

The Impact and Risk Factors of Screen Time Exposure in Children with Autism Spectrum Disorder

Shahad Ali Ahmed AL-Baldawi,¹ Nabeeha Najatee Akram,^{2,*} and Zahraa Aqeel Abdulmajeed³

¹Department of Pediatrics, Central Child Teaching Hospital,
Alkarkh Health Directorate, Ministry of health, Baghdad, Iraq.

²Department of Pediatrics, College of Medicine, Mustansiriyah University, Baghdad, Iraq.

³Department of Psychiatry, Central Child Teaching Hospital,
Alkarkh Health Directorate, Ministry of health, Baghdad, Iraq.

(Received : 28 September 2024; Accepted : 24 November 2024; First published online: 22 December 2024)

ABSTRACT

Background: Children with autism spectrum disorder (ASD) are increasingly exposed to screens that correlate to negative health effects.

Objectives: To identify possible risk factors associated with long screen viewing in ASD children and identify the effects of prolonged screen time.

Materials and methods: A cross-sectional study recruited children with ASD who were followed in the Psychiatry Department in the Central Child Teaching Hospital, Baghdad, Iraq over 7 months. For all children, personal data (age, age at diagnosis, sex, sleeping duration at day and night, and aggressive behavior) and both parents' data (age, educational level, and occupation) and screen data (duration of screen exposure, type of device used for, and the content of screening) were collected for each participant.

Results: A total of 138 children with a mean age of 5.25 ± 2.85 years were included in the study with a male-to-female ratio of 5.6:1. One-third of ASD children had long-duration of screen exposure (≥ 2 hours per day). Although none of the studied patient's characteristics was related to the duration of screen exposure, two maternal factors were significantly related to the longer duration of screen exposure (lower level of education and being a housewife with P-values of 0.008 and 0.02 respectively). Children diagnosed at younger ages are subjected to a higher duration of screen exposure with a correlation coefficient $r = -0.337$ and P-value = 0.027.

Conclusion: Maternal level of education and occupation represent significant determinants of screen time in children with ASD. Long screen exposure in ASD children correlates with the patient's age at diagnosis but has a non-significant effect on their social communication.

Keywords: Autism; Electronic devices; Sleep disturbance; Social communication questionnaire.

DOI: 10.33091/amj.2024.153975.1945

© 2025, Al-Anbar Medical Journal



INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that encompasses a spectrum of symptoms reflecting an impairment of social interaction together with repetitive and restrictive behavior [1]. Reports of autism spectrum disorder (ASD) are on the rise, with a frequency approaching 2.3% in the USA

[2]. Children with ASD proved to be more attached to electronic devices, which makes them spend more time on screens than typically developing peers [3]. Adding to the problem, ASD children are introduced to electronic devices at an earlier age, and they are more likely to exhibit symptoms of screen addiction even when exposed to fewer screens as compared to typically developing children [4]. This suggests that children with ASD are in serious situations regarding the consequences of their screen exposure [5].

Over the years, the impact of screen exposure on children with ASD has been a subject of conflict. Recent reports have highlighted the negative effects of increasing screen time,

* Corresponding author: E-mail: nabiha@uomustansiriyah.edu.iq
This is an open-access article under the CC BY 4.0 license

which include increased severity of social impairment, sleep disturbance, adiposity, psychiatric disturbances such as stress, and emotional instability [6].

Although few researchers examined the role of environmental factors on screen time in children with ASD [7], studies examining personal and family factors associated with screen exposure among children with ASD are scarce. Identification of factors associated with increasing screen viewing in those children can aid in developing interventional strategies to prevent the negative effects of long screen time [8]. Therefore, we conducted this study to identify possible risk factors associated with screen exposure in children with ASD and determine the effects of prolonged screen time.

MATERIALS AND METHODS

A cross-sectional study incorporated children diagnosed with ASD that was followed in the Department of Psychiatry at the outpatient clinic in Central Child Teaching Hospital, Baghdad, Iraq, over 7 months from 1st of February 2024 to 1st of September 2024.

ASD was diagnosed by the fifth version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), which includes children who presented with two major symptom categories, including a deficit in social communication and a restricted and repetitive pattern of interests/activities presented in early childhood [9]. Children with ASD who were diagnosed with DSM-5 and had screen exposure to any type of electronic device were enrolled in the current study. ASD children with no screen exposure and/or had chronic illness including hearing and visual impairment, and those who refused to participate were excluded from the study.

