



Brief Original Report

A television in the bedroom is associated with higher weekday screen time among youth with attention deficit hyperactivity disorder (ADD/ADHD)

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ABSTRACT

Objective. A TV in the bedroom has been associated with screen time in youth. Youth with attention deficit hyperactivity disorder (ADD/ADHD) have higher rates of screen time, but associations with bedroom TVs are unknown in this population. We examined the association of having a bedroom TV with screen time among youth with ADD/ADHD.

Methods. Data were from the 2007 National Survey of Children's Health. Youth 6–17 years whose parent/guardian reported a physician's diagnosis of ADD/ADHD ($n = 7024$) were included in the analysis. Parents/guardians reported the presence of a bedroom TV and average weekday TV screen time. Multivariate linear and logistic regression models assessed the effects of a bedroom on screen time.

Results. Youth with ADD/ADHD engaged in screen time with an average of 149.1 min/weekday and 59% had a TV in their bedroom. Adjusting for child and family characteristics, having a TV in the bedroom was associated with 25 minute higher daily screen time (95% CI: 12.8–37.4 min/day). A bedroom TV was associated with 32% higher odds of engaging in screen time for over 2 h/day (OR = 1.3; 95% CI: 1.0–1.7).

Conclusion. Future research should explore whether removing TVs from bedrooms reduces screen time among youth with ADD/ADHD.

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Introduction

Screen time, including time spent watching television/videos, using computers, electronic games, and other visual devices, is a risk factor for childhood obesity, attention problems, school performance, sleep disturbance, and risky behaviors (Gilbert-Diamond et al., 2014; Gorely et al., 2004; Ferguson, 2011; Johnson et al., 2007). The American Academy of Pediatrics (AAP) recommends that children over 2 years engage in a maximum of 2 h of screen time daily (American Academy of Pediatrics, 2012). However, more than half of youth exceed these recommendations (Sisson et al., 2009). In a recent study, 28% of children 6–11 years with a TV in their bedroom engaged in more than 2 h/day of screen time versus 15% of youth without a TV in their bedroom; among adolescents, these proportions were 31% and 20%, respectively, (Wethington et al., 2013) suggesting that bedroom TVs may be a risk factor for elevated screen time.

Youth with attention deficit hyperactivity disorder (ADD/ADHD) engage in more screen time than youth without ADD/ADHD, with television comprising the majority of screen time (Gorely et al., 2004; Gordon-Larsen et al., 1999). While bedroom TVs are associated with screen time among youth generally, the impact of a bedroom TV on screen time among youth with ADD/ADHD is unknown (Wethington et al., 2013). Among youth with ADD/ADHD, high exposure to screens can exacerbate difficulties with behavior, self-regulation, and focusing that make them vulnerable to social isolation and other issues (de Boo and Prins, 2007; Nixon, 2001; Johnson et al., 2007). Previous studies of risk factors for screen time among youth with ADD/ADHD are hampered by small sample sizes and a lack of a comparison group (Ferguson, 2011; Johnson et al., 2007; Engelhardt et al., 2013). The purpose of this study is to compare screen time by the presence of a TV in the child's bedroom among a nationally-representative sample of youth with ADD/ADHD.

Methods

The 2007 National Survey of Child Health (NSCH) is a publicly available, cross-sectional survey that assesses the physical and emotional

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health of youth in the United States (Blumberg et al., 2009). Households with child(ren) aged 0–17 years were identified, and one child was randomly selected. The adult member of the household who is most knowledgeable about the child's health completed an interview in English, Spanish, or one of four Asian languages. The University of Massachusetts Medical School's Institutional Review Board approved this study.

Respondents were asked "Has a doctor or health care provider ever told you that [sampled child] had attention deficit disorder or attention deficit hyperactive disorder?"; only the youth whose parent/guardian respondent answered "Yes" were included in this analysis. The study was restricted to youth 6–17 years as ADD/ADHD is more likely diagnosed among school-aged youth (Waring and Lapane, 2008).

Parents/guardians were asked "Is there a television in [sampled child]'s bedroom?". Those who refused to answer, did not know, or whose answer was missing were excluded from analysis. Respondents answered "On the average weekday, about how much time does [sampled child] usually watch television, watch videos, or play video games?" Responses were provided in minutes or hours; we standardized screen time to minutes per weekday. We also dichotomized screen time according to the AAP recommendations for a maximum of 2 h/day (American Academy of Pediatrics, 2012).

Demographics included age, gender, and race/ethnicity. Respondents were asked "During the past week, on how many days did [sampled child] exercise, play a sport, or participate in physical activity for at least 20 min that made [him/her] sweat and breathe hard?". The NSCH includes a child with special health care needs screener, a consequence-based five-item tool that assesses special health care needs stemming from conditions lasting more than 12 months affecting physical, mental, and/or behavioral health. Because of missing data (8.5%) NSCH includes a multiple imputation of the household poverty-level item, and this imputed variable was used in this analysis (Pedlow et al., 2007). Respondents also reported whether the child was currently taking medication for ADD/ADHD, with responses of "No", "Yes", and "Don't Know". Family structure was categorized as two parents, single mother, and other type of family structure. Respondents also reported their relationship to the youth.

