

Parents' and Teachers' Perceptions of Abnormal Attention Span of Elementary School-Age Children

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ABSTRACT

Background: To determine teacher and parental perception of minimal expected sustained attention span during various daily tasks among elementary school children.

Methods: 54 parents and 47 teachers completed the attention span questionnaire (AtSQ) that was developed for this study. The AtSQ consists of 15 academic and leisure tasks that require a child's sustained attention. The study focused on third and fourth graders in Israel.

Results: There was a high degree of variability among teachers and parents in their responses to the AtSQ. The expected attention span of children as judged by parents was higher and more varied compared to teachers, and higher for girls than for boys.

Conclusions: Our results indicate poor agreement in cut-off values for sustained attention span between teachers and parents and within each group.

Disorders 5 (DSM-5)(1), the definition of a major symptom of inattention is that the child “often has difficulty sustaining attention in tasks or play activities (e.g., has difficulty remaining focused during lectures, conversations or lengthy reading)” (criteria A1b in the DSM-5 list of ADHD symptoms) (1). It has been our impression that there is considerable variability among both parents and teachers in what is considered the cut-off for an abnormally short attention span.

To date, there has been little empirical data on the attention span of children. One meta-analysis revealed that children with ADHD show shorter and more varied attentive behavior compared to typically developing children (2). Questions concerning a potential influence of situational and contextual factors, such as the specific type of academic assignment or gender differences, on children's attention were described, but they were excluded from the meta-analysis itself because there were too few studies that addressed the differences between tasks or between boys and girls (2). Results from an observational study on the variability in classroom attention among children with ADHD compared to typically developing children aged 6 to 11 years showed wide differences in the optimal ability to remain attentive on academic tasks (3). Those authors noted that children with ADHD were able to maintain attention for only two minutes during 20 minutes of observation compared to seven minutes for non-ADHD children. Furthermore, while all children oscillated between attentive and inattentive states, children with ADHD switched between those states more frequently compared to non-ADHD children. Those authors concluded that their results may indicate that variability of attention exists not only among children with ADHD, but also among non-ADHD children, and that there might be

INTRODUCTION

A fundamental symptom of attention deficit/hyperactivity disorder (ADHD) is inattention that is inconsistent with developmental level and negatively affects many aspects of functioning of children in school and at home. According to the current Diagnostic and Statistical Manual of Mental

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a considerable overlap between children with ADHD and non-ADHD children with regard to the length of time they are able to maintain attention. Parens and Johnston (4) referred to an overlap of inattentive behavior between ADHD and non-ADHD children as “*zone of ambiguity*” in which different observers - clinicians, parents or teachers - interpret the same behavior differently. The authors noticed that different environments differ in their degree of tolerance to children at risk for ADHD (4). In a review that described attention in preschool children, it has also been claimed that attention problems are not necessarily indicative of ADHD, but that they rather reflect normal variations in preschool children aged 6 and younger (5). Taken together, these data indicate that it is actually difficult to set clear cut-offs between normal and abnormal expected lengths of attention spans, which is at the heart of reliably diagnosing ADHD.

The main purpose of the present study was to assess the judgments of parents and teachers regarding the minimal expected sustained attention span during various daily tasks of boys and girls in the third and fourth grades. Based on the above-cited data, we hypothesized that: a. there would be a large variability in responses of both parents and teachers regarding the expected duration of attention among children in completing various daily tasks; b. the variability would be higher among parents than among teachers; c. both parents and teachers would have higher expectations for the length of sustained attention on various tasks for girls compared to boys; d. the expected attention span for boys and girls would be longer for leisure tasks than for academic tasks.

METHOD

PARTICIPANTS AND PROCEDURE

The 47 teachers of third and fourth graders who were recruited from elementary schools in the catchment area of the hospital had a mean of 15.43 (SD=10.89) years of teaching experience. They and a parent of each of 54 children (41 boys and 13 girls) who had been referred to the ADHD and Learning Disorders Clinic at Sheba Medical Center (2011-2013) were requested to complete a questionnaire. The participating parents had completed a mean of 14.65 (SD= 2.80) years of education. The mean number of children in each family was 2.89 children (SD =1.16).

