

Screen Time Exposure in Preschool Children with ADHD: A Cross-Sectional Exploratory Study from South India

Sivapriya Vaidyanathan¹, Harshini Manohar², Venkatesh Chandrasekaran³, Preeti Kandasamy⁴

ABSTRACT

Background: Concern is mounting regarding screen exposure among young children and its association with mental health. Children with attention deficit hyperactivity disorder (ADHD) may be more vulnerable to its effects such as increased externalizing behaviors and problems with language and cognitive development and biological functions such as sleep. We aimed to assess screen exposure in preschool children with ADHD and to study the correlation of screen time with the severity of ADHD and parental stress levels.

Methods: Children of age 2.5–6 years, diagnosed with ADHD ($n = 56$) were included, and details of the total duration of screen exposure, maximum continuous screen exposure time, and types of screen-based devices used, reasons for screen exposure were collected from primary caregivers. ADHD symptom severity was assessed on Conner's Abbreviated Rating Scale. Family interview for stress and coping, adapted for ADHD, was used to measure parental stress.

Results: Total screen exposure time in preschool children with ADHD was more

than the recommended standards in 80.4% of children, with a median of 140.00 minutes (range: 20–500 minutes). The most commonly used modality was television (98.2%), followed by mobile phones (87.3%), tablets (17.9%), and laptops (10.7%). The severity of ADHD ($r = 0.29$, $P = 0.02$) and parent stress levels ($r = 0.29$, $P = 0.03$) were positively correlated to increased screen time exposure in the child.

Conclusions: Preschool children with ADHD have screen exposure above the recommended duration of one hour/day. Structured parent training programs for children with preschool ADHD and providing developmentally appropriate interventions are essential in curtailing screen time exposure and also to address parental stress.

Keywords: Attention deficit hyperactivity disorder, ADHD, preschool, screen time, India

Key Messages: Screen exposure time was above the recommended standards of one hour/day in 80.4% of preschool children with ADHD, and it had a positive correlation with the severity of ADHD and parental stress. Structured parent training programs for preschool ADHD are important in

curtailing screen time exposure and addressing parental stress.

Media forms an integral part of the life of young children, with increasing trends in screen exposure in recent years.¹ Screen time is defined as “the time spent in sedentary behaviors such as viewing television, playing games, and using computer and smartphones.”² According to the American Academy of Pediatrics (AAP) guidelines, the recommended screen time for children above the age of 2 years is less than one hour per day.^{2,3} The World Health Organization (WHO) guideline recommends no screen exposure to children less than 2 years old and not more than 1 hour of screen time to children of 2–4 years of age.⁴ There is an increasing concern regarding the association of screen exposure with mental illness in children.⁵ Diversity of the impact of digital media depends on the types of devices, content, and degree of interactive interfaces, solitary engagement, background exposure, maximum continuous exposure at one time, and cumulative

¹Dept. of Psychiatry, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India. ²Dept. of Child and Adolescent Psychiatry, National Institute of Mental Health and Neuro-Sciences, Bangalore, Karnataka, India. ³Dept. of Pediatrics, Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry, India. ⁴Dept. of Psychiatry, Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry, India.

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Address for correspondence: Preeti Kandasamy, Dept. of Psychiatry, Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry, India.
E-mail: preetikandasamy@gmail.com

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exposure per day. The interactions of these variables are multifaceted and complex, and hence need intensive research.²

The prevalence of ADHD in India ranges between 4.7% and 29.2%,⁶ with limited reports of prevalence in preschool children.⁷ Early intervention is vital in improving long-term adverse outcomes in children with ADHD.^{8,9} Family members of children with ADHD undergo higher stress in interpersonal and social spheres.¹⁰ Given the current trends in nuclear family structure and employment status of both parents, an increase in gadget-based engagement is practiced in place of developmentally appropriate activities.^{2,11,12} Though parents may perceive technology-assisted learning as an advantage, its adverse effects on the child are major limitations.¹³

Children with ADHD have executive function deficits such as impairment in delay aversion and temporal processing. Screen-based devices with their varying multisensory stimuli can keep them engaged, making them more vulnerable than typically developing children.^{9,14} Attention problems, hyperactivity, and impulsivity increased screen time as an alternative for developmentally appropriate engagement, could be challenging in children with ADHD.^{12,15,16}

Most studies on screen time and its effect on children's mental health are conducted in Western countries.^{2,5,14-16} Given the smartphone penetration and the sociocultural diversity of India, there is a need to explore screen exposure among Indian children. Due to dearth of Indian studies on this topic, this study aimed to measure screen exposure and the factors affecting screen time in preschool children with ADHD in South India.

