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Association of Young Children's Use of Mobile Devices with Their Self-regulation

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Association of Young Children's Use of Mobile Devices with Their Self-regulation

Young children's use of mobile devices (eg, smartphones, tablets) is prevalent and increasing.[1] Although television exposure can harm young children's self-regulation,[2] little research has investigated associations between children's use of mobile devices and this consequential capacity. We examined associations between multimethod assessments of self-regulation and screen media device use in early childhood, comparing use of traditional (eg, television, computers) and mobile devices.

Methods

Data were collected from July 1, 2016, through January 11, 2019. The institutional review board at the University of California, Davis, approved this research, and we obtained written parental consent and verbal child assent. As part of a longitudinal study, we recruited a community sample of children aged 32 to 47 months. In our laboratory, parents completed demographic questions; the Children's Behavior Questionnaire[3] or Early Childhood Behavior Questionnaire,[4] per the child's age; and the Screen Media Survey, a novel measure of duration, content, and context of children's screen media use by device. For this study, we aggregated children's mean durations of weekday and weekend or holiday use of devices into weekly weighted means; parents also reported the age at which children began using each device owned. In another room, children attempted an 11-task behavioral self-regulation battery adapted from Kochanska and colleagues[5] (eg, Day/Night, Whisper, Gift Delay); scores were standardized, and a mean was calculated ($\kappa = 0.9$; $\alpha = .70$), with higher scores indicating better self-regulation. Controlling for demographic covariates for children with complete screen media data, we estimated multivariable linear regressions explaining children's parent-reported or behaviorally assessed self-regulation from their mean weekly use of screen media devices, their age at first use of screen media devices, and statistical interactions between the 2. We also used this analysis to test the reverse direction of outcome. We used a 2-tailed *P* value threshold of .05, for all analyses. Analyses were completed in SPSS Statistics version 26 (IBM).

Results

A total of 73 children were recruited, and 56 were included in analyses. Parents (48 women [85.7%]) had a mean (SD) age of 36.7 (3.8) years; children (26 girls [46.4%]) had a mean (SD) age of 37.4 (4.5) months (Table 1). Fifty children (89.3%) used traditional devices weekly (mean [SD] time, 10.8 [11.7] hours; range, 0-68 hours), and 40 (71.4%) used mobile devices weekly (mean [SD] time, 3.9 [3.9] hours; range, 0-14 hours). Children began using screen media devices at ages 3 to 36 months (mean [SD] age, 16.1 [7.0] months). Children's mean (SD) Children's Behavior Questionnaire or Early Childhood Behavior Questionnaire self-regulation scores (effortful control broadband) were 5.2 (0.4; $\alpha = .70$) and 5.0 (0.5; $\alpha = 0.8$), respectively, on a scale of 0 to 7 points. Accounting for child age (β, 0.39 [95% CI, 0.01-0.06]; $P = .004$) and sex, family income, and parent education (with no significant differences between groups), children's mean weekly use of mobile devices (β, −0.27 [95% CI, −0.057 to −0.002]; $P = .04$) and age at first use of any screen media device (β, 0.28 [95% CI, 0.002-0.03]; $P = .03$) each were associated with children's behaviorally assessed self-regulation scores ($F_{2,46} = 6.02$; $P = .003$; $R^2 = 0.34$), but not parent-reported self-regulation (Table 2). Use of traditional media and separate assessment of

age at first use of traditional vs mobile devices did not explain self-regulation. No evidence emerged of a statistical interaction between current use of screen media devices and the age at first use or the reverse direction of association; children's behaviorally assessed or parent-reported self-regulation also did not explain their mean weekly use of screen media devices.

Discussion

Although cross-sectional designs cannot determine causality, our findings indicate that young children who began using screen media devices earlier or who spent more time engaging with mobile devices displayed lower self-regulation in a behavioral battery. In contrast with previous research,[6] we found no evidence that self-regulation explained children's use of screen media devices in this sample. Sample size and composition limit the generalizability of these findings beyond middle-class groups. Longitudinal studies, investigations of screen media content, and more rigorous assessments of screen media device use are needed to elucidate relations to self-regulation development.

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Concept and design: Lawrence, Choe.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Lawrence.

