

Longitudinal Associations Between Early Childhood Externalizing Behavior, Parenting Stress, and Child Media Use

Brandon T. McDaniel, PhD,¹ and Jenny S. Radesky, MD²

Abstract

Limited research has examined bidirectional associations between modern media (e.g., smartphone, tablet) use and behavior in early childhood. This study aimed to test the hypotheses that, over 6 months, (H1) child externalizing behavior would predict later media use, mediated by parenting stress, and (H2) media use would predict later externalizing behavior. Participants included mothers and fathers from 183 heterosexual couples with a child 1–5 years old, followed for 6 months—assessed at baseline, 1, and 6 months. Frequency of child media use was assessed at baseline and 6 months through parent report across eight items (e.g., television [TV], smartphone, tablet use). Child externalizing behavior was assessed through the Child Behavioral Checklist, and parent stress through the Parenting Stress Index. Hypotheses were tested using structural equation modeling. Mothers were 31.8 (standard deviation [*SD*] = 4.2), fathers 33.3 (*SD* = 4.9), and children 3.0 years old (*SD* = 1.2). Structural equation models showed good overall fit. As hypothesized, we found that (H1) greater child externalizing behavior predicted greater parenting stress ($\beta = 0.48, p < 0.001$), which predicted increases in child media use ($\beta = 0.15, p < 0.05$); however, (H2) child media use did not predict later externalizing behavior ($\beta = 0.06, p = 0.23$). In *post hoc* analyses, results differed slightly by specific type of media; for example, externalizing behavior was associated with later tablet and game use, whereas TV use predicted increases in externalizing behavior. Our results suggest that child behavior problems associate with later media use habits, possibly as a parent coping strategy, which should be considered when providing clinical guidance.

Keywords: mobile device, smartphone, tablet, digital media, child behavior, parenting

Introduction

THE RELATIONSHIP BETWEEN digital media use and child social-emotional development is complex. Early research on this topic primarily examined links between television (TV) viewing and early childhood behavioral outcomes, with concern that violent content,¹ prolonged duration,^{2,3} or displacement of other activities such as play⁴ or sleep⁵ could negatively influence child behavior regulation and social skills. Conversely, research also suggests that child social and emotional traits may shape their media use habits. Cross-sectional and longitudinal observational studies have documented associations between infant regulatory problems,⁶ excessive crying,⁷ toddler disruptive behavior,⁸ energetic temperament,⁹ and preschooler negative emotionality¹⁰ and higher overall media use.

Research examining child social-emotional development and mobile media specifically (e.g., smartphones, tablets)

has been limited. Mobile devices have design affordances—such as mobility and interactivity—that may influence child outcomes differently than traditional platforms such as TV. For example, mobile devices are handheld and portable, so are more likely to be used individually (rather than co-viewed).^{11,12} Mobile devices can be used throughout daily routines or taken to bed,¹³ which may displace opportunities for parent–child interaction or self-soothing. In addition, their gamified design may absorb children’s attention more strongly, making it more difficult to interact around mobile devices.¹⁴ Evidence regarding mobile media use and child development is primarily cross-sectional,¹³ which makes it difficult to understand directionality—that is, whether mobile device use contributes to social-emotional difficulties, or whether parents, frustrated with difficult child behaviors, allow more media use to keep the child occupied or calm. The latter hypothesis is supported by ethnographic interviews¹⁵ and cross-sectional data in which mothers with

¹Health Services and Informatics Research, Parkview Mirro Center for Research and Innovation, Fort Wayne, Indiana.

²Department of Pediatrics, University of Michigan Medical School, Ann Arbor, Michigan.

lower well-being¹⁶ and lower perceived control around parenting report more child mobile device use.¹⁷

However, transactional theories of child development posit that there are bidirectional relationships between child characteristics and the caregiving environment (including household media use), which interact to shape child outcomes over time.¹⁸ Although bidirectionality has been examined in the mediation literature,¹⁹ only two studies have examined bidirectional relationships between media use and early childhood development and behavior. Cliff et al.²⁰ found that more media exposure at 2 years was associated with weaker self-regulation at 4 years, whereas weaker self-regulation at 4 years was significantly associated with higher TV viewing, gaming, and media use at 6 years; however, effect sizes were small. Madigan et al.²¹ found small but significant associations between media use at 24 and 36 months and poorer performance on a developmental screening questionnaire at 36 and 60 months, respectively. In that study, lower screening test scores did not predict greater media use.

In this study, we build upon the prior literature by examining bidirectional longitudinal associations between media use and child social-emotional development. We focused specifically on early childhood externalizing behavior (as a behavioral marker of problems with a child's emotion regulation and social competence) and use of various media devices across 6 months. Based on the aforementioned literature, we tested the following hypotheses: (H1) more externalizing behavior at baseline would predict more media use 6 months later, particularly mobile media that can be accessed as-needed for behavior regulation, mediated by higher parenting stress; and (H2) more media use at baseline would predict more externalizing behavior 6 months later, particularly mobile device use (smartphones and tablets) given their higher likelihood of being taken through daily routines or interrupting parent-child interactions.

