusion or added burden on parents. Our findings support the development of an abbreviated form of the TAND Checklist for toddlers, using developmentally appropriate language (e.g., developmental/cognitive vs. intellectual ability) and focusing on sections that are most relevant for this developmental stage.

Acknowledgements

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Figure 1.
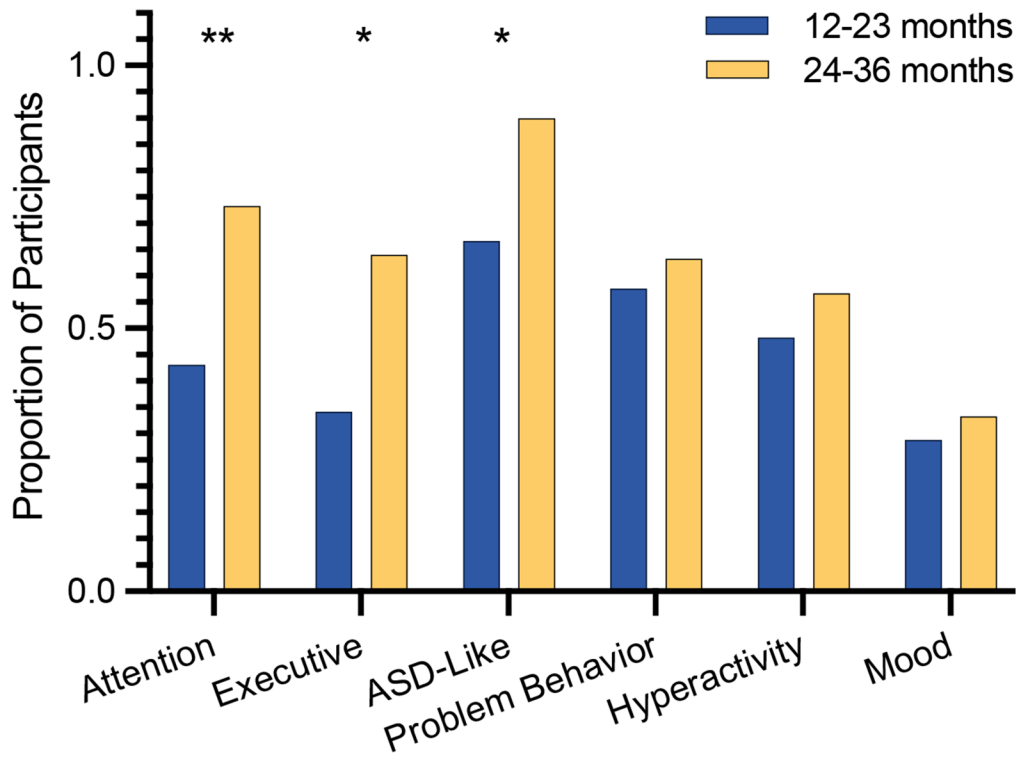Proportion of participants whose parents endorsed at least one behavior in the factors identified by Alperin et al. .[5] Chi-square analyses performed to analyze age group differences, *$p < .05$, **$p < .01$. ASD=Autism spectrum disorder. Note that ASD-like behavior included the very commonly endorsed concern related to delayed language, which is likely driving the high proportion of participants in this group.

Table 1.

Demographic data based on caregiver report at study entry. Gender and maternal education differed by age group. Ethnicity not reported for 5 participants. Race not reported for 2 participants. Father education unknown for 3 participants. Current seizure status unknown for 6 participants. Vineland-3 scores unavailable for 3 participants. "No seizures currently" refers to the past 3 months.