The children's ages ranged between 8 to 11 years ($M=8.61$, $SD=0.85$), 24 (44%) were in the third grade and 30 (56%) were in the fourth grade. The diagnosis of ADHD was confirmed in all children by means of a clinical evaluation by a senior child psychiatrist and based on the DSM-IV criteria. Most of the children (44, 81.48%) were diagnosed as having

ADHD: specifically, 26 (48.15%) had ADHD combined type, 11 (20.37%) had ADHD inattentive type, 3 (5.55%) had ADHD hyperactive type and 4 (7.41%) had ADHD NOS. Psychiatric comorbidities included learning disorders ($N=8$, 14.8%), developmental coordination disorder ($N=2$, 3.7%) and obsessive compulsive disorder, enuresis, adjustment disorder, oppositional defiant disorder, selective mutism and generalized anxiety disorder ($N=1$ each, 1.85%). Seven children (12.97%) had no psychiatric diagnosis.

The study was approved by the Institutional Review Board of Sheba Medical Center, Tel Hashomer, Israel, and the Israel Ministry of Health, and conducted according to the Declaration of Helsinki.

MEASURE

The Attention Span Questionnaire (AtSQ): The AtSQ was especially designed for this study and it was used to measure the expectations of teachers and parents for the children's span of sustained attention during the performance of various academic and leisure tasks. The questionnaire contains 15 items on 7 academic and 8 leisure tasks (see Appendix). The raters are instructed to estimate the minimal expected duration of sustained attention for each of the academic (e.g., listening to lectures or silent reading) and leisure tasks (e.g., playing ball games) for boys and for girls.

STATISTICAL ANALYSIS

Cronbach's alpha was calculated to assess internal consistency of the AtSQ items. One-sample Kolmogorov-Smirnov tests were conducted to test the assumption of normality. In addition, skewness and kurtosis were calculated as measures of the deviation from normality. The difference in variance between teachers and parents was tested using Levene tests. The main analysis focused on a 2 x 2 mixed-design analysis of variance (ANOVA). Group membership (parent or teacher) was included as a between-subject factor, and gender (boy or girl) was included as a within-subject factor. The AtSQ total score is presented as the mean of all AtSQ items. The mean subtotal scores for academic tasks and leisure tasks were also computed. Paired-sample t-tests were used to test for any difference between mean expected durations of academic and leisure tasks. The Statistical Package of Social Sciences (SPSS, version 21) was used for all assessments, and an alpha level of .05 (two-tailed) was applied.

RESULTS

The Cronbach alpha was calculated and divided to four groups: Cronbach alpha for parents report in class activity

was 0.92 and for leisure activity was 0.90. Cronbach alpha for teachers report in class activity was 0.85 and for leisure activity was 0.88. Thus, reliability of parent reports was excellent, slightly better than teacher reports. However both present adequate and acceptable reliability values.

VARIABILITY IN RESPONSES OF ATSQ ITEMS

Responses to all the AtSQ items deviated significantly from the normal distribution as assessed with Kolmogorov-Smirnov tests (all p values ≤0.008). Overall, the results from skewness and kurtosis statistics also indicated a large variability between parents and teachers in their responses to the AtSQ items. Some specific items are shown in Figure 1a-d. In addition, negative kurtosis values and positive kurtosis values for items indicating distributions peaked higher than normal or were more flat than normal for both teachers and parents (see Table 1). The skewness was both positive and negative for all AtSQ items, indicating a

distribution less symmetric around the mean for parents. Positive skewness indicating distributions with greater numbers of larger values was found for most of the items rated by teachers (Table 1).

PARENT AND TEACHER DIFFERENCES IN VARIABILITY OF RESPONSES TO AFSQ ITEMS

The variability of the parents’ responses to most AtSQ items was significantly larger than that of teachers (Levene tests $p \leq 0.05$, see Tables 2 and 3). There were significant differences between parents and teachers for most of the items, with the exceptions of “watching a show” (both boys and girls), “drawing” (only boys) and “watching TV, playing board games and playing ball” (only girls) (Tables 2 and 3).