Statistical analysis

Characteristics of the sample in relation to bedroom TVs were compared using t-test and Chi-square tests. Linear and logistic regression models estimated the association between bedroom TVs and total weekday television screen time and screen time of 2 h or more, respectively. The distribution of weekday screen time was skewed toward higher values. We repeated the analysis using the square-root transformation of screen time. Results did not differ from the non-transformed outcome, and thus the original results are presented for ease of interpretation. Multivariate models adjusted for all variables in Table 1. Sampling weights, which adjust for non-response, non-coverage of youth in non-landline telephone households, and multiple telephone lines in a household were provided by the NSCH and applied to generate nationally representative estimates (Blumberg et al., 2009). Statistical analyses were performed in STATA 12 (StataCorp, College Station, TX).

Results

Of the 7024 youth aged 6–17 years with ADD/ADHD, we excluded those missing screen time ($n = 44$) or bedroom TVs ($n = 18$), or covariates ($n = 593$), resulting in an analytic sample of 6369 youth, representing 4,832,682 youth with ADD/ADHD nationally. Fifty-nine percent of youth with ADD/ADHD had a TV in their bedroom. Table 1 describes the characteristics of youth in relation to the presence of a TV in the bedroom.

Table 1

Characteristics of youth aged 6–17 years with attention deficit hyperactivity disorder (ADD/ADHD), by the presence of TV in the bedroom, M (SE) or %^a.

	TV in the bedroom	No TV in the bedroom	p-Value
Sample N	3754	2615	
Weighted N	2,848,383	1,984,299	
Age (years)	12.5 (0.1)	12.1 (0.1)	0.09
Race/ethnicity			
White, non-Hispanic	61.8	77.2	<0.001
Black, non-Hispanic	22.6	9.9	
Other, non-Hispanic	2.1	1.5	
Hispanic	13.3	11.5	
Days in past week in physical activity	6.5 (1.1)	5.1 (0.3)	0.20
ADD/ADHD medication status			
No medication	25.9	22.9	<0.001
Currently takes medication	48.8	53.9	
Unknown	25.3	23.2	
Child with special health care need	74.0	70.9	0.26
Respondent relationship to child			
Mother	75.0	77.2	0.002
Father	18.0	16.2	
Other	12.1	6.6	
Family structure			
2 parents	54.1	67.9	<0.001
Single mother	34.7	23.4	
Other	11.2	8.6	
Other children living in the household			
None	29.4	24.5	0.01
1	40.6	36.3	
2	21.6	28.9	
3+	8.4	10.3	
Family derived poverty level			
≤100%	24.8	14.3	<0.001
>100% to ≤200%	24.4	20.5	
>200% to ≤400%	32.0	27.7	
>400%	8.8	37.4	

^a 95% CIs around proportions are ≤2 percentage points.

Youth with a TV in the bedroom engaged in 149.1 min/day screen time compared to 115.2 min/day among youth without a TV in the bedroom (Table 2). After adjustment for confounding, a TV in the child's bedroom was associated with 25.1 additional minute screen time per weekday (95% CI: 12.8–37.4 min/day; Table 2). Thirty-four percent of youth with TVs in their bedroom engaged in more than 2 h/day of screen time compared to 24.3% of youth without bedroom TVs. A bedroom TV was associated with 1.32 times the odds of exceeding 2 h/day of screen time (OR = 1.3; 95% CI: 1.0–1.7; Table 2).

Discussion

This study found that youth with ADD/ADHD with a bedroom TV engaged in almost a half hour more screen time daily than youth without a bedroom TV. These findings are similar to associations observed among U.S. youth generally (Wethington et al., 2013; Ramirez et al.,

Table 2

Weekday screen time in relation to the presence of a television in the child's bedroom, among youth with ADD/ADHD in the United States.

	TV in the bedroom	No TV in the bedroom
Weekday screen time (min/day)		
Screen time (min), M (SE)	149.1 (5.3)	115.2 (5.0)
Crude beta (95% CI)	33.9 (19.6–48.2)	(Reference)
Adjusted beta (95% CI) ^a	25.1 (12.8–37.4)	(Reference)
Screen time exceeding 2 h/day		
Percent	34.0%	24.3%
Crude OR (95% CI)	1.6 (1.2–2.1)	(Reference)
Adjusted OR (95% CI) ^a	1.3 (1.0–1.7)	(Reference)

^a Adjusted for age, sex, race/ethnicity, child's physical activity level, ADHD medication status, respondent relationship to child, family structure, number of siblings living in the household, child with special health care need status, and derived poverty level.

2011). Youth with ADD/ADHD experience difficulties with behavior, self-regulation, and focusing that make them vulnerable to social isolation and other issues (de Boo and Prins, 2007; Nixon, 2001). High exposure to screen time may exacerbate these conditions (Johnson et al., 2007), highlighting the importance of understanding and reducing screen time among youth with ADD/ADHD. Caregivers of youth with ADD/ADHD should also consider the quality of the screen time their child is engaging in, as there may be benefits to some types of screen time for this population, such as the acquisition of pro-social behaviors and learning skills (Anderson and Bushman, 2001; Roberts et al., 1999).