Demographic variable	12-23 months (*n*=60)	24-36 months (*n*=30)	Total (*n*=90)
Sex			
Male	28 (46.7%)	22 (73.3%)	50 (55.6%)
Female	32 (53.3%)	8 (26.7%)	40 (44.4%)
Race			
White	45 (77.6%)	26 (86.7%)	71 (80.7%)
Black/African American	1 (1.7%)	0 (0%)	1 (1.1%)
Asian/Pacific Islander	7 (12.1%)	2 (6.7%)	9 (10.2%)
American Indian	1 (1.7%)	0 (0%)	1 (1.1%)
Multi-racial/Other	4 (6.9%)	2 (6.7%)	6 (6.8%)
Ethnicity			
Hispanic/Latino	9 (16.4%)	6 (20.0%)	15 (17.6%)
Not Hispanic/Latino	46 (83.6%)	24 (80.0%)	70 (82.4%)
Mother Education			
High School	5 (8.3%)	4 (13.3%)	9 (10.0%)
Some College	5 (8.3%)	5 (16.7%)	10 (11.1%)
College Degree	33 (55.0%)	6 (20.0%)	39 (43.3%)
Graduate Degree	17 (28.3%)	15 (50.0%)	32 (35.6%)
Father Education			
High School	11 (19.3%)	8 (26.7%)	19 (21.8%)
Some College	6 (10.5%)	5 (16.7%)	11 (12.6%)
College Degree	25 (43.9%)	5 (16.7%)	30 (34.5%)
Graduate Degree	15 (26.3%)	12 (40.0%)	27 (31.0%)
Seizure Status			
No Seizures Ever	9 (15.0%)	2 (6.7%)	11 (12.2%)
No Seizures Currently	31 (51.7%)	13 (43.3%)	44 (48.9%)
Less than 1 per month	5 (8.3%)	2 (6.7%)	7 (8.3%)
Monthly	2 (3.3%)	2 (6.7%)	4 (4.4%)
Weekly	3 (5.0%)	2 (6.7%)	5 (5.6%)
Daily	5 (8.3%)	2 (6.7%)	7 (7.8%)
More than 1 per day	1 (1.7%)	5 (16.7%)	6 (6.7%)
Infantile Spasms			
Yes	37 (61.7%)	21 (70.0%)	58 (64.4%)
No	23 (38.3%)	9 (30.0%)	32 (35.6%)

Demographic variable	12-23 months (*n*=60)	24-36 months (*n*=30)	Total (*n*=90)
Vineland-3 Composite *M (SD)*	79.66 (14.89)	74.76 (13.44)	78.02 (14.53)

Table 2.

P-values based upon chi-square tests comparing yes/no responses between age groups. "Yes" responses presented as a proportion of the full group/sample (including "no response" participants). Section 6: 1 12-to 23-month and 1 24- to 36-month participant (2 for spelling) responded with a "no" to academic questions. Uncorrected p-values presented. P-value in bold survived FDR correction ($p<.05$).

