

# Screen Based Media Use among Children with Autism Spectrum Disorder, Attention Deficit Hyperactive Disorder and Typically Developing Siblings

Ahmed Malallah AlAnsari\*, Haitham Ali Jahrami

Department of Psychiatry, College of Medicine and Medical Sciences, Arabian Gulf University, Manama, Bahrain

## ABSTRACT

**Objectives:** Screen-based media (SBM) use has become a widely practiced way of entertainment and social interaction among children and adolescent. Previous studies on the effects on health and socialization have revealed mixed results. The purpose of this study was to assess the reactions (magnitude, type) of withholding media devices among children with Autism Spectrum Disorder (ASD), Attention Deficit Hyperactive Disorder (ADHD) and their typically developed siblings.

**Method:** A cross-sectional design study of children (n=75) attending Al-Wafa and Al-Rashad Centers for Autism recruited as a convenience sample for all registered cases with ASD diagnosis; each case had a typically developed sibling matched for sex and age. ADHD (n=50) group were children with similar age group, diagnosed with ADHD, attending the school Health Clinic. Similar inclusion criteria were applied to the ASD group. Sibling groups were brothers and sisters of ASD, ADHD cases matched for gender and age group of five years.

**Results:** SBM use of ASD cases was similar to their siblings use in term of the type of screen, daily duration of viewing, and reaction to device withhold. SBM use among ADHD cases was also similar to their matched siblings in term of a type, time spent on SBM and reaction to device withhold. However, SBM use was different among ASD and ADHD cases ( $P=.001$ ) in all three domains: type, viewing duration and reaction to devices removal. Tablets emerged as the preferred platform.

**Conclusion:** SBM use is widely influenced by parental rules and flexibility. These rules are linked with times spent on watching the screen; however, pathological use of SBM seems to be more among children with ADHD in comparison to children with ASD, defined as an overuse of video games/smartphones and their reactions when devices were withheld.

**Keywords:** Screen-based media; ASD; ADHD; Sibling; Bahrain

## INTRODUCTION

Screen-based media (SBM) use has become a popular way of entertainment and social interaction among typically developing children and adolescents [1]. The term screen-based media are used to refer to a smartphone, video games, tablets devices, and television. A report by the National Health and Nutrition Examination Survey in the US (2001-2006) showed that 47% of the children sample (n=>6,000) spent two hours/day using SBM such as television, videos, and computers [2]. A Canadian study showed youth spent 3 hours daily on watching screen [3]. While children at risk of psychiatric disorders spend one-third of their day

time watching screens [4]. In a recent study among children aged (6-12), television viewing was 2.9 hours/day [5]. With the increasing popularity of video games, the new pathological pattern of play emerged among adolescents, characterized by features suggestive of addictive behaviour [6]. Excessive use of television and video games have been implicated in the detrimental effects on socialization skills, attention and school performance [7,8].

Pathological use of these media is implicated in the formation of clinical and familial problems for children with and without autism spectrum disorder (ASD) [9]. Vandewater stated that the time spent using SBM is negatively correlated to time spent

**Correspondence to:** Ahmed Malallah AlAnsari, Department of Psychiatry, College of Medicine and Medical Sciences, Arabian Gulf University, Manama, Bahrain, Tel: 97339459043; E-mail: aansari@health.gov.bh

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in social interaction and could lead to weight gain [10,11]. In a recent two years, follow-up study of video games among adolescents, an association of pathological gaming with negative outcomes including poor school performance, depression, anxiety, and social phobia was observed [12]. Children with ASD and attention deficit Hyperactive disorder (ADHD) spend significantly more time using screen-based media than any other activity, exhibit a higher rate of pathological game use and have more difficulties disengaging from it [13-16]. Adolescents with ASD spend significantly more time using nonsocial media compared to adolescents with other neurodevelopmental disabilities [17]. The above finding was not generalized or compared to typically developing children.

Relationship of media use and ADHD related behavior yielded mixed results [18]. A recent meta-analysis study that investigated the relationship between the use of screen media use and ADHD related behaviors in children and adolescents under the age of 18 showed a small significant relationship [19]. Various studies confirm that ADHD is associated with internet overuse with the degree of use increasing with ADHD severity. The vulnerability of overuse is probably correlated with the fact that these games are brief and is not attention demanding [20]. In addition, rapidly changing screen put less demand on attention and working memory [21]. A two year follow up on the study of 2000 adolescents with ADHD, early exposure to screen time was shown to be the most significant predictor for the development of internet addiction and gaming [21]. However, in a study on a smaller sample that compared videogame playing by children with ADHD and controls did not find significant differences [22]. Hence, with such apparently conflicting results, more research is needed to study the pattern of SBM use among children with ADHD and typically developing children.