The objectives of the study were the following:

1. To assess the nature of screen exposure in preschool children with ADHD.
2. To study the correlation between the severity of ADHD and parental stress levels with screen time.

Materials and Methods

The study was conducted at the child and adolescent psychiatry unit, JIPMER, Puducherry, from December 2017 to December 2018. A total of 56 participants

aged 2.5–6 years, with a diagnosis of ADHD as per *DSM-5*, were consecutively recruited after taking informed consent from the parents. After detailed assessment and evaluation, the diagnosis was made by a team consisting of a pediatrician, child psychiatrist, and senior resident in child psychiatry, as part of standard care, based on *DSM-5* criteria checklist. Exclusion criteria were children with comorbid autism or social quotient below 50 as measured on the Vineland Social Maturity Scale.¹⁷ The study was approved by the Institutional Ethics Committee.

A semistructured pro forma was used, during a one-to-one in-depth interview with parents, to collect details such as sociodemographic profile, the total duration of screen exposure, maximum continuous screen time, number of types of screen-based devices used and their duration, and the reasons for screen exposure. The operational definition of excessive screen time was, in accordance with the recommendations of the American Academy of Pediatrics and WHO guidelines for preschool children, more than one hour of screen exposure in a day.^{3,4} The ADHD symptom profile and severity were assessed on *DSM-5* diagnostic criteria and Conner's Abbreviated Behavior Rating Scale.¹⁸ Parental stress was measured using family interview for stress and coping (FISC), a structured instrument validated for use in the Indian setting.¹⁹

Statistical Analysis

IBM PAW STATISTICS SPSS version 19.0 was used for statistical analysis. Frequencies and percentages were used to represent categorical variables. Means and standard deviations were used to represent continuous variables. Correlation between the educational status of parents, the severity of ADHD, baseline stress and coping scores, and screen time exposure was done using Pearson's correlation.

Results

1. Sociodemographic profile: Of the 56 children, 47 (83.9%) were male, and 9 (16.1%) were female. A total of 35 (62.5%) and 16 (28.6%) of the

families belonged to lower and middle socioeconomic status, respectively, whereas 5 (8.9%) belonged to higher socioeconomic status. 38 (67.9%) of the families were nuclear and 26 (46.4%) belonged to the urban background. Of the parents, 13 (23.3%) were professionals, while 43 (76.8%) mothers were housewives. The mean \pm SD educational status of the primary caregiver as the number of years of schooling was 10.6 ± 4.84 years.

2. Clinical profile: The mean age of the children was 57.82 ± 15.12 months. The most common presentation of ADHD was combined in 31 (55.4%) children, followed by 14 (25%) having predominant hyperactivity-impulsivity and 11 (19.6%), inattentive presentation. The average severity of ADHD was 20.0 ± 4.01 as measured on Conner's Abbreviated Rating Scale. Comorbid speech and language disorder was present in 27 (48.2%), "at-risk" for specific learning disability in 7 (12.5%), and oppositional defiant behaviors in 4 (7.14%). The mean total scores of parental stress and the coping were 27.05 ± 8.70 and 25.53 ± 5.70 , respectively.
3. Screen exposure: Total screen exposure time was more than the recommended standards in 45 (80.4%) children, with a mean of 170.37 ± 127.9 minutes and a median of 140.00 minutes (20–500 minutes) (**Table 1**). The total screen time was more in children with predominant hyperactivity (192.8 ± 127 minutes), followed by predominant inattention (179.0 ± 128.5 minutes) and combined presentation (157.1 ± 130.5 minutes). A total of 45 (80.4%) children had screen time viewing above the WHO recommendations of one hour, and among them, 34 (60.7%) had above 2 hours. Children experiencing higher than the recommended duration of screen exposure did not significantly differ from those who did not, in terms of sociodemographic profile. All children were exposed to solitary screen exposure.