GROUP AND GENDER DIFFERENCES

Mixed-design ANOVAs revealed significant main effects for group and gender for most of the 15 items of the AtSQ academic and leisure activities (Table 2 and 3). The parents’ AtSQ scores were significantly higher than those of teachers on all items (all p values ≤ 0.006) except for “homework,” “playing ball” and “drawing” which did not differ significantly between them (see Tables 2 and 3). Additionally, the expectations were significantly higher for girls than for boys for most of the items (all p values ≤ 0.001), except for “watching a show,” “watching TV,” “playing ball” and “playing computer games,” which did not differ significantly between boys and girls. The difference in the *Gender x Group* interaction effect was significant for “watching a show” which was higher for boys according to teachers and higher for girls according to parents ($p < 0.0001$) and for “ceremonies” which was higher for girls according to parents only. Group and gender effects are shown in Tables 2 and 3.

DIFFERENCES BETWEEN ACADEMIC AND LEISURE TASKS

The paired-sample t-test showed higher mean total scores for academic tasks compared to leisure tasks for both genders and for both parental and teacher reporting (all p values <0.0001).

DISCUSSION

The main objective of the present study was to determine and compare the parental and teacher perceptions of the minimal expected attention span for carrying out tasks that require sustained attention among elementary school children. We designed the AtSQ to acquire the relevant data. As expected, we found a high variability for the minimal expected attention span reported by teachers and parents.

Table 1. Skewness and kurtosis values for the AtSQ items

	Skewness				Kurtosis			
	Parents		Teachers		Parents		Teachers	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Group work	0.16	-0.42	1.18	0.63	-1.06	-0.92	1.31	0.08
Workbook	0.93	0.00	-0.41	0.38	-0.29	-1.25	-1.31	-0.61
Listening in class	0.24	-0.02	0.64	0.15	-0.78	-0.73	0.97	0.39
Reading	0.67	0.01	1.01	0.58	-0.85	-1.65	1.19	-0.06
Copying from blackboard	1.35	0.61	1.78	1.33	1.48	-0.70	4.73	2.13
Participating in a discussion	0.55	-0.08	0.10	0.63	-0.37	-1.45	1.48	0.15
Homework	0.20	-0.65	1.21	1.03	-1.10	-0.84	0.83	-0.10
Watching a show	-1.05	-1.71	0.40	0.75	-0.30	2.45	-0.88	-0.67
Watching TV	-2.22	-2.06	-0.12	-0.08	3.72	3.42	-1.57	-1.37
Playing computer games	-1.85	-1.75	-0.28	0.06	2.03	2.00	-1.50	-1.22
Playing ball	0.39	-0.83	-0.07	1.07	-0.78	-0.94	-0.34	0.65
Drawing	0.53	-0.66	0.69	0.26	-0.94	-1.07	-0.06	-1.22
Playing board games	-0.11	-0.48	0.84	0.76	-1.27	-0.89	0.52	-0.67
Ceremonies	0.31	-0.51	0.79	0.83	-0.67	-0.82	0.04	1.35

Note. Standard error (SE) values of kurtosis for parents=0.67 and for teachers=0.75; SE skewness for parents=0.34 and SE skewness for teachers=0.38.

Table 2. Comparison of mean minimal expected time presented in minutes (SD) of AtSQ items of parents and teachers: Academic tasks

	Parents		Teachers		Levene Statistic		Group effect (teachers vs. parents)		Gender effect ^a	
	Boys	Girls	Boys	Girls	Boys	Girls	F	p	F	p
	M	M	M	M	p	p	F	p	F	p
Group work	33.10 (17.17)	41.30 (16.81)	25.19 (12.44)	30.07 (13.73)	.008	.016	8.3	.005	28.5	<.0001
Workbook	28.40 (15.86)	36.00 (17.67)	21.98 (8.10)	27.67 (11.04)	<.0001	<.0001	7.9	.006	28.2	<.0001
Listening to lectures	29.50 (13.90)	36.00 (14.95)	20.35 (7.90)	23.37 (7.77)	<.0001	<.0001	24.1	<.0001	19.6	<.0001
Reading	29.90 (18.06)	37.00 (19.74)	15.70 (9.17)	21.51 (11.16)	.001	<.0001	25.7	<.0001	22.4	<.0001
Copying from blackboard	18.10 (12.77)	28.30 (16.31)	14.35 (7.71)	18.04 (9.36)	.006	<.0001	8.9	.004	46.1	<.0001
Participating in discussions	27.70 (15.82)	35.30 (19.47)	20.83 (10.30)	23.57 (11.22)	.003	<.0001	11.2	.001	12.8	.001
Homework	33.90 (17.42)	42.30 (18.13)	32.32 (10.99)	36.43 (11.51)	.009	.001	1.7	.201	23.0	<.0001
Total academic score	29.04 (10.88)	37.90 (13.48)	22.73 (5.91)	27.90 (6.99)						