This study has strengths and limitations. Results are nationally generalizable, thus reducing bias from clinical samples. The cross-sectional design does not allow for causal inference. Parent/guardian report of physician diagnosis of ADD/ADHD has acceptable concordance with psychologist-administered standardized clinical interviews (Faraone et al., 1995) and is widely-used in national surveys. The NSCH asked only about weekday screen time, which may underestimate total weekly screen time. Parents may be unaware of their child's screen time when not in their presence. This potential underreporting may be higher among youth with a TV in their bedroom, thus underestimating the association of a bedroom TV with screen time.

This study is the first to examine the association between a television in the bedroom and screen time among a nationally representative sample of youth with ADD/ADHD. Experimental studies should explore whether removing bedroom TVs reduces screen time among youth with ADD/ADHD.

Conflicts of interest statement

Dr. Pagoto is on the advisory board of Empower Fitness and has a contract with Sears FitStudio. The authors have no other conflicts of interest to disclose.

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References

- American Academy of Pediatrics, 2012. Media and children [online]. Available: <http://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/pages/media-and-children.aspx> (Accessed 2012).
- Anderson, C.A., Bushman, B.J., 2001. Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: a meta-analytic review of the scientific literature. *Psychol. Sci.* 12, 353–359.
- Blumberg, S.J., Foster, E.B., Frasier, A.M., et al., 2009. Design and Operation of the National Survey of Children's Health, 2007. Department of Health and Human Services, Hyattsville.
- De Boo, G.M., Prins, P.J., 2007. Social incompetence in children with ADHD: possible moderators and mediators in social-skills training. *Clin. Psychol. Rev.* 27, 78–97.
- Engelhardt, C.R., Mazurek, M.O., Sohl, K., 2013. Media use and sleep among boys with autism spectrum disorder, ADHD, or typical development. *Pediatrics* 132, 1081–1089.
- Faraone, S.V., Biederman, J., Milberger, S., 1995. How reliable are maternal reports of their children's psychopathology? One-year recall of psychiatric diagnoses of ADHD children. *J. Am. Acad. Child Adolesc. Psychiatry* 34, 1001–1008.
- Ferguson, C.J., 2011. The influence of television and video game use on attention and school problems: a multivariate analysis with other risk factors controlled. *J. Psychiatr. Res.* 45, 808–813.
- Gilbert-Diamond, D., Li, Z., Adachi-Mejia, A.M., McClure, A.C., Sargent, J.D., 2014. Association of a television in the bedroom with increased adiposity gain in a nationally representative sample of children and adolescents. *JAMA Pediatr.* 168 (5), 427–434.
- Gordon-Larsen, P., McMurray, R.G., Popkin, B.M., 1999. Adolescent physical activity and inactivity vary by ethnicity: The National Longitudinal Study of Adolescent Health. *J. Pediatr.* 135, 301–306.
- Gorely, T., Marshall, S.J., Biddle, S.J., 2004. Couch kids: correlates of television viewing among youth. *Int. J. Behav. Med.* 11, 152–163.
- Johnson, J.G., Cohen, P., Kasen, S., Brook, J.S., 2007. Extensive television viewing and the development of attention and learning difficulties during adolescence. *Arch. Pediatr. Adolesc. Med.* 161, 480–486.
- Nixon, E., 2001. The social competence of children with attention deficit hyperactivity disorder: a review of the literature. *Child Psychol. Psychiatr. Rev.* 6, 172–180.
- Pedlow, S., Luke, J.V., Blumberg, S.J., 2007. Multiple Imputation of Missing Household Poverty Level Values from the National Survey of Children with Special Health Care Needs, 2001, and the National Survey of Children's Health, 2003. National Center for Health Statistics. Division of Health Interview Statistics, Survey Planning and Special Surveys Branch.
- Ramirez, E.R., Norman, G.J., Rosenberg, D.E., et al., 2011. Adolescent screen time and rules to limit screen time in the home. *J. Adolesc. Health* 48, 379–385.
- Roberts, D.F., Foehr, U.G., Rideout, V.G., Brodie, M., 1999. Kids & Media @ the New Millennium. Menlo Park, CA, Kaiser Family Foundation.
- Sisson, S.B., Church, T.S., Martin, C.K., et al., 2009. Profiles of sedentary behavior in children and adolescents: the US National Health and Nutrition Examination Survey, 2001–2006. *Int. J. Pediatr. Obes.* 4, 353–359.
- Waring, M.E., Lapane, K.L., 2008. Overweight in children and adolescents in relation to attention-deficit/hyperactivity disorder: results from a national sample. *Pediatrics* 122, e1–e6.
- Wethington, H., Pan, L., Sherry, B., 2013. The association of screen time, television in the bedroom, and obesity among school-aged youth: 2007 National Survey of Children's Health. *J. Sch. Health* 83, 573–581.