The most common preferred devices of the children and parents were television and mobile. Parent-related reasons ($n = 34, 60.7%$) for screen exposure were

more common than child-related reasons ($n = 22, 39.3\%$). Common reasons for increased screen time exposure are illustrated in **Figure 1**.

The severity of ADHD had a positive correlation with parent stress levels ($r = 0.54, P = 0.000$). Increased screen time had a positive correlation with child's ADHD severity ($r = 0.29, P = 0.02$) and parental stress levels ($r = 0.29, P = 0.03$). The age of the children and the total screen time duration showed no correlation ($r = 0.06, P = 0.66$) (**Table 2**). Among the parents, 7 (12.5%) mothers had major depressive disorder and were referred for independent evaluation and management, whose 5 (71.4%) children had a screen time exposure higher than 1 hour/day.

Discussion

In this study, screen time was above the recommendations as per guidelines for most of the children. Television (98.2%) and mobile phone (87.3%) were the most common modalities of screen exposure in the study sample, and parent-related reasons for screen exposure were more common than child-related reasons.³ While there is a scarcity of research in this age group, there exists an added limitation in the extant Indian literature that the available research focuses largely on school-going children and adolescents. A multi-centric study, which included India, demonstrated that 31.3% of children aged 9–11 years had screen exposure duration more than 2 hours, with an average duration of 1.8 hours/day.¹⁶ Studies examining correlates of sedentary behavior have been limited by small sample size, restricted geographic area, and little socio-cultural variability. Further, few studies have examined correlates of total sedentary time (SED). The most common mode of screen use demonstrated was television.^{20,21} Another study demonstrated that 35.8% of children aged 6–12 years had screen time exposure above 2 hours per day, with lower maternal education being associated with higher screen exposure.²⁰ In a study from Delhi, the mean screen time in the adolescent age group was 3.8 (2.77) hours/day. About 68% had screen time more than recommended (> 2 hours).²¹

A study on preschool children found a trend towards an association of higher

TABLE 1.

Details of Screen Exposure

Details of Screen Exposure	Median (Range)
Total screen time/day in minutes	140(480)
Maximum continuous exposure in minutes/day	120(350)
Duration of TV in minutes/day	60(380)
Duration of mobile in minutes/day	30(360)
Duration of laptop in minutes/day	0(120)
Duration of tablet in minutes/day	0(180)

FIGURE 1.

Reasons for Screen Exposure

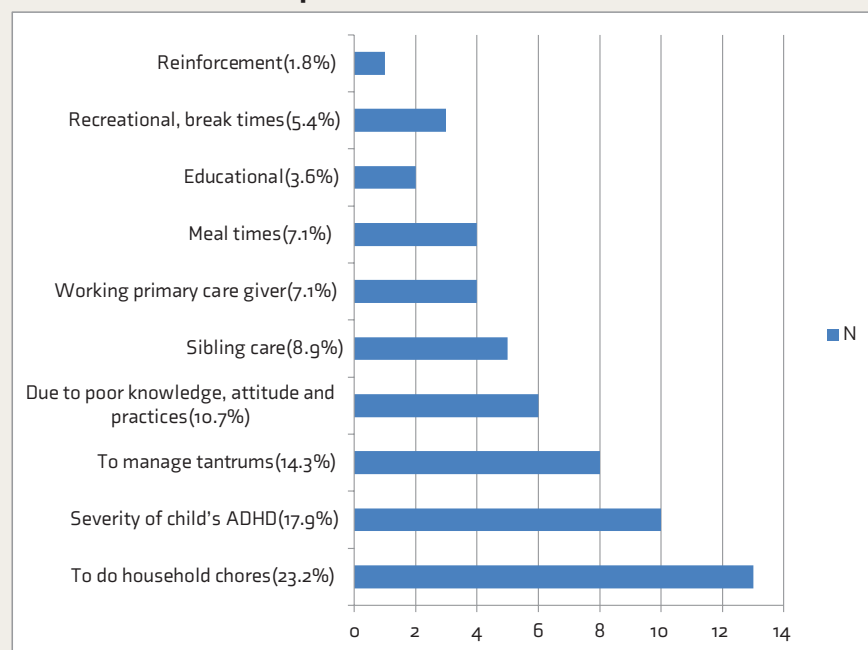


TABLE 2.