Materials and Methods

Participants and procedure

Data were from the *Daily Family Life Project*, a longitudinal study of family relationships that recruited 183 heterosexual couples with a young child. Participants were recruited from a family research database in a Northeastern U.S. state, through flyers in the local community, and announcements on online resources and listservs. To be eligible to participate, parents had to be at least 18 years old, have a child 5 years or younger, speak English, and currently live with their child and spouse/partner, who also had to be willing to participate. Eligible participants were e-mailed a survey link through which they completed informed consent and a baseline online survey through Qualtrics. Participants completed followup online assessments at approximately 1, 3, and 6 months. Data from the baseline, 1, and 6 month assessments are used in this analysis.

In this study, as the Child Behavioral Checklist (CBCL) was not standardized for infants, we excluded 11 families with a child <1 year (at baseline, T0) from our analysis. We further excluded any parents who were missing both time points of CBCL data (T0 and T6). We utilized data from all remaining parents with CBCL data on at least one or more time points ($n=337$ parents comprising 171 mothers and 166 fathers; 92 percent of the original sample of 366 par-

ents); 74 percent of these 337 parents had CBCL data at both time points (T0 and T6). In the analytic sample, mothers were on average 31.8 years old (standard deviation [SD]=4.2; range 22–42), and fathers were 33.3 years old ($SD=4.9$; range 22–52); most parents were married (94 percent), and had at least a bachelor's degree (72 percent). Parent race/ethnicity was 91 percent Caucasian, 3 percent Latino, 2 percent Black/African American, 2 percent Asian American, and 2 percent other. Most families (61 percent) had more than one child (mean [M]=1.90, $SD=0.91$), and the index child was 3.0 years old on average ($SD=1.2$; 55 percent female). Median yearly household income was approximately \$69,500 ($M=\$74,870$, $SD=\$39,470$), with 21 percent of families reporting some form of state or federal assistance (e.g., medical assistance, food stamps). Families resided in the following U.S. regions: 54 percent Northeast, 16 percent Midwest, 15 percent South, and 15 percent West. Parents in our analytic sample were in a longer relationship [$t(360)=1.945$, $p=0.052$] and had more children [$t(360)=3.79$, $p<0.001$] than excluded participants; the samples were otherwise similar.

Measures

Child media use. At the baseline (T0) and 6 month data collection wave (T6), child media use was assessed through parent report across eight items ("Please rate how much time YOUR CHILD spends on the following activities on a TYPICAL DAY") on an 11-point scale ranging from 0 (*None*) to 10 (*7 or more hours*). The eight items included using the computer; watching TV; using a smartphone; using an iPod Touch; using an iPad, Kindle, or other tablet; playing video games on console (Wii, Xbox, Playstation, etc.); playing games on computer; playing games on touchscreen device (tablet, phone, etc.). Items were summed to produce an overall media use score (Cronbach's α T0=0.75 mothers, 0.79 fathers; T6=0.60, 0.66; however, alphas might not be expected to be high as children may use some forms of media frequently, while not using other forms much at all). In *post hoc* analyses, we examined some of the items individually and also created an overall game use score by combining the last three items, which all referred to games. Computer and iPod use was infrequent, so these were not included in *post hoc* analyses.

Child externalizing behavior problems. At baseline (T0) and month 6 (T6), parents completed the CBCL, a validated measure of child behavioral development.²² The externalizing subscale (24 items) asks parents to rate their child now or within the past 2 months on a 3-point scale ranging from 0 (*not true*) to 2 (*very true or often true*) on items such as "can't sit still, restless, or hyperactive," "easily frustrated," and "temper tantrums or hot temper." Items were summed to produce separate mother and father ratings of externalizing child behavior (Cronbach's α T0=0.92 mothers, 0.93 fathers; T6=0.94, 0.93).

Parenting stress. At month 1 (T1), parents completed 27 items from the Parenting Stress Index (PSI).²³ We used 27 items from the 36-item PSI Short Form due to lower factor loadings on 9 of the items, as others have done.^{23,24} Items were averaged to produce an overall stress score (Cronbach's $\alpha=0.93$ mothers, 0.93 fathers).

Potential confounding variables. At baseline, parents reported their age, educational attainment, marital status, race/ethnicity, family composition, household income, and child's age, gender, and health. Parents also reported their depression symptoms with the validated Center for Epidemiologic Studies Depression Scale.²⁵ Participants rated how often they experienced 20 symptoms (e.g., "I felt depressed" and "I felt sad") in the past week on a 4-point scale ranging from 0 (*rarely or none of the time, <1 day*) to 3 (*most or all of the time, 5–7 days*). Items were averaged to produce an overall depression score (Cronbach's $\alpha=0.89$ mothers, 0.89 fathers).