	12-23 months (n=60)		24-36 Months (n=30)		Total (n=90)		
SECTION 3	**Yes**	*No Response*	**Yes**	*No Response*	**Yes**	*No Response*	*p-value*
Anxiety	6 (10%)	*1 (1.7%)*	7 (23.3%)	*1 (3.3%)*	13 (14.4%)	*2 (2.2%)*	.083
Depressed Mood	0 (0%)	*2 (3.3%)*	0 (0%)	*1 (3.3%)*	0 (0%)	*3 (3.3%)*	-
Extreme Shyness	8 (13.3%)	*1 (1.7%)*	6 (20.0%)	*0 (0%)*	14 (15.6%)	*1 (1.1%)*	.430
Mood Swings	11 (18.3%)	*1 (1.7%)*	8 (26.7%)	*0 (0%)*	19 (21.1%)	*1 (1.1%)*	.383
Aggressive Outbursts	14 (23.3%)	*1 (1.7%)*	13 (43.3%)	*0 (0%)*	27 (30.0%)	*1 (1.1%)*	.057
Temper Tantrums	23 (38.3%)	*1 (1.7%)*	17 (56.7%)	*0 (0%)*	40 (44.4%)	*1 (1.1%)*	.113
Self-Injury	15 (25.0%)	*1 (1.7%)*	11 (36.7%)	*0 (0%)*	26 (28.9%)	*1 (1.1%)*	.270
Absent/Delayed Language	35 (58.3%)	*1 (1.7%)*	26 (86.7%)	*0 (0%)*	61 (67.8%)	*1 (1.1%)*	.009**
Repetitive Language	6 (10.0%)	*1 (1.7%)*	9 (30%)	*0 (0%)*	15 (16.7%)	*1 (1.1%)*	.018*
Poor Eye Contact	8 (13.3%)	*0 (0%)*	9 (30.0%)	*0 (0%)*	17 (18.9%)	*0 (0%)*	.057
Difficulties with Peers	9 (15.0%)	*1 (1.7%)*	10 (33.3%)	*0 (0%)*	19 (21.1%)	*1 (1.1%)*	.049
Repetitive Behaviors	10 (16.7%)	*1 (1.7%)*	10 (33.3%)	*1 (3.3%)*	20 (22.2%)	*2 (2.2%)*	.065
Rigid/Inflexible Behavior	4 (6.7%)	*1 (1.7%)*	10 (33.3%)	*0 (0%)*	14 (15.6%)	*1 (1.1%)*	**.001***
Overactivity/Hyperactivity	14 (23.3%)	*3 (5.0%)*	14 (46.7%)	*0 (0%)*	28 (31.1%)	*3 (3.3%)*	.036*
Difficulty Paying Attention	16 (26.7%)	*2 (3.3%)*	15 (50.0%)	*2 (6.7%)*	31 (34.4%)	*4 (4.4%)*	.019*
Restlessness	25 (41.7%)	*2 (3.3%)*	13 (43.3%)	*1 (3.3%)*	38 (42.2%)	*3 (3.3%)*	.879
Impulsivity	10 (16.7%)	*2 (3.3%)*	11 (36.7%)	*0 (0%)*	21 (23.3%)	*2 (2.2%)*	.043*
Difficulties with Eating	22 (36.7%)	*2 (3.3%)*	10 (33.3%)	*0 (0%)*	32 (35.6%)	*2 (2.2%)*	.671
Sleep Difficulties	23 (38.3%)	*2 (3.3%)*	15 (50.0%)	*0 (0%)*	38 (42.2%)	*2 (2.2%)*	.353
SECTION 6	**N/A**	*No Response*	**N/A**	*No Response*	**N/A**	*No Response*	
Reading	43 (71.7%)	*16 (26.7%)*	21 (70.0%)	*8 (26.7%)*	64 (71.1%)	*24 (26.7%)*	-
Writing	43 (71.7%)	*16 (26.7%)*	21 (70.0%)	*8 (26.7%)*	64 (71.1%)	*24 (26.7%)*	-
Spelling	43 (71.7%)	*16 (26.7%)*	20 (66.7%)	*8 (26.7%)*	63 (70.0%)	*24 (26.7%)*	-
Mathematics	43 (71.7%)	*16 (26.7%)*	21 (70.0%)	*8 (26.7%)*	64 (71.1%)	*24 (26.7%)*	-
SECTION 7	**Yes**	*No Response*	**Yes**	*No Response*	**Yes**	*No Response*	*p-value*
Memory	2 (3.3%)	*22 (36.7%)*	6 (20.0%)	*5 (16.7%)*	8 (8.9%)	*27 (30.0%)*	.029*
Attention	13 (21.7%)	*17 (28.3%)*	16 (53.3%)	*4 (13.3%)*	29 (32.2%)	*21 (23.3%)*	.011*
Dual-Tasking	11 (18.3%)	*20 (33.3%)*	13 (43.3%)	*5 (16.7%)*	24 (26.7%)	*25 (27.8%)*	.046*
Visuo-Spatial Skills	14 (23.3%)	*19 (31.7%)*	11 (36.7%)	*5 (16.7%)*	25 (27.8%)	*24 (26.7%)*	.423
Executive Skills	6 (10.0%)	*22 (36.7%)*	12 (40.0%)	*5 (16.7%)*	18 (20.0%)	*27 (30.0*	.006**
Getting Disoriented	4 (6.7%)	*21 (35.0%)*	2 (6.7%)	*9 (30.0%)*	6 (6.7%)	*30 (33.3%)*	.928