The purpose of the current study was to study the amount and pattern of television, video games, smartphone, and Tablets devices use among children with ASD and ADHD in comparison to typically developed siblings. In this study, SBM use was compared in children with ASD, ADHD and their siblings matched for age and gender.

## METHODOLOGY

### Design

A cross-sectional study design was used. The study was carried out between September 2017 and January 2018.

### Samples

**ASD group:** Children aged 4-16 years old attending Al Wafa and Al Rashad enter for Autism. The cases were recruited as a convenience sample that includes all cases registered in both centers. Recruited cases with ASD diagnosis should have a sibling matched for gender and age group ( $\pm$  Five-year difference). No other exclusion criteria were applied. None of the mothers refused to participate in the study.

**ADHD group:** Children aged 4-16 years attended an outpatient clinic of the school health mental health center located in a primary care setup. Cases were recruited as a convenience sample. The inclusion criteria to the ADHD group were the same criteria used for the ASD group.

All cases in the ASD and ADHD groups were diagnosed according to (DSM-IV-TR or DSMV) criteria [23,24]. Diagnosis of ASD is made using the diagnostic specifics of Childhood Autism Rating Scale (CARS), a Modified Checklist for Autism in Toddlers, Revised with follow-up (M-Chat), the Autism diagnostic observation schedule (ADOS) if applicable. Diagnostic specifics for cases with ADHD include Conner's Rating Scale-Revised for both Parents and teachers [25]. None of the mothers refused to participate.

**Typically developing siblings group:** Brothers and sisters to each case of ASD and ADHD matched for gender and age group of five years.

## PROCEDURES

Mothers were interviewed face-to-face by a trained research assistant from outside the research team. Mothers were asked to complete a data collection form in the Arabic language specially prepared for the study. The form focused on seeking information on mother's age, employment, education and 7 other questions on SBM use by their children. The SBM use questions were, whether child and sibling use television, Tablets devices, smartphone and videogames, time spent on each screen (hours/day) and what were the children's reactions to withholding of screen time. The form takes approximately ten minutes to complete (Appendix 1).

Neither Mother or father was assessed for SBM use. Other means of assessing time spent watching screen such as diaries were not included. Informed written consent for participation in the study was signed before data collection. Participation in the study was voluntary and did not affect the services provided by the centers to both mother and child. Ethical approval was obtained from the Executive Committee, Bahrain Association for Intellectual Disability and Autism, Kingdom of Bahrain.

### Data Analysis

Data were entered into SPSS version [26]. Descriptive statistics were summarized for the demographic characteristics and outcome measures. The mean and standard deviation (SD) were reported for continuous variables and count and percentage were reported for other variables. Pearson chi<sup>2</sup> or Fisher exact test and independent t-test were used to investigate the difference between groups.

## RESULTS

Of the 125 participants included in the study, 60% (n=75) were diagnosed with autism spectrum disorder and 40% (n=50) were diagnosed with attention deficit and hyperactivity disorder. Of this approximately 70% were males and 30% were females, a detailed breakdown of the children gender is presented in Table 1. Enrolled children were approximately 8 years old with cases from the ASD (mean age  $8.5 \pm 3.2$ ) being slightly older than those with ADHD (mean age  $7.7 \pm 3.5$ ). Cases from both groups came from families of similar socio-economic background; a detailed overview of the mother's education and employment is presented in Table 1.

Cases from both groups had a moderate engagement in the use of screen-based media. Three major platforms were used most frequently these are television, tablets devices or tablets, and

smartphones or mobile consoles. The results of the use of screen-based media suggest that cases with ASD have a higher frequency of such use compared to cases with ADHD from the same age- and gender- distribution. For television, Tablets devices or tablets, and smartphones or mobile consoles cases of ASD had 84%, 66.6% and 74.7% of usage history respectively compared with cases of ADHD who had 66.6%, 42%, and 38% usage history. Cases with ASD had a statistically significantly higher frequency of use Tablets devices or tablets (P Value 0.005), and smartphones or mobile consoles (P Value 0.001) (Table 2).

Table 2 also shows the response of children from both groups if screen-based entertainment was stopped. Cases with ADHD appeared to get more distressed if they stopped from screen-based entertainment was stopped compared to cases with ASD with violence being a hallmark of the distress (P Value 0.019). Children with ASD demonstrated other symptoms if screen-based entertainment was stopped (P Value=0.001). These symptoms were mainly social withdrawal or self-injurious behaviors.

Table 3 present the daily time spent on different screen-based media. The overall result shows that cases with ADHD use screen-based media significantly more than cases with ASD. This difference reaches a statistical significance at 0.001 for all three major platforms. According to Table 3 tablets emerged as the preferred mode for both ADHD and ASD groups.