Data analysis

We first conducted descriptive statistics and bivariate Pearson correlations on our main study variables using SPSS 26; we also examined pairwise *t* tests on child media use over time within those who had data at both time points ($n=243-246$), pairwise *t* tests on child media use and externalizing behavior at baseline between mothers and fathers, and mean differences in media use and externalizing behavior by child gender using *t* tests. For descriptive purposes, we also split media use into child age categories (i.e., <24, 24–35, 36–47, and ≥ 48 months; Table 1). We then utilized multilevel

TABLE 1. DAILY DURATION OF CHILD MEDIA USE AT STUDY BASELINE (AS REPORTED BY MOTHERS)

	All children		<24 months		24–35 months		36–47 months		≥ 48 months	
	n	Percent	n	Percent	n	Percent	n	Percent	n	Percent
Watching TV										
Never	21	12.4	11	25.6	4	9.5	4	9.8	2	4.5
1–15 minutes	16	9.4	9	20.9	2	4.8	3	7.3	2	4.5
16–30 minutes	24	14.1	7	16.3	4	9.5	5	12.2	8	18.2
31 minutes–1 hour	29	17.1	7	16.3	8	19.0	7	17.1	7	15.9
1–2 hours	52	30.6	7	16.3	18	42.9	13	31.7	14	31.8
2–3 hours	17	10.0	1	2.3	5	11.9	3	7.3	8	18.2
>3 hours	11	6.5	1	2.3	1	2.4	6	14.7	3	6.8
Using a smartphone										
Never	121	72.0	31	72.1	32	78.0	24	58.5	34	79.1
1–15 minutes	26	15.5	9	20.9	7	17.1	7	17.1	3	7.0
16–30 minutes	9	5.4	1	2.3	2	4.9	5	12.2	1	2.3
31 minutes–1 hour	7	4.2	2	4.7	0	0.0	2	4.9	3	7.0
1–2 hours	3	1.8	0	0.0	0	0.0	2	4.9	1	2.3
>2 hours	2	1.2	0	0.0	0	0.0	1	2.4	1	2.3
Using an iPad, Kindle, or other tablet										
Never	94	55.3	32	74.4	22	52.4	18	43.9	22	50.0
1–15 minutes	33	19.4	8	18.6	11	26.2	5	12.2	9	20.5
16–30 minutes	21	12.4	3	7.0	6	14.3	6	14.6	9	20.5
31 minutes–1 hour	12	7.1	0	0.0	2	4.8	7	17.1	0	0.0
1–2 hours	6	3.5	0	0.0	1	2.4	3	7.3	2	4.5
>2 hours	4	2.4	0	0.0	0	0.0	2	4.8	2	4.6
Playing video games on console										
Never	156	91.8	41	95.3	41	97.6	39	95.1	35	79.5
1–15 minutes	8	4.7	1	2.3	1	2.4	1	2.4	5	11.4
16–30 minutes	2	1.2	1	2.3	0	0.0	0	0.0	1	2.3
31 minutes–1 hour	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1–2 hours	2	1.2	0	0.0	0	0.0	1	2.4	1	2.3
>2 hours	2	1.2	0	0.0	0	0.0	0	0.0	2	4.6
Playing games on a computer										
Never	153	90.5	41	97.6	40	95.2	38	92.7	34	77.3
1–15 minutes	9	5.3	1	2.4	1	2.4	3	7.3	5	11.4
16–30 minutes	4	2.4	0	0.0	0	0.0	0	0.0	3	6.8
31 minutes–1 hour	2	1.2	0	0.0	1	2.4	0	0.0	1	2.3
1–2 hours	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
>2 hours	1	0.6	0	0.0	0	0.0	0	0.0	1	2.3
Playing games on touchscreen device										
Never	97	57.4	34	81.0	24	57.1	17	41.5	22	50.0
1–15 minutes	37	21.9	4	9.5	14	33.3	9	22.0	10	22.7
16–30 minutes	14	8.3	1	2.4	3	7.1	3	7.3	7	15.9
31 minutes–1 hour	15	8.9	2	4.8	1	2.4	9	22.0	3	6.8
1–2 hours	2	1.2	1	2.4	0	0.0	1	2.4	0	0.0
>2 hours	4	2.4	0	0.0	0	0.0	2	4.8	2	4.6

Data presented here are from mother reports at baseline only. Data for "using the computer" and "using an iPod Touch" are not presented here.

structural equation modeling (SEM) in Mplus to examine our hypotheses: (H1) child externalizing behavior would predict later media use, mediated by parenting stress; (H2) media use would predict later externalizing behavior. In additional *post hoc* models, we examined differences by media device/format. Multilevel SEM with the complex samples correction was utilized to account for the nested nature of the data (i.e., mothers and fathers are nested in families); this uses maximum likelihood estimation with robust standard errors. SEM was also utilized as it allowed us to examine the cross-lagged paths between our variables simultaneously, controlling for prior levels of these variables. Standardized estimates are shown for the models in Figures 1–5. We controlled for potential confounders, including child age, parent education, parent gender, and parent depression symptoms, in all models. Child gender was also tested as a confounding variable, but its inclusion did not change model results. We also tested whether our main path coefficients significantly differed by parent gender by testing interaction terms with gender. Finally, model fit was assessed in the models before entering parent gender interactions terms, which has been recommended as SEM models containing interaction terms do not align with traditional SEM fit statistics.²⁶