Sampling was done by convenience as all children who matched the inclusion criteria during the study period were recruited in the study. The study was approved by the medical college, Mustansiriyah University (Reference number 18 on 1-2-2024). The parents of children who participated in the study gave informed consent.

For each patient, four sets of data were collected as follows: Initially, we gathered the demographic and personal details of the patients, which encompassed their current age, their age at diagnosis, their gender, their sleeping patterns during the day and night, and the existence of aggressive behavior. Second, family history includes the number of siblings, the age of both parents, the educational level of both parents (illiterate, primary school graduate, secondary school graduate, and bachelor), and the occupation of both parents. Third, screen exposure data including duration of screen exposure per day, the type of electronic device for the screen, the content, and whether the electronic device is the patient's own or parental. Fourth, the social communication questionnaire (SCQ) score was assessed by a validated Arabic version of a social communication questionnaire [10] which consisted of 40 questions that had "NO" and "YES" answers. The total score for the questionnaire is 39, with higher scores indicating a higher level of impairment in social communication. The questions were filled out by parents which took 20–30 minutes, and the scores were collected by the second author who is not involved in the management of the patients.

Children were divided into 2 groups based on the duration of screen exposure Group 1: Had less than 2 hours per day of screen exposure, and Group 2: Had 2 hours or more screen exposure per day. This division was based on previous study [11] and on recommendations by the American Academy of

Pediatrics which recommends a maximum of 2 hours of screen exposure per day in children [12].

Sample size was calculated by the following formula [13]:

$$N = (Z\alpha/2 + Z\beta)^2 / r^2$$

$$(Z\alpha/2 + Z\beta) = 1.96 + 0.84 = 2.8$$

$$r = 2.8 \text{ (Based on previous study) [14].}$$

$$(2.8)^2 = 7.84$$

$$N = 7.84 / (0.236)^2 \approx 140.7641$$

The required sample size ≈ 141 , however only 138 children matched the inclusion criteria during the study period.

Statistical analysis

The statistical analysis was performed by the software program statistical package for social sciences (SPSS), version 26 (IBM, Armonk, New York, USA). Numerical data were normally distributed and presented as mean \pm standard deviation while categorical variables were presented as frequencies and percentages. The Pearson correlation coefficient was used to measure the association between the duration of screen exposure and patient-family characteristics. The P-value of less than 0.05 is set as a significant cut.

RESULTS

The study included 138 children with ASD, 117 of whom were boys and 21 of whom were girls, with a male-to-female ratio of 5.6:1. The majority of the ASD children ($n = 96$, 70%) had screen exposure for less than 2 hours, and all of them had parental electronic devices. ASD children had a mean SCQ score of 18. About two-thirds of children, or 74%, did not exhibit aggressive behavior (Table 1).

Smartphones represent the most frequent electronic device used in 66 (63.8%) of ASD children, and television comes next in frequency ($n = 45$, 32.6%), as shown in Figure 1. Figure 2 shows that most ASD children ($n = 58$, 42%) prefer to watch cartoons, and nursery rhythms come next ($n = 28$, 20%).

None of the studied characteristics of children with ASD, including age, gender, the average duration of sleep day and night, the number of meals, the SCQ scores, and the presence of aggressive behavior shows a statistically significant difference (P-value > 0.05) with a time of screen exposure (Table 2).

The mother's level of education and occupation significantly influenced the average duration of screen exposure (P-value = 0.008 and 0.02, respectively). All other analyzed family variables, including the father's level of education, the father's occupation, parental age, and the presence of siblings, did not significantly correlate with the duration of screen exposure in children with ASD (Table 3).

The age of the patient at the time of diagnosis was negatively related to screen time ($r = -0.337$, P-value = 0.027). While no correlation was found between screen duration and each of the following: Sleeping duration, and the score obtained by social communication questionnaire (Table 4).