Table 4 presents the screen-based media usage for cases with ASD and cases with ADHD. The results of the siblings appear to be concordant with the cases respectively in both groups, the ASD-Siblings paired groups and the ADHD-Siblings paired groups. The two siblings group did not differ with cases, while cases differed significantly when compared with each other.

## DISCUSSION

Education and employment status among mothers of ASD and ADHD groups were similar. In both groups, the majority of mothers were highly educated but were full-time homemakers. The mean age of children with ASD and ADHD was nearly the same (7-8 yrs.)

Table 1. Socio-demographic variable of cases.

Variable	ASD (n=75)	ADHD (n=50)
Child's gender	Male 74.7%	Male 70%
	Female 25.3%	Female 30%
Child's age	8.5 ± 3.2	7.7 ± 3.5
Mother's Education	Reads 2.7%	Reads 0%
	Junior School 14.7%	Junior School 10%
	Secondary School 36%	Secondary School 44%
	University Educated 45.3%	University Educated 42%
	Further Education 1.3%	Further Education 4%
Mother's Employment	Employed 26.5%	Employed 28%
	Retired 5.3%	Retired 2%
	Housewife 68%	Housewife 66%
	Student 0%	Student 4%

Table 2. Screen based media usage.

Variable	ASD (n=75)	ADHD (n=50)	Chi <sup>2</sup> P Value
Use of TV	Yes (84%); No (16%)	Yes (66.6%); No (33.4%)	0.47
Use of Tablets	Yes (66.6%); No (33.4%)	Yes (42%); No (58%)	0.005*
Use of Smartphone/ Mobile Phone	Yes (74.7%); No (25.3%)	Yes (38%); No (62%)	0.001*
Does the child feels bad if s/he is stopped from screen-based entertainment	Yes (60%); No (40%)	Yes (72%); No (28%)	0.118
Does the child get shaky if s/he is stopped from screen-based entertainment	Yes (44%); No (56%)	Yes (54%); No (46%)	0.180
Does the child start crying hysterically if s/he is stopped from screen-based entertainment	Yes (33.4%); No (66.6%)	Yes (36%); No (64%)	0.453
Does the child get violent if s/he is stopped from screen-based entertainment	Yes (14.7%); No (85.3%)	Yes (32%); No (68%)	0.019*
Other symptoms if s/he is stopped from screen-based entertainment	Yes (54.7%); No (45.3%)	Yes (14%); No (86%)	0.001*

Table 3. Time Spent/day on the different screen based media platforms.

Platform	ASD (n=75)	ADHD (n=50)	t-test P Value
TV	1.5 ± 1.6	2.6 ± 1.3	0.001*
Tablets	1.8 ± 1.6	3.2 ± 1.7	0.001*
Smartphone/Mobile Phone	0.5 ± 0.5	2.5 ± 1.6	0.001*

Table 4. Screen based media usage for cases with ASD and cases with ADHD.

Variable	ASD (n=75)	Siblings of ASD (n=75)	P Value	ADHD (n=50)	Siblings of ADHD (n=50)	P Value
Use of TV	Yes (84%) No (16%)	Yes (86.7%); No (13.3%)	0.81	Yes (82%); No (18%)	Yes (86%); No (14%)	0.78
Use of Tablets	Yes (66.6%); No (33.4%)	Yes (76%); No (24%)	0.90	Yes (42%); No (58%)	Yes (56%); No (44%)	0.23
Use of Smartphone/ Mobile Phone	Yes (74.7%); No (25.3%)	Yes (76%); No (24%)	0.95	Yes (38%); No (62%)	Yes (34%); No (66%)	0.52
Does the child feels bad if s/he is stopped from screen-based entertainment	Yes (60%); No (40%)	Yes (62.7%); No (37.3%)	0.88	Yes (72%); No (28%)	Yes (78%); No 22%	0.35
Does the child get shaky if s/he is stopped from screen-based entertainment	Yes (44%); No (56%)	Yes (41.3%); No (58.7%)	0.62	Yes (54%); No (46%)	Yes (44%); No (56%)	0.41
Does the child start crying hysterically if s/he is stopped from screen-based entertainment	Yes (33.4%); No (66.6%)	Yes (41.3%); No (58.7%)	0.39	Yes (36%); No (64%)	Yes (44%); No (56%)	0.54
Does the child get violent if s/he is stopped from screen-based entertainment	Yes (14.7%); No (85.3%)	Yes (13.3%); No (86.7%)	0.96	Yes (32%); No (68%)	Yes (30%); No (70%)	0.30
Other symptoms if s/he is stopped from screen-based entertainment	Yes (54.7%); No (45.3%)	Yes (56%); No (44%)	0.91	Yes (14%); No (86%)	Yes (38%); No (62%)	0.23

which was close to the sibling's mean age. These facts would make a comparison between the 3 groups more applicable and appropriate.