Correlation of Clinical Profile and Screen Time Exposure

Clinical and Sociodemographic Profile	Correlation with Total Screen Time $r(P)$
ADHD severity in Conner's Abbreviated Rating Scale	0.29 (0.02)*
FISC-ADHD parental stress	0.29 (0.03)*
FISC-ADHD parental coping	0.06(0.612)
Parental education in years	-0.004(0.97)

* $P < 0.05$. ADHD: attention deficit hyperactivity disorder, FISC-ADHD: family interview for stress and coping adapted for ADHD.

screen exposure duration with externalizing behavior. It was highlighted that children with more screen time had significantly higher screen time in caregivers.²² Results from a cohort study showed that screen-based devices were accessible to over 95% of children. The average screen time was 1.5 hours/day

in the preschool age group. In comparison with children with below 30 minutes/day screen time, those watching more than 2 hours a day had clinically significant externalizing problems and inattention issues. These children had a higher risk of having ADHD (95% CI: 1.6, 38.1, $P = 0.01$).²³ Contradicting the above

results, a UK-based study reported that there was no association between screen time and behavior problems in the pre-school age group.¹⁵

Our study is corroborative of the available literature. The severity of ADHD was found to have a positive correlation with the increased screen time exposure. One possible explanation is that the severe the ADHD, due to the executive function deficits, the more the child has difficulty in engaging in developmentally appropriate play-based tasks that require sustained attention. The child may then prefer the screen devices to the play-based activities, as they tend to offer more multisensory and diverse stimulation.⁹ However, it was noted that screen time was more associated with parent-related factors, indicating that the screen could also be used as a respite by the parents for children with severe symptoms.

A cross-sectional study of mothers of children in the preschool age group reported that boys and girls had a mean screen time duration of 2.0 and 2.2 hours/day, respectively. Solitary screen time may adversely affect preschool children's social skills, which are a significant difficulty in children with ADHD. Screen time that is sedentary and solitary decreases interaction with peers and, therefore, reduces socialization and development of normal social skills and, moreover, worsens the outcomes for this already vulnerable population.¹² including psychosocial wellbeing. Social skills, one component of psychosocial wellbeing, are vital for children's school readiness and future mental health. This study investigates potential associations of screen time and outdoor play (as a proxy for physical activity. Another possible mechanism of screen time affecting ADHD symptoms is by worsening the sleep disturbances.⁵

Families of children with ADHD have significant stress levels.^{10,24} In our study, the severity of ADHD was found to have a positive correlation with parental stress and both, in turn, were positively correlated with increased screen time exposure. Parental stress can impact child outcomes due to lack of availability of the parents and limited dyadic interaction to provide adequate stimulation and environmental enrichment. This may, in

turn, lead to poor adherence to medical treatment and parental engagement and motivation for behavioral interventions.¹⁰

The odds of TV viewing increased by almost half with parental depression.²⁵ Similar to maternal depression, early TV viewing poses added risks of reduced stimulation for optimal infant development. This highlights the need to evaluate and address parental stress, which is an important strategy to enhance motivation and parental involvement in the therapeutic process and thereby improve the child-related outcomes.^{10,26}

In our study, there was no correlation between the age of the child and screen time duration. However, it has been associated with a risk for increased ADHD and autism. Therefore, it is a modifiable environmental risk factor of clinical relevance for children with neurodevelopmental vulnerabilities.^{11,27}

While most studies on screen exposure in the preschool age group have been observational, there is a paucity of interventional studies. A randomized control trial tested a simple intervention to decrease the duration of screen exposure in preschool children. The components of the intervention were information-based and included harmful effects of screen-based devices and other options of activities such as reading age-appropriate books, alternative activities, joint meals with devices off, and use of "no screen" signs. The parents in the intervention group reported less screen time and lesser aggression in their children.²⁸

Though the current study was primarily observational, at the end of the parental interview, a feedback was provided regarding their child's screen time use, and its possible influence on development and information regarding the current expert recommendations was shared.