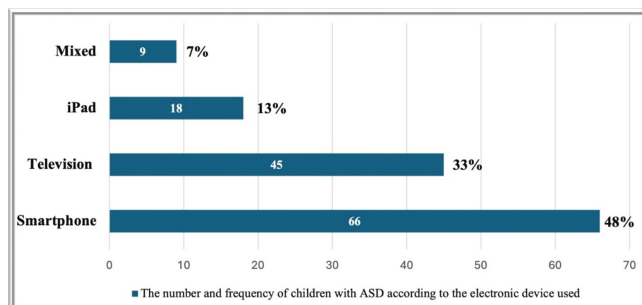
DISCUSSION

Research has proven that long-screen exposure in children with ASD leads to a negative health outcome. Despite the identification of multiple factors that influence the duration of screening time in this population, a knowledge gap remains, underscoring the need for further investigation [15]. In the current study, the average duration of screen time in Iraqi children with ASD was 1.94 ± 1.277 hours per day with 30% of them having a screen time of ≥ 2 hours per day. This duration

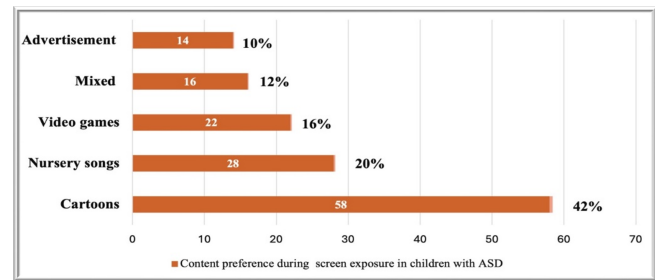
Table 1. Characteristics of the 138 autism spectrum disorder children with screen exposure.*

Variables	Values
Current age	
Mean \pm SD (years)	5.25 \pm 2.85
Range	2–12
Age at diagnosis	
Mean \pm SD (years)	2.57 \pm 1.137
Range	1–7
Gender, N (%)	
Male	117 (84.8%)
Female	21 (15.2%)
Duration of screen exposure	
Mean \pm SD (years)	1.94 \pm 1.277
Range	0.5–6
< 2 hours	96 (70%)
\geq 2 hours	42 (30%)
Ownership of independent electronic device, n (%)	
Yes	0
No	138 (100%)
Sleeping at daytime	
Mean \pm SD (Hours)	1.44 \pm 1.07
Range	0–6
Sleeping at night	
Mean \pm SD (Hours)	7.85 \pm 2
Range	5–12
Social Communication Questionnaire's Score	
Mean \pm SD	18.17 \pm 5.79
Range	7–32
Aggressive behavior, N (%)	
Yes	36 (26%)
No	102 (74%)

* N: Number, SD: Standard deviation.

**Figure 1.** The distribution of children with autism spectrum disorder (ASD) according to the electronic device used during screen exposure.

of screen exposure is lower than reported in other studies [7, 11, 16]. The highest screen exposure in children with ASD was documented in Qatar by Kheir et al. [17] with an average of 5.2 ± 4.3 hours. The differences in age of children recruited in these studies could partially explain the discrepancies in the duration of screen exposure, as older children often receive special education or schooling while young children with ASD spend more time indoors, giving them more opportunities for

**Figure 2.** The distribution of children with autism spectrum disorder (ASD) according to the screen preference.**Table 2.** The association of patient's characteristics with the average duration of screen exposure.*

Variables	Duration of screen exposure		P-value
	< 2 hours (N = 96)	\geq 2 hours (N = 42)	
Gender, N (%)			
Male	81	36	0.907*
Female	15	6	
Current age			
Mean \pm SD	5.16 \pm 2.87	5.46 \pm 2.89	0.746 [†]
Age at diagnosis			
Mean \pm SD	2.51 \pm 1.07	2.74 \pm 1.33	0.555 [†]
Sleeping at day			
Mean \pm SD	1.47 \pm 1.03	1.37 \pm 1.04	0.784 [†]
Sleeping at night			
Mean \pm SD	7.5 \pm 1.7	8.82 \pm 2.32	0.061 [†]
SCQ scores			
Mean \pm SD	18.22 \pm 6.03	18.07 \pm 5.44	0.938 [†]
Aggressive behavior, N(%)			
Present	10	26	0.166*
Absent	57	6	

* Chi-square test; [†]Student t-test, N: Number, SD: Standard deviation, SCQ: Social communication questionnaire.

electronic screen time.