Results

Almost half of children were reported to watch TV for >1 hour per day at baseline (47.1 percent); use of smartphones, tablets, and mobile games was less common (Table 1). Child age correlated with use of TVs, computers, tablets, video games, computer games, and touchscreen games, with older children using these media more (mother-reported $r=0.19$ – 0.28 , $ps < 0.05$). Within children on average, most device use was similar for the 6 months of the study; however, smartphone use [$t(241)=2.13$, $p=0.03$] and touchscreen games [$t(242)=3.18$, $p < 0.01$] decreased slightly. At baseline,

mother and father reports of child media use were correlated 0.45 – 0.69 ($ps < 0.001$), depending on device. Parent reports were similar for child TV, computer, tablet, and iPod use; however, on average fathers (as compared with mothers) perceived greater child media use overall [$t(164)=2.43$, $p=0.02$], overall game use [$t(163)=2.16$, $p=0.03$], and phone use [$t(161)=2.26$, $p=0.03$].

At baseline, child media use showed small correlations with child externalizing behavior ($r=0.17$, $p < 0.01$), child age ($r=0.26$, $p < 0.001$), and was negatively correlated with parent education level ($r=-0.18$, $p < 0.001$). Child externalizing behavior was positively correlated with parent depression symptoms ($r=0.24$, $p < 0.001$), but was not correlated with either child age or parent education. According to parent reports, boys and girls showed no significant differences in terms of externalizing behavior or child media use at either baseline or month 6. Mothers and fathers did not differ on perceptions of child externalizing behavior.

As described earlier, we first ran a multilevel SEM model for child media use, parenting stress, and child externalizing to examine our study hypotheses, while entering control variables; we judged the model to have good fit [$\chi^2(2)=3.70$, $p=0.16$; root mean square error of approximation = 0.05 ; comparative fit index = 0.99 ; standardized root mean square residual = 0.01]. We then ran *post hoc* exploratory models to examine child TV use, game use, smartphone use, and tablet use separately. We also judged these models to fit the data well (see fit statistics in Figs. 2–5).

H1: Greater child externalizing behavior would predict more media use, indirectly through parenting stress

After controlling for child age and parent gender, education, and depression, we found support for our hypothesis (H1) that child externalizing behavior at T0 predicted parenting stress at T1 (Fig. 1, $\beta=0.48$, $p < 0.001$), which in turn

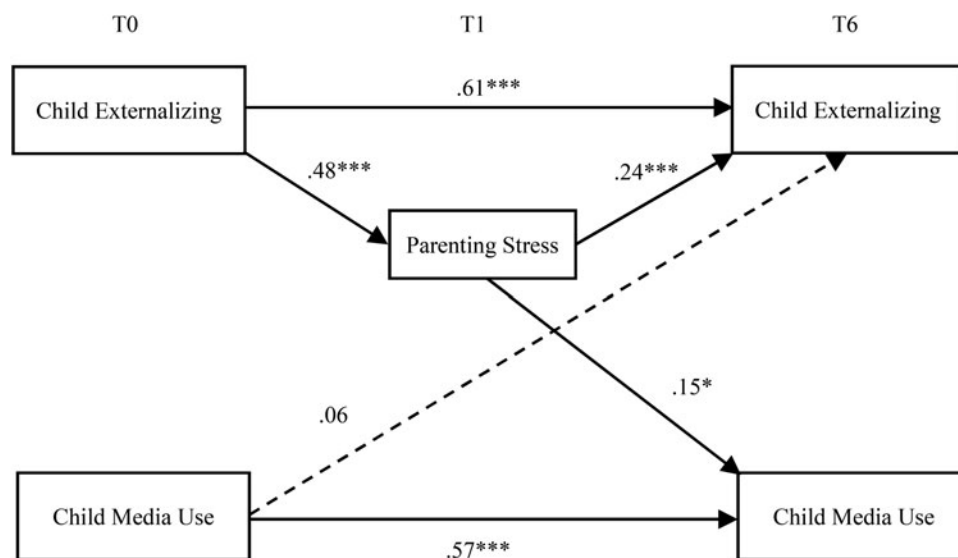
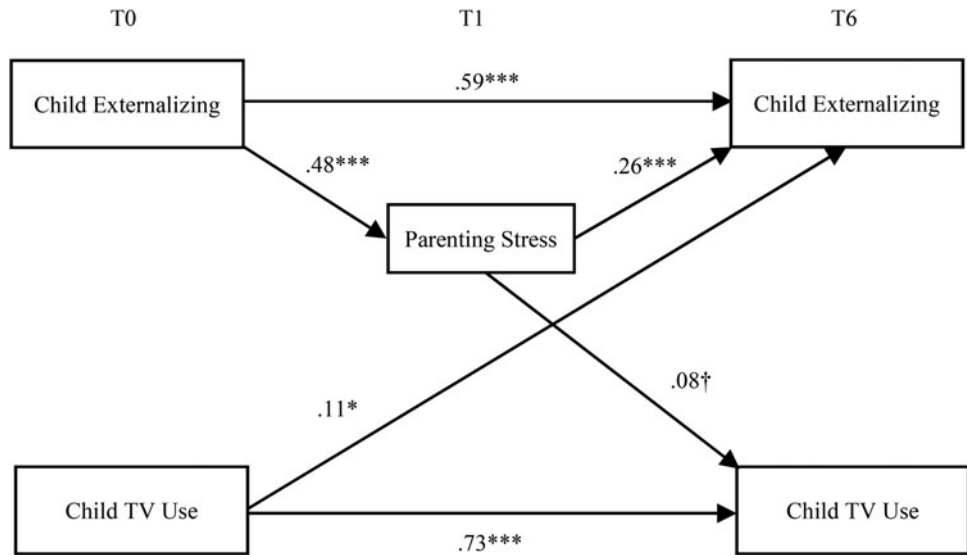