The other strength of the study compared to previous studies was the elimination of the effect of gender difference between cases with ASD, ADHD, and siblings. Siblings were matched with their brother or sister cases of ASD and ADHD according to gender. In this study, there was no significant difference between children with ASD and their siblings with regard to time spent viewing SBM. This is in contrast to a study by (Muzureck and Wentrup 2013) [14]. One of the reasons that might explain the difference in results is probably related to the mean age of children. In our study, both ASD cases and siblings were younger (8 vs. 12 years). Furthermore, younger children as is the case in this study were easier to be controlled by parents when using video games compared to the adolescent age group. The other reason could be attributed to the gender effect. However, both studies reached the same conclusion as far as TV watching. Both studies found no significant differences in time watching TV among boys with ASD and their siblings.

Another surprising finding in this study was the similarity of SBM use, both type and amount spent, between children with ADHD and their siblings. An earlier published study on ADHD and SBM use had mixed results [18]. The majority of studies found an increase in the amount of time spent on SBM among adolescents with ADHD [21,22]. To our knowledge, there were no reports examining SBM use in children with ADHD and their siblings in order to compare the results. We reached the conclusion that at least in Arab culture and among young age group what determines the SBM use is parental control. Parents applied the same rules for all their children who are close in age with regard to SBM use.

One should not overlook that the number of siblings among families in developing countries such as Bahrain is higher than it is in developed countries. For economic reasons, parents tend to time the amount of viewing screens, especially with expensive video games to allow equal opportunity among children. The explanation received additional support from a recent study which showed that mother's screen-time modelling, mealtime screen use, and use of the screen to control behavior were positively associated with children's day screen-time [26]. This explanation became even stronger when we compared SBM use among children of

ASD and ADHD. There was a significant difference in time spent watching screens. Here we are dealing with different families with different rules and societal values. The children of ASD, ADHD, and siblings reacted in a similar manner to restricting screen time.

This was not surprising to us as previous reports related to variables like - Type of used screen and time spent on SBM use were also almost similar in cases and siblings. However, when comparing the reactions of children with ASD and ADHD to withholding devices, the picture was different. Children with ADHD reacted more violently to the removal of SBM in comparison to ASD. Such findings may explain reports which indicated that children with ADHD are more likely to overuse media [27-30].

Another way of interpreting the results is the possible effect of the child on his surroundings. The child might influence the siblings and both parents on how and to what extent family members view the screen. This idea can only be tested if one studies the parents SBM use in relation to their restrictive rules. Ko et al found parents more frequently applied restrictive strategies for video gaming with adolescents with ASD than their siblings, but their rules declined significantly over the year [31]. These results and other researcher's findings demonstrate the complexity of SBM use among children and their parents.

Finally, the similarity of SBM use of cases to controls might be due in part to the possibility that some controls had symptoms of ASD or ADHD (sub-clinical level) this assumption cannot be ruled out without clinical interviewing the siblings. In summary, both environmental and genetic factors contributed to the complexity of interpreting the results.

## STUDY LIMITATIONS

- Small sample size will not allow further detailed analysis of co-variables.
- Parents (Mothers and Fathers) SBM use habits were not recorded to see if it was a shared activity and if parental use of SBM had an on their children's use.
- Mother subjectively recorded time spent viewing screens. Other ways of collecting these data, such as diaries were not attempted. Mothers' recall has its limitations.



## CLINICAL IMPLICATION

Nearly 90% of children in the study use SBM more than the recommended time according to their age. The public should be warned about the recommended time and the possible detrimental effects of the internet overuse on children. In investigating adolescents with ADHD, one should routinely ask about SBM use and educate both parents and adolescents on ways of reducing pathological use and encourage positive aspect of SBM use such as educational purposes and improving the relationship with peers.

## CONCLUSION

In this cross-sectional explorative study on SBM use in children with ASD, ADHD and their siblings, mothers reported no difference in the type of screen used, time spent on viewing and reaction to withholding of the screen among cases and siblings. However, there were clear differences between ASD and ADHD in SBM use in terms of times spent and reactions to screen removal. Children with ADHD diagnosis watched screens more frequently and reacted in a violent way and with irritable mood when the screen time was restricted. Parental role in controlling SBM use seems to be a key issue within the family and especially among younger children.

The other conclusive remark is that children with ADHD diagnosis constitute a high-risk group for the screen overuse. Children, in general overuse SBM in this part of the world judging from time spent on SBM, if one follows the American paediatric Association SBM use guideline. The results of the study have implications for clinical practice and children health promotion strategy.

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