Smartphones are the predominant electronic device used by 63.8% of ASD children in the current study and only 4.3% of them use more than one device. On the other hand, previous reports identified television as the predominant device used for screen time in ASD children [18, 19] and that most of them were exposed to an average of 2 to 3 electronic devices [20]. This difference can be attributed to the increasing role of smartphones in screen time in children with or without ASD in parallel to the development of network technology and advancements in electronic technology [21, 22]. In addition, different smartphone applications were introduced to enhance the learning skills of children with ASD which is likely to further enhance the role of smartphones in children with ASD [23]. The main content that children with ASD spend screen time with watching cartoons in 42% and this goes with previous reports [24]. However, the preferred content varies with age as cartoons are most popular in children of 7 years and younger, but they decrease in popularity as children get older [18].

Table 3. Analysis of family variables associated with the average duration of screen exposure in children with ASD.*

Variables	Duration of screen exposure		Total N = 138 (%)	P-value
	< 2 hours, N = 96(%)	≥ 2 hours, N = 42 (%)		
Father's level of education				
Illiterate	3 (3.1)	9 (21.4)	12(8.7)	0.056
Primary	27 (28.1)	6 (14.3)	33(23.9)	
Secondary	36 (37.5)	24 (57.1)	60(43.5)	
Bachelor	30 (31.3)	3 (7.1)	33(23.9)	
Mother's level of education				
Illiterate	3 (3.1)	3 (7.1)	6 (4.3)	0.008
Primary	24 (25)	24 (57.1)	48(34.8)	
Secondary	27 (28.1)	15(35.7)	42(30.4)	
Bachelor	42 (43.8)	0 (0)	42(30.4)	
Father occupation				
Free work	36 (37.5)	24 (57.1)	60(43.5)	0.216
employee	60 (62.5)	18 (42.9)	78(56.5)	
Mother Occupation				
Housewife	63 (65.6)	42 (100)	105(76.1)	0.02
Employee	33 (34.4)	0 (0)	33(23.9)	
Father's age (per years)				
< 20	3 (3.1)	0 (0)	3(2.2)	0.640
20–39	51(53.1)	18 (42.9)	69 (50)	
40–59	39 (40.6)	21 (50)	60 (43.5)	
≥60	3 (3.1)	3 (7.1)	6(4.3)	
Mother's age (per years)				
<20	3 (3.1)	6 (14.3)	9(6.5)	0.058
20–39	78 (81.3)	24 (57.1)	102(73.9)	
40–59	15(15.6)	12 (28.6)	27(19.6)	
≥60	0(0)	0(0)	0(0)	
Presence of other children at home				
Absent	30 (31.3)	6 (14.3)	36 (26.1)	0.228
Present	66 (68.8)	36 (85.7)	102 (73.9)	

* N: Number.

Table 4. The correlation between the duration of screening time and patients' characteristics.*

Variables	r	P-value
Sleeping at daytime	0.025	0.870
Sleeping at night	0.276	0.081
Age at diagnosis	– 0.337	0.027
SCQ score	– 0.029	0.847

* r = Correlation coefficient, SCQ: Social communication questionnaire.

The present study revealed no association between screen duration and patients' characteristics. However, we found two family factors significantly associated with long screen time: The maternal level of education and the maternal occupation (P-value = 0.008, 0.02, respectively). Dong et al. [11] reached a similar conclusion as in their study lower levels of paternal education are associated with higher screen exposure which matches our data, but the difference failed to show statistical significance (P-value = 0.056). Parents of low educational levels may have less knowledge about the hazards of prolonged screen exposure and have less time to actively engage children in non-screen-based activities, leading to in-

creased screen time [25, 26].

The impairment of social communication, which represents one of the cornerstones in diagnostic criteria of ASD was found to be exaggerated in children with long screen exposure [27], and the reduction of screen time was found to result in a significant improvement in core symptoms of autism [28]. In the present study, we used the SCQ scores to assess the degree of impairment in social communication, and we found no statistical difference in SCQ score with the duration of screen exposure (P-value = 0.938), and by Pearson correlation testing there was no correlation between duration of screen exposure and SCQ scores with correlation coefficient ($r = -0.029$, P-value = 0.847). This disagrees with results from previous studies, and this discrepancy could be attributed to different screen contents and screen duration in the studied sample included in these studies [29].