FIG. 1. Model of child externalizing behavior, parenting stress, and child media use over time [$\chi^2(2)=3.70$, $p=0.16$; RMSEA = 0.05 ; CFI = 0.99 ; SRMR = 0.01]. Standardized estimates displayed here. No significant gender differences were found for mothers and fathers. Child age and parent gender, education, and depression were entered as control variables (paths not displayed), and externalizing and media use were allowed to correlate at T0 and T6, respectively (paths not displayed). CFI, comparative fit index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual.

FIG. 2. Model of child externalizing behavior, parenting stress, and child TV use over time [$\chi^2(2)=3.22$, $p=0.20$; RMSEA=0.04; CFI=0.99; SRMR=0.01]. Standardized estimates displayed here. No significant gender differences were found for mothers and fathers. Child age and parent gender, education, and depression were entered as control variables (paths not displayed), and externalizing and media use were allowed to correlate at T0 and T6, respectively (paths not displayed).



predicted overall media use at T6 (Fig. 1, $\beta=0.15$, $p<0.05$). Once broken down into *post hoc* models on the different types of media use, externalizing behavior at T0 predicted parenting stress across all types of media use (Figs. 2–5), and parenting stress predicted media use at T6 for game use (Fig. 3, $\beta=0.12$, $p<0.05$), tablet use (Fig. 5, $\beta=0.16$, $p<0.01$), and TV use at the trend level (Fig. 2, $\beta=0.08$, $p=0.10$), but not smartphone use (Fig. 4, $\beta=0.06$, $p=0.42$).

H2: Greater child media use would predict more externalizing

After controlling for child age and parent gender, education, and depression, we did not find support for our hypothesis (H2) for the overall media use model. Specifically, overall media use at T0 did not predict child externalizing behavior at T6 (Fig. 1, $\beta=0.06$, $p=0.23$). Examining the different types of media use models, child game use (Fig. 3), smartphone use (Fig. 4), and tablet use (Fig. 5) were not associated with later child externalizing behavior. However,

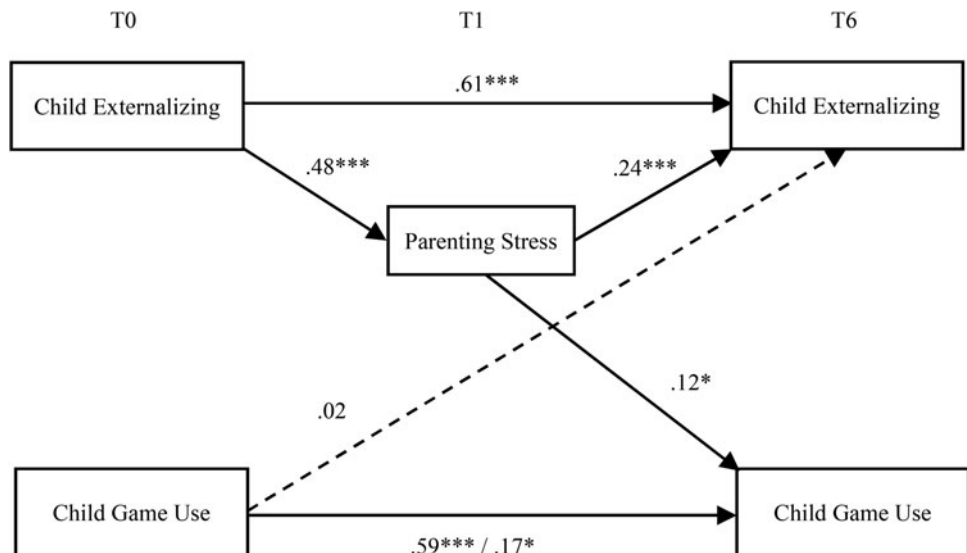
TV use at T0 significantly predicted externalizing behavior at T6 (Fig. 2, $\beta=0.11$, $p<0.01$).

Discussion

In this longitudinal study, we examined bidirectional associations between children’s externalizing behavior symptoms and their media use habits across 6 months. We found that child behavioral difficulties predicted greater media use overall—and more TV, game, and tablet use specifically—a relationship that was mediated by higher parenting stress. Contrary to our second hypothesis, only TV viewing—but not other forms of media use—predicted later externalizing behavior.