Table 3. Comparison of mean minimal expected time presented in minutes (SD) of AtSQ items of parents and teachers: Leisure tasks

	Parents		Teachers		Levene Statistic		Group effect		Gender effect ^a	
	Boys	Girls	Boys	Girls	Boys	Girls	F	p	F	p
	M	M	M	M	p	p	F	p	F	p
Watching a show ^a	46.53 (17.71)	50.71 (14.22)	38.27 (14.04)	28.57 (16.72)	.112	.135	27.8	<.0001	2.8	.097
Watching TV	53.40 (14.86)	52.60 (14.15)	42.38 (16.20)	43.69 (14.40)	.037	.417	12.1	.001	0.0	.837
Playing computer games	52.50 (15.36)	52.20 (14.08)	42.44 (18.27)	40.00 (16.41)	.009	.049	12.7	.001	1.3	.255
Playing ball	44.70 (18.86)	29.40 (17.60)	42.32 (12.86)	25.12 (13.90)	<.0001	.163	1.3	.256	0.3	.612
Drawing	29.70 (18.64)	44.20 (18.55)	32.07 (14.36)	40.91 (13.48)	.254	.002	0.0	.886	60.4	<.0001
Playing board games	40.10 (17.22)	43.67 (16.51)	30.12 (12.42)	36.90 (14.69)	.001	.345	8.6	.004	11.3	.001
Ceremonies ^a	31.80 (16.87)	40.70 (17.61)	25.54 (9.87)	30.24 (9.30)	.012	<.0001	10.0	.002	24.1	<.0001
Total leisure score	45.83 (11.84)	45.38 (11.10)	35.98 (11.67)	38.30 (11.88)						

Abbreviations:
M=mean
(SD)=standard deviation
^ap<0.05;
Note: ^asignificant Group x Gender interaction (p<0.0001).

The distribution of their responses to the AtSQ items was skewed. The mean expected attention span was generally higher for the parents than for the teachers.

The finding of a high variability for parental and teacher responses indicates that there is no consensus of what is considered as being a reasonable attention span and what characterizes a deviant one. This lack of a clear definition of an expected attention span identifies a weakness of the DSM diagnostic criteria. Although the DSM-5 (1) intended to improve the diagnostic criteria of the DSM-IV (6) by adding more examples of possible manifestations of ADHD-related inattention symptoms (“has difficulty remaining focused during lectures, conversations, or lengthy reading”) (1), there are no precise definitions of an abnormal attention span. The DSM-5 still neither specifies the length of attention span during lectures, conversations or lengthy reading, nor does it provide clear cut-off values which will enable a more reliable diagnosis of ADHD. DSM-5 states that to be considered a symptom of inattention for the purposes of diagnosis, a symptom must “have persisted for at least 6 months to a degree that is inconsistent with developmental level” (1). Yet to our knowledge there are no developmental norms for attention. Therefore, as shown by the high variability of their responses to the AtSQ in our study, parental and teacher reporting cannot be a reliable source for this DSM criterion.

Symptoms of ADHD as well as those of some psychiatric disorders, such as autism spectrum disorder, are more complex and more difficult to define. The DSM-5 admits the lack of clearly defined symptoms by acknowledging that some disorders are better conceptualized dimensionally rather than categorically (1). Of note that similarly

to other psychiatric diagnosis the face and construct validity of the ADHD questionnaires was based on the “combined picture.” The DSM-5 and even more so the ICD attempt to assist the clinician in implementing the diagnostic criteria by providing clinical examples and vignettes.