In the current study, there was no correlation between the duration of screen exposure and duration of sleep, and although the mean sleeping time during daytime and night was higher in children who were exposed to screen for ≥ 2 hours, it does not reach statistical significance (P-value = 0.784, 0.061 respectively). Studies found that viewing electronic screens before bedtime may have a soothing effect on children with ASD, and children may be accustomed to falling asleep on them, cutting these activities before bed may intensify the

sleeping problems in children with ASD in the short term [30].

There are multiple limitations to this study. Firstly, the collection of data regarding children's sleeping and social communication relied on parent ratings, making the information subjective, and there may have been recall bias. Second, being cross-sectional limits the ability to draw a causal relationship between the duration of screen exposure and impairments in children's social communication and sleep disturbances. The small sample size and hospital-based setting are also major limitations. However, this study could pave the way for a large-scale study in the future that collects data objectively in a community setting, particularly through the use of home cameras for monitoring sleep and behavior.

CONCLUSION

Maternal level of education and occupation represent significant determinants of screen time in children with ASD. These children's extended screen time was associated with their diagnosis age, but it did not appear to significantly impact their social communication skills. In children with ASD, the duration of screen time did not affect the duration of their sleep, either at night or during the day.

ETHICAL DECLARATIONS

Acknowledgments

The authors thank the families of children who agreed to participate in this study and Mustansiriyah University for

continuous support.

Ethics Approval and Consent to Participate

The study was approved by the College of Medicine, Mustansiriyah University (Reference number 18 on 1-2-2024). Informed consent was obtained from the parents of each child.

Consent for Publication

Not applicable (no individual personal data included).

Availability of Data and Material

The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Competing Interests

The authors declare that there is no conflict of interest.

Funding

No funding.

Authors' Contributions

All authors have an intellectual participation in preparing and writing the manuscript. All authors read and approved the final version of the manuscript.

REFERENCES

- [1] T. Hirota and B. H. King. Autism spectrum disorder: a review. *Jama*, 329(9):157–168, 2023.
- [2] M. J. Maenner *et al.* Prevalence and characteristics of autism spectrum disorder among children aged 8 years—autism and developmental disabilities monitoring network, 11 sites, united states, 2018. *MMWR. Surveillance Summaries*, 70(11):1–16, 2021.
- [3] M. O. Mazurek, C. R. Engelhardt, J. Hilgard, and K. Sohl. Bedtime electronic media use and sleep in children with autism spectrum disorder. *Journal of Developmental & Behavioral Pediatrics*, 37(7):525–531, 2016.
- [4] O. Slobodin, K. F. Heffler, and M. Davidovitch. Screen media and autism spectrum disorder: a systematic literature review. *Journal of Developmental & Behavioral Pediatrics*, 40(4):303–311, 2019.
- [5] J. Lin *et al.* The relationship among screen use, sleep, and emotional/behavioral difficulties in preschool children with neurodevelopmental disorders. *Journal of Developmental & Behavioral Pediatrics*, 40(7):519–529, 2019.
- [6] J. M. Twenge and W. K. Campbell. Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. *Preventive medicine reports*, 12(1):271–283, 2018.
- [7] S. Healy, J. M. Garcia, and J. A. Haegele. Environmental factors associated with physical activity and screen time among children with and without autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 50(5):1572–1579, 2020.
- [8] R. A. Jones *et al.* Physical activity, sedentary behavior and their correlates in children with autism spectrum disorder: A systematic review. *PloS one*, 12(2):e0172482, 2017.
- [9] S. R. Sharma, X. Gonda, and F. I. Tarazi. Autism spectrum disorder: classification, diagnosis and therapy. *Pharmacology & therapeutics*, 190(10):91–104, 2018.
- [10] M. Aldosari *et al.* Validation of the arabic version of the social communication questionnaire. *Autism*, 23(7):1655–1662, 2019.
- [11] H. Y. Dong, J. Y. Feng, B. Wang, L. Shan, and F. Y. Jia. Screen time and autism: current situation and risk factors for screen time among pre-school children with asd. *Front Psychiatry*, 12:675902, 2021.
- [12] S. Guram and P. Heinz. Media use in children: American academy of pediatrics recommendations 2016. *Archives of Disease in Childhood-Education and Practice*, 103(2):99–101, 2018.
- [13] M. A. Pourhoseingholi, M. Vahedi, and M. Rahimzadeh. Sample size calculation in medical studies. *Gastroenterology and Hepatology from bed to bench*, 6(1):2, 2013.
- [14] H. Y. Dong, B. Wang, H. H. Li, X. J. Yue, and F. Y. Jia. Correlation between screen time and autistic symptoms as well as development quotients in children with autism spectrum disorder. *Front Psychiatry*, 12:619994, 2021.
- [15] D. Hermawati, F. A. Rahmadi, T. A. Sumekar, and T. I. Winarni. Early electronic screen exposure and autistic-like symptoms. *Intractable & rare diseases research*, 7(1):69–71, 2018.