Strategies of behavior interventions such as activity scheduling; physical exercise; attention-enhancing tasks like coloring, puzzles, and mazes, and differential reinforcement principles can be efficacious in addressing these difficulties.²⁹ In cases where the primary caregiver is working, sharing of responsibilities by other caregivers can help in keeping the child engaged. Parents can choose high-quality programming and co-view

it with the children. The AAP guidelines also recommend parents to limit their own media use and model this behavior for their children. It is important to screen the digital applications and programs for fast-paced and violent content as well as continuously monitor the use regularly.^{3,30} Further, there is upcoming evidence for the use of pharmacotherapy in preschool children with severe symptoms.^{30,31}

There is a growing prevalence of neurodevelopmental disorders such as autism and language deficits along with increasing use of electronic devices, which despite offering multisensory stimulation, cannot replace the sensory-motor and cognitive skills acquired from developmentally-appropriate play-based stimulation and environmental enrichment.^{11,27,32} It becomes important to delineate what is child-friendly versus development-friendly, as they are not necessarily synonymous and may hinder the typical development of a child.

Limitations

The small sample size and lack of comparator are the major limitations. The diagnosis of ADHD was done clinically using the DSM-5 symptom checklist, and the severity was assessed using Conner's Abbreviated Behavior Rating Scale; no structured diagnostic interview schedule was used. Further research with longitudinal design with a comparator can evaluate the cause-effect relationship and assess the long-term adverse outcomes. Studies about specific details such as the nature of the content of screen time practices can provide more valuable information.

Conclusion

Preschool children with ADHD have screen time exposure more than the recommended duration. The adverse physical and mental health effects on a developing child are major implications. Increasing focus on effective interventions to reduce screen time and promote healthy and developmentally appropriate engagement for children with ADHD is essential.