Our results are consistent with prior research highlighting the role child behavior problems play in shaping child media habits. For example Nikken and Schols found that parents of young children with disruptive behavior are more likely to use media as a behavior modifier or babysitter,⁸ whereas Nabi and Krmar found that energetic temperament in

FIG. 3. Model of child externalizing behavior, parenting stress, and child game use over time [$\chi^2(2)=1.52$, $p=0.47$; RMSEA=0.00; CFI=1.00; SRMR=0.01]. Standardized estimates displayed here. Paths found to be significantly different for mothers and fathers are displayed as mother estimate/father estimate. Child age and parent gender, education, and depression were entered as control variables (paths not displayed), and externalizing and media use were allowed to correlate at T0 and T6, respectively (paths not displayed).



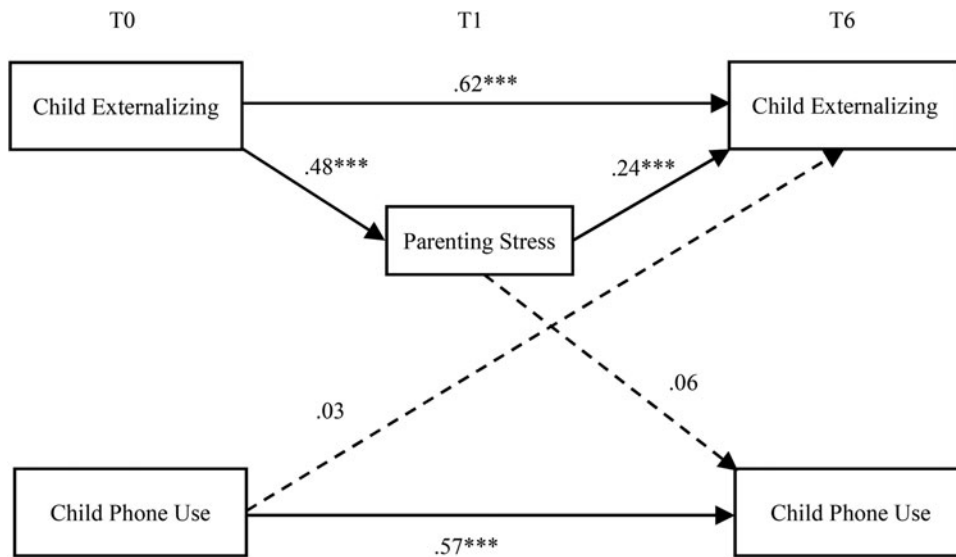


FIG. 4. Model of child externalizing behavior, parenting stress, and child phone use over time [$\chi^2(2) = 0.45$, $p = 0.79$; RMSEA = 0.00; CFI = 1.00; SRMR = 0.00]. Standardized estimates displayed here. No significant gender differences were found for mothers and fathers. Child age and parent gender, education, and depression were entered as control variables (paths not displayed), and externalizing and media use were allowed to correlate at T0 and T6, respectively (paths not displayed).

children <6 years was related to parents' motives for providing electronic media use.⁹ Infants with regulatory problems (such as self-soothing difficulties, impulsive/demanding behaviors) have been found to consume more TV and videos⁶ and are more likely to be given mobile devices to be used individually, rather than co-viewed with their parent.²⁷

Unlike two other recent studies examining bidirectional associations between media and child development, we did not find that heavier media use at baseline predicted greater behavioral problems 6 months later—after controlling for child age and parent gender, education, and depression. These disparate results may be explained by the measures used in different studies. Madigan et al.²¹ used a developmental screening test, the Ages & Stages Questionnaire (ASQ), which assesses multiple domains of early childhood development. A lower ASQ score could reflect delayed language, cognitive, motor, or social-emotional development, which could be impacted if heavy media use displaces other developmentally enriching activities or parent-child

interaction. Cliff et al.²⁰ used a complex composite measure of self-regulation from caregiver-, teacher-, and observer-report data, which may not map onto constructs captured by the CBCL externalizing subscale. Another recent study found that parent-reported duration of app playing was negatively associated with performance on standardized tests of impulse inhibition 12 months later.²⁸ In contrast, our findings suggest that long-term changes in media use may be driven by child externalizing behavior, through the mechanism of higher parenting stress.

Only TV viewing showed a small significant association with later externalizing. Although we had hypothesized that mobile handheld media would have a stronger association with child social-emotional difficulties, it is possible that TV viewing involves more on-demand streaming of longer programs, and perhaps longer bouts of media use. TV viewing was also the most common media use behavior in our cohort. These findings are consistent with a recent study showing that higher levels of program viewing were associated with increases in externalizing behaviors 12 months