- [16] M. O. Mazurek and C. Wenstrup. Television, video game and social media use among children with asd and typically developing siblings. *Journal of autism and developmental disorders*, 43(6):1258–1271, 2013.
- [17] N. M. Kheir, O. M. Ghoneim, A. L. Sandridge, S. A. Hayder, M. S. Al-Ismael, and F. Al-Rawi. Concerns and considerations among caregivers of a child with autism in qatar. *BMC Research Notes*, 5(1):290, 2012.
- [18] A. Stiller and T. Mößle. Media use among children and adolescents with autism spectrum disorder: A systematic review. *Review Journal of Autism and Developmental Disorders*, 5(3):227–246, 2018.
- [19] M. H. Kuo, G. I. Orsmond, W. J. Coster, and E. S. Cohn. Media use among adolescents with autism spectrum disorder. *Autism*, 18(8):914–923, 2014.
- [20] J. A. MacMullin, Y. Lunskey, and J. A. Weiss. Plugged in: Electronics use in youth and young adults with autism spectrum disorder. *Autism*, 20(1):45–54, 2016.
- [21] J. Geissler *et al.* Smartphone-based behaviour analysis for challenging behaviour in intellectual and developmental disabilities and autism spectrum disorder—study protocol for the provia trial. *Frontiers in Neuroscience*, 16(5):984618, 2022.
- [22] M. Melchior *et al.* Tv, computer, tablet and smartphone use and autism spectrum disorder risk in early childhood: a nationally-representative study. *BMC Public Health*, 22(1):865, 2022.
- [23] A. Ishaq and M. Shoaib. A smartphone application for enhancing educational skills to support and improve the safety of autistic individuals. *Universal Access in the Information Society*, 21(4):851–861, 2022.
- [24] N. Martins, A. King, and R. Beights. Audiovisual media content preferences of children with autism spectrum disorders: Insights from parental interviews. *Journal of autism and developmental disorders*, 50(9):3092–3100, 2020.
- [25] C. Chen, S. Chen, P. Wen, and C. E. Snow. Are screen devices soothing children or soothing parents? investigating the relationships among children’s exposure to different types of screen media, parental efficacy and home literacy practices. *Computers in Human Behavior*, 112(1):106462, 2020.
- [26] K. Tombeau Cost *et al.*, Daphne Korczak, Alice Charach, Catherine Birken, Jonathon L Maguire, Patricia C Parkin, and Peter Szatmari. Association of parental and contextual stressors with child screen exposure and child screen exposure combined with feeding. *JAMA Network Open*, 3(2):e1920557–e1920557, 2020.
- [27] A. Alqifari *et al.* The association between screen time exposure, parent depression, and development of social communication skills among preschool children in qassim region. *Middle East Current Psychiatry*, 31(1):51, 2024.
- [28] K. F. Heffler, L. R. Frome, B. Garvin, L. M. Bungert, and D. S. Bennett. Screen time reduction and focus on social engagement in autism spectrum disorder: A pilot study. *Pediatrics International*, 64(1):e15343, 2022.
- [29] N. Alrahili *et al.* The association between screen time exposure and autism spectrum disorder-like symptoms in children. *Cureus*, 13(10), 2021.
- [30] H. Dong, T. Wang, J. Feng, Y. Xue, and F. Jia. The relationship between screen time before bedtime and behaviors of preschoolers with autism spectrum disorder and the mediating effects of sleep. *BMC psychiatry*, 23(1):635, 2023.