Declaration of Conflicting Interests

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References

- Vandewater EA, Rideout VJ, Wartella EA, et al. Digital childhood: electronic media and technology use among infants, toddlers, and preschoolers. *Pediatrics* 2007; 119(5): e1006–1015.
- Canadian Paediatric Society. Screen time and young children: promoting health and development in a digital world. *Paediatr Child Health*. Oxford Academic (Internet). <https://academic.oup.com/pch/article/22/8/461/4392451> (accessed May 10, 2019).
- Media and Young Minds. From the American Academy of Pediatrics. *Pediatrics* <https://pediatrics.aappublications.org/content/138/5/e20162591> (accessed May 13, 2019)
- WHO. To grow up healthy, children need to sit less and play more (Internet). Available at: <https://www.who.int/news-room/detail/24-04-2019-to-grow-up-healthy-children-need-to-sit-less-and-play-more> (accessed on May 8, 2019).
- Domingues-Montanari S. Clinical and psychological effects of excessive screen time on children. *J Paediatr Child Health* 2017; 53(4): 333–338.
- Kuppili PP, Manohar H, Pattanayak RD, et al. ADHD research in India: a narrative review. *Asian J Psychiatry* 2017; 30: 11–25.
- Suvarna BS and Kamath A. Prevalence of attention deficit disorder among preschool age children. *Nepal Med Coll J NMCJ* 2009; 11(1): 1–4.
- Biederman J, Petty CR, Woodworth KY, et al. Adult outcome of attention-deficit/hyperactivity disorder: a controlled 16-year follow-up study. *J Clin Psychiatry* 2012; 73(7): 941–950.
- Roth RM and Saykin AJ. Executive dysfunction in attention-deficit/hyperactivity disorder: cognitive and neuroimaging findings. *Psychiatr Clin North Am* 2004; 27(1): 83–96, ix.
- Fridman M, Banaschewski T, Sikirica V, et al. Factors associated with caregiver burden among pharmacotherapy-treated children/adolescents with ADHD in the Caregiver Perspective on Pediatric ADHD survey in Europe. *Neuropsychiatr Dis Treat* 2017; 13: 373–386.
- Courage ML and Setliff AE. When babies watch television: attention-getting, attention-holding, and the implications for learning from video material. *Dev Rev* 2010; 30(2): 220–238.
- Hinkley T, Brown H, Carson V, and Teychenne M. Cross sectional associations of screen time and outdoor play with social skills in preschool children. *PLoS One* 2018; 13(4): e0193700.
- Radesky JS, Schumacher J, and Zuckerman B. Mobile and interactive media use by young children: the good, the bad, and the unknown. *Pediatrics* 2015; 135(1): 1–3.
- Nikkelen SWC, Valkenburg PM, Huizinga M, and Bushman BJ. Media use and ADHD-related behaviors in children and adolescents: a meta-analysis. *Dev Psychol* 2014; 50(9): 2228–2241.
- Griffiths LJ, Dowda M, Dezateaux C, and Pate R. Associations between sport and screen-entertainment with mental health problems in 5-year-old children. *Int J Behav Nutr Phys Act* 2010; 7: 30.
- LeBlanc AG, Katzmarzyk PT, Barreira TV, et al. Correlates of total sedentary time and screen time in 9–11 year-old children around the world: the international study of childhood obesity, lifestyle and the environment. *PLoS One* 2015; 10(6): e0129622.
- Association AP. *Diagnostic and statistical manual of mental disorders*. 5th rev ed. Washington, DC: American Psychiatric Publishing, 2013. 991 p.
- Ullmann RK, Sleator EK, and Sprague RL. A change of mind: the Conners Abbreviated Rating Scales reconsidered. *J Abnorm Child Psychol* 1985; 13(4): 553–565.
- Girimaji SC, Srinath S, Seshadri S, and Krishna DK. Family interview for stress and coping in mental retardation (fiscmr): a tool to study stress and coping in families of children with mental retardation. *Indian J Psychiatry* 1999; 41(4): 341–349.
- Ravikiran SR, Baliga BS, Jain A, and Kotian MS. Factors influencing the television viewing practices of Indian children. *Indian J Pediatr* 2014; 81(2): 114–119.
- Dubey M, Nongkynrih B, Gupta SK, et al. Screen-based media use and screen time assessment among adolescents residing in an Urban Resettlement Colony in New Delhi, India. *J Fam Med Prim Care* 2018; 7(6): 1236–1242.
- Tansriratanawong S, Louthrenoo O, Chonchaiya W, and Charmsil C. Screen viewing time and externalising problems in pre-school children in Northern Thailand. *J Child Adolesc Ment Health* 2017; 29(3): 245–252.
- Tamana SK, Ezeugwu V, Chikuma J, et al. Screen-time is associated with inattention problems in preschoolers: Results from the CHILDBIRTH cohort study. *PLoS One* 2019; 14(4): e0213995.
- Theule J, Wiener J, Tannock R, and Jenkins JM. Parenting stress in families of children with ADHD: a meta-analysis. *J Emot Behav Disord* 2013; 21(1): 3–17.
- Anand V, Downs SM, Bauer NS, and Carroll AE. Prevalence of infant television viewing and maternal depression symptoms. *J Dev Behav Pediatr* 2014; 35(3): 216–224.
- Deault LC. A systematic review of parenting in relation to the development of comorbidities and functional impairments in children with attention-deficit/hyperactivity disorder (ADHD). *Child Psychiatry Hum Dev* 2010; 41(2): 168–192.
- Mazurek MO, Shattuck PT, Wagner M, and Cooper BP. Prevalence and correlates of screen-based media use among youths with autism spectrum disorders. *J Autism Dev Disord* 2012; 42(8): 1757–1767.
- Yilmaz G, Caylan ND, and Karacan CD. An intervention to preschool children for reducing screen time: a randomized controlled trial. *Child Care Health Dev* 2015; 41(3): 443–449.
- Charach A, Carson P, Fox S, et al. Interventions for preschool children at high risk for ADHD: a comparative effectiveness review. *Pediatrics* 2013; 131(5): e1584–1604.
- Vitiello B, Lazzaretto D, Yershova K, et al. Pharmacotherapy of the preschool ADHD treatment study (PATS) children growing up. *J Am Acad Child Adolesc Psychiatry* 2015; 54(7): 550–556.
- Vaidyanathan S, Rajan TM, Chandrasekaran V, and Kandasamy P. Pre-school attention deficit hyperactivity disorder: 12 weeks prospective study. *Asian J Psychiatry* 2020; 48: 101903.
- Chonchaiya W and Pruksananonda C. Television viewing associates with delayed language development. *Acta Paediatr* 2008; 97(7): 977–982.