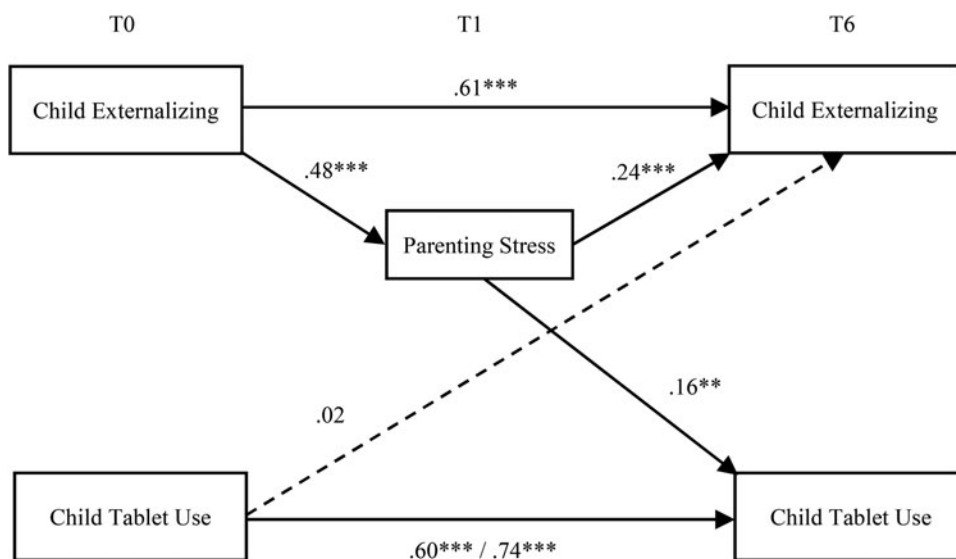


FIG. 5. Model of child externalizing behavior, parenting stress, and child tablet use over time [$\chi^2(2) = 3.62$, $p = 0.16$; RMSEA = 0.05; CFI = 0.99; SRMR = 0.02]. Standardized estimates displayed here. Paths found to be significantly different for mothers and fathers are displayed as mother estimate/father estimate. Child age and parent gender, education, and depression were entered as control variables (paths not displayed), and externalizing and media use were allowed to correlate at T0 and T6, respectively (paths not displayed).

later.²⁸ We did not collect data about the content of media use, so it is unclear whether content differences between TV and mobile platforms may explain these associations.

Overall, these results contribute to a growing understanding of the ways in which child individual differences, such as temperament, self-regulation difficulties, or disruptive behavior, may contribute to early childhood patterns of media use. It is important that future research take into account the individual relationships that children may develop with media as they shift from more parent-mediated use to more independent use into school-age and adolescence.²⁹ In ongoing and future work, we will recruit more diverse cohorts of young children and use objective measures of mobile device use that provide details about content and timing of usage.³⁰ Thus, more precise interventions—that take into account both child characteristics and digital affordances—can be designed.

Several limitations are worthy of mention. Our sample was primarily Caucasian and well-educated, but did represent a range of income levels. Although we assessed a range of different modern forms of media, we did not collect information about the TV programs viewed or mobile content or games used, which could influence child responses to media.³¹ Future research should also consider the context of media use (e.g., whether shared, used in transit, during meals, at bedtime) and collect data at several time points so that cross-lagged associations can be more fully tested. Moreover, we did not measure how much time each mother and father spent with the child within each family, which could influence mother and father perceptions of child time on media. We did, however, examine whether model paths differed by parent gender and often found no differences in the strengths of these paths.

Strengths of this study include the use of longitudinal data to test hypotheses about the transactional ways media use and child behavior interact, and the role of parental stress in shaping child media habits. Little is known about how mothers and fathers might manage young children's media use differently, but our structural equation models suggest that no significant differences existed in the current processes.

There are several clinical implications of this study. Compared with when the American Academy of Pediatrics guidelines were written in 2016,³² there is now a more robust literature suggesting that children with early behavioral regulation problems use more media overall, spend more time on mobile devices, and use media more individually. It is, therefore, important that pediatric clinicians and early childhood providers help parents develop alternate coping strategies for managing difficult child behaviors or intense emotions. Future policy statements might consider providing specific guidance for managing child demands for media, choosing content for children with social-emotional difficulties, or parent stress reduction.

Acknowledgments

The authors acknowledge the contribution of the families who participated in this study as well as the research assistants who made data collection possible.

Author Disclosure Statement

J.S.R. sits on the Board of Directors and is a paid consultant for Melissa & Doug Toys, LLC. B.T.M. has no competing conflicts of interest to disclose. The content is solely

the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health or Parkview Health.

Funding Information

The study was funded by College of Health and Human Development, Department of Human Development and Family Studies, and the Bennett Pierce Prevention Research Center at The Pennsylvania State University; NIDA (T32DA017629); NICHD (F31 HD084118).