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References

1.Rideout V. The Common Sense census: media use by kids age zero to eight. Published 2017. Accessed February 21, 2020. https://www.commonsensemedia.org/sites/default/files/uploads/research/csm_zerotoeight_fullreport_release_2.pdf

2.Lillard AS, Li H, Boguszewski K. Television and children's executive function. *Adv Child Dev Behav*. 2015;48:219-248. doi:10.1016/bs.acdb.2014.11.006

3.Putnam SP, Rothbart MK. Development of short and very short forms of the Children's Behavior Questionnaire. *J Pers Assess*. 2006;87(1):102-112. doi:10.1207/s15327752jpa8701_09

4.Putnam SP, Gartstein MA, Rothbart MK. Measurement of fine-grained aspects of toddler temperament: the early childhood behavior questionnaire. *Infant Behav Dev*. 2006;29(3):386-401. doi:10.1016/j.infbeh.2006.01.004

5.Kochanska G, Murray K, Jacques TY, Koenig AL, Vandegeest KA. Inhibitory control in young children and its role in emerging internalization. *Child Dev*. 1996;67(2):490-507. doi:10.2307/1131828

6.Radesky JS, Peacock-Chambers E, Zuckerman B, Silverstein M. Use of mobile technology to calm upset children: associations with social-emotional development. *JAMA Pediatr*. 2016;170(4):397-399. doi:10.1001/jamapediatrics.2015.4260

Table 1. Demographics of Study Participants (N = 56 Unless Otherwise Noted)

Variable	***N***	**%**
Child		
Sex		
Female	26	46.43
Male	30	53.57
Racial/Ethnic minority	24	42.86
Parent		
Sex		
Female	48	85.71
Male	8	14.29
Employed	39	69.64
Income (*N* = 54)		
$20,000–$40,000	1	1.85
$40,000–$60,000	4	7.41
$60,000–$80,000	8	14.81
$80,000–$100,000	6	11.11
≥ $100,000	35	64.81
Racial/Ethnic minority	25	44.64

Table 2. Summary of Multivariable Linear Regressions Explaining Children's Behaviorally Assessed Self-Regulation (N = 56)

Model	B (95% CI)	SE. B	β	*P* value
Parent education				
1	−.07 (−.17 to .04)	.05	−.17	.202
2	−.07 (−.18 to .03)	.05	−.18	.165
3	−.06 (−.16 to .05)	.05	−.14	.262
4	−.07 (−.17 to .04)	.05	−.16	.198
Family income				
1	−.02 (−.12 to .08)	.05	−.05	.720
2	−.02 (−.12 to .08	.05	−.04	.740
3	−.00 (−.10 to .10)	.05	−.01	.972
4	−.01 (−.10 to .09)	.05	−.01	.918
Child's age				
1	.03 (.01 to .06)	.01	.36**	.009
2	.04 (.01 to .06)	.01	.36**	.008
3	.04 (.01 to .06)	.01	.40**	.004
4	.04 (.01 to .06)	.01	.39**	.004
Child's sex				
1	.08 (−.15 to .30)	.12	.09	.498
2	.11 (−.11 to .33)	.11	.13	.328
3	.09 (−.15 to .31)	.11	.10	.434
4	.12 (−.10 to .34)	.11	.14	.266
Child's mean weekly use, h				
All screen media devices [a]				
1	−.15 (−.29 to −.02)	.07	−.29*	.027
Mobile devices				
2	−.04 (−.06 to −.01)	.01	−.34**	.009
4	−.03 (−.06 to −.002)	.01	−.27*	.036
Traditional devices [a]				
2	−.09 (−.19 to .02)	.05	−.20	.108
Child's age at first use of any screen media device, months				
3	.02 (.01 to .04)	.01	.33*	.012
4	.02 (.002 to .03)	.01	.28*	.028
R^2 (F for change in R^2) [b]				
1	.25 (5.18*)			.027
2	.31 (4.70*)			.014
3	.27 (6.83*)			.012
4	.34 (6.02**)			.005

[a]Log transformed to address positive skew.
[b]F for change in R^2 indicates improvement over demographic-covariate-only model.
*$p < .05$.
**$p < .01$.