Two aspects should be taken into consideration when referring to the difficulty in defining attention span among children. First, children’s attention span changes with time throughout normal development, and there is abundant evidence that attention span significantly increases with age (7). Secondly, attention is not a stand-alone construct, but rather appears to be associated with and related to specific types of activities that have different attentional demands. We addressed this issue by including the main tasks that elementary school children are ordinarily engaged in when we constructed the AtSQ. We found that the expected attention span by parents and teachers was significantly higher for leisure tasks than for academic tasks. For example, the attention span for boys was rated longer by parents for playing computer games (52.50 minutes) than for listening to lectures by a teacher standing at the head of a classroom (29.50 minutes). This is in line with Rapport et al. (3), who mentioned that academic assignments might involve greater demands on cognitive resources. Our findings also validate the “low arousal” theory of Antrop et al. (8), which states that people with ADHD need excessive stimulation because of their state of abnormally low arousal. The leisure activities on the AtSQ scale are highly stimulating when compared to academic assignments (8).

The higher expected attention span of parents and teachers to leisure compared to academic tasks also reflects our clinical experience that parents of children with ADHD report that their child’s attention span is longer when they are involved in leisure activities than during academic activities.

Studies have shown that there is a low correlation between parents and teachers reports of psychiatric symptoms in children (9-13): and also specifically for reports of inattention symptoms (11). Epkins (12) found that in comparison to teachers, parents report on psychiatric symptoms of children tended to be more severe. This finding is consistent with our report that parents tend to have higher demands regarding the expected attention span of children. Taken together with the findings from our study, it seems important to inquire about inattentive symptoms from multiple sources and each source should report on the full range of potential ADHD symptoms.

Our results indicate a gender effect on expected attention span. Attention span expectations of both the teachers and parents were higher for girls than for boys, irrespective

of the task. It has been established that boys have higher rates of externalizing and disruptive behaviors, including ADHD, than girls. (14) Additionally, girls are expected to be more calm and patient than boys. The higher rates of disruptive behaviors in boys are very likely to lead to biases on the part of teachers and parents in expecting girls to have a longer attention span than boys.

LIMITATIONS

It is important to remind the naturalistic nature of our study. It could be argued that our sample of parents, that is parents seeking help in an ADHD clinic, may have skewed perception of normative attention span. If our intention had been to establish norms of attention span in children than probably parents of typically developing children would have been a better choice. Yet our parent and teacher sample represents the real life situation where clinicians base the child diagnosis of ADHD on the child’s parent and teachers. We show in our paper that complexity of the information obtained in clinical evaluations since there is a high variability both between and within groups.

Our study was a survey of perceptions of parents and teachers regarding the expected attention span of third and fourth graders in Israel. Future studies should focus on other age groups and on children in different countries. We believe that cultural issues and attitudes of parents and teachers towards educational issues have a major effect on attention span expected from children. For example, a parent who believes that learning and education are critical for the future career of his/her child will probably have higher expectations regarding the time his/her child should focus on academic tasks. We recommend that such important potential mediators (e.g., cultural and attitudes towards the importance of education) will be the focus of future studies of expected attention span in children. Moreover future studies should compare reports on the AtSQ of parents with children with ADHD to parents of typically developing children.

Our survey measured the distribution of attention spans in the various contexts that comprised the AtSQ. More empirical studies are needed to establish reliable age norms that could serve to update diagnostic criteria of ADHD.

CLINICAL IMPLICATIONS

In conclusion, we believe that this is the first study that assessed the minimal expected attention span time among children in different academic and leisure activities as rated

by their parents and teachers. Our results indicate that there is a poor agreement between and within the groups of teachers and parents regarding the cut-off values for a child's short attention span.

Given that the diagnosis of ADHD is largely based on subjective reports of parents and teachers, this lack of agreement and high variability among them points to a weakness in the DSM-5-based diagnostic assessment of ADHD. We suggest using the lower boundary of the teachers report (see Table 2), e.g., one standard deviation below the mean, as a possible comparison to future studies.

Conflict of Interest

The authors declare that they have no conflict of interest.

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Appendix. Attention Span Questionnaire (AtSQ)

Please answer what you think is the minimal expected sustained attention time for each activity listed below for a child 9 to 10 years of age.

Activity	Minimal* (minutes) expected duration					
	5	10	20	30	45	60
Listening to a lecture						
Preparing homework						
Copying text from the blackboard						
Silent reading						
Working in a notebook						
Studying in a group						
Arts and crafts						
Taking part in a discussion						
Watching a ceremony						
Watching a play						
Ball games during recess						
Watching TV						
Playing computer games						
Playing board games (monopoly, chess, etc.)						

*Minimal expected attention span duration means that any less is considered by you to be abnormally low.