References

1. Tomopoulos S, Dreyer BP, Valdez P, et al. Media content and externalizing behaviors in Latino toddlers. *Ambulatory Pediatrics* 2007; 7:232–238.
2. Verlinden M, Tiemeier H, Hudziak JJ, et al. Television viewing and externalizing problems in preschool children: the Generation R Study. *Archives of Pediatrics & Adolescent Medicine* 2012; 166:919–925.
3. Munzer TG, Miller AL, Peterson KE, et al. Media exposure in low-income preschool-aged children is associated with multiple measures of self-regulatory behavior. *Journal of Developmental and Behavioral Pediatrics: JDBP* 2018; 39:303–309.
4. Vandewater EA, Rideout VJ, Wartella EA, et al. Digital childhood: electronic media and technology use among infants, toddlers, and preschoolers. *Pediatrics* 2007; 119:e1006–e1015.
5. Vijakhana N, Wilaisakditipakorn T, Ruedeekhajorn K, et al. Evening media exposure reduces night-time sleep. *Acta Paediatrica* 2015; 104:306–312.
6. Radesky JS, Silverstein M, Zuckerman B, et al. Infant self-regulation and early childhood media exposure. *Pediatrics* 2014; 133:e1172–e1178.
7. Thompson AL, Adair LS, Bentley ME. Maternal characteristics and perception of temperament associated with infant TV exposure. *Pediatrics* 2013; 131:e390–e397.
8. Nikken P, Schols M. How and why parents guide the media use of young children. *Journal of Child and Family Studies* 2015; 24:3423–3435.
9. Nabi RL, Krcmar M. It takes two: the effect of child characteristics on US parents' motivations for allowing electronic media use. *Journal of Children and Media* 2016:1–19.
10. Domoff SE, Lumeng JC, Kaciroti N, et al. Early childhood risk factors for mealtime TV exposure and engagement in low-income families. *Academic Pediatrics* 2016; 17:411–415.
11. Domoff SE, Radesky JS, Harrison K, et al. A naturalistic study of child and family screen media and mobile device use. *Journal of Child and Family Studies* 2018; 28:401–410.
12. Munzer TG, Miller AL, Weeks HM, et al. Differences in parent-toddler interactions with electronic versus print books. *Pediatrics* 2019; 143:e20182012.
13. Raman S, Guerrero-Duby S, McCullough JL, et al. Screen exposure during daily routines and a young child's risk for having social-emotional delay. *Clinical Pediatrics* 2017; 56:1244–1253.
14. Hiniker A, Lee B, Kientz JA, et al. (2018) Let's play!: Digital and analog play between preschoolers and parents. In: *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, p. 659.
15. Radesky JS, Eisenberg S, Kistin CJ, et al. Overstimulated consumers or next-generation learners? Parent tensions about child mobile technology use. *The Annals of Family Medicine* 2016; 14:503–508.

16. Pempek TA, McDaniel BT. Young children's tablet use and associations with maternal well-being. *Journal of Child and Family Studies* 2016; 25:2636–2647.
17. Radesky JS, Peacock-Chambers E, Zuckerman B, et al. Use of mobile technology to calm upset children: associations with social-emotional development. *JAMA Pediatrics* 2016; 170:397–399.
18. Sameroff A. Transactional models in early social relations. *Human Development* 1975; 18:65–79.
19. Nelissen S, Kuczynski L, Coenen L, et al. Bidirectional socialization: an actor-partner interdependence model of internet self-efficacy and digital media influence between parents and children. *Communication Research* 2019; 46: 1552–3810.
20. Cliff DP, Howard SJ, Radesky JS, et al. Early childhood media exposure and self-regulation: bidirectional longitudinal associations. *Academic Pediatrics* 2018; 18:813–819.
21. Madigan S, Browne D, Racine N, et al. Association between screen time and children's performance on a developmental screening test. *JAMA Pediatrics* 2019; 173: 244–250.
22. Achenbach TM, Rescorla LA. (2000) *Manual for the ASEBA preschool forms & profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth and Families.
23. Abidin RR. (1995) *Parenting stress index*. Odessa, FL: Psychological Assessment Resources, Inc.
24. Feinberg ME, Brown LD, Kan ML. A multi-domain self-report measure of coparenting. *Parenting* 2012; 12:1–21.
25. Radloff LS. The CES-D scale a self-report depression scale for research in the general population. *Applied Psychological Measurement* 1977; 1:385–401.
26. Maslowsky J, Jager J, Hemken D. Estimating and interpreting latent variable interactions: a tutorial for applying the latent moderated structural equations method. *International Journal of Behavioral Development* 2015; 39:87–96.
27. Levine LE, Waite BM, Bowman LL, et al. Mobile media use by infants and toddlers. *Computers in Human Behavior* 2019; 94:92–99.
28. McNeill J, Howard SJ, Vella SA, et al. Longitudinal associations of electronic application use and media program viewing with cognitive and psychosocial development in preschoolers. *Academic Pediatrics* 2019; 19:520–528.
29. Buckingham D, Banaji S, Carr D, et al. (2005) *The media literacy of children and young people: a review of the research literature*. London: Ofcom.
30. Yuan N, Weeks HM, Ball R, et al. How much do parents actually use their smartphones? Pilot study comparing self-report to passive sensing. *Pediatric Research* 2019; 86: 416–418.
31. Christakis DA, Garrison MM, Herrenkohl T, et al. Modifying media content for preschool children: a randomized controlled trial. *Pediatrics* 2013; 131:431–438.
32. Radesky J, Christakis D, Hill D, et al. Media and young minds. *Pediatrics* 2016; 138:e20162591.

Address correspondence to:

Dr. Brandon T. McDaniel
Health Services and Informatics Research
Parkview Mirro Center for Research and Innovation
10622 Parkview Plaza Drive
Fort Wayne, IN 46845

E-mail: btmcdaniel.phd@gmail.com