frontiers | Frontiers in Developmental Psychology

TYPE Original Research
PUBLISHED 04 April 2024
DOI 10.3389/fdpys.2024.1377998

OPEN ACCESS

EDITED BY
Priscilla Goble,
Texas State University, United States

REVIEWED BY
Jessica Dollar,
University of North Carolina at Greensboro, United States
Sara Cruz,
Lusíada University of Porto, Portugal

*CORRESPONDENCE
Heather Kirkorian
✉ kirkorian@wisc.edu

RECEIVED 28 January 2024
ACCEPTED 20 March 2024
PUBLISHED 04 April 2024

CITATION
Suh B, Kirkorian H, Barr R, Kucker SC, Torres C and Radesky JS (2024) Measuring parents' regulatory media use for themselves and their children. *Front. Dev. Psychol.* 2:1377998. doi: 10.3389/fdpys.2024.1377998

Measuring parents' regulatory media use for themselves and their children

Bolim Suh[1], Heather Kirkorian[1]*, Rachel Barr[2], Sarah C. Kucker[3], Chioma Torres[4] and Jenny S. Radesky[5]

[1]Human Development and Family Studies, University of Wisconsin-Madison, Madison, WI, United States, [2]Department of Psychology, Georgetown University, Washington, DC, United States, [3]Department of Psychology, Southern Methodist University, Dallas, TX, United States, [4]Department of Pediatrics, Michigan State University College of Human Medicine, East Lansing, MI, United States, [5]Department of Pediatrics, University of Michigan Medical School, Ann Arbor, MI, United States

Introduction: Parents often use media to manage their own or their child's emotions and behaviors, which is called "regulatory media use." While the use of media to alleviate negative emotions and behaviors may be helpful in the short-term, there may be negative consequences in the long-term (e.g., for children's development of self-regulatory skills). Research remains limited, often relying on a single, binary question asking whether a parent ever uses media to calm their child. To enable future research on the effects of regulatory media use, this paper described initial scale development efforts for measuring parents' regulatory media use for themselves (parent scale) and their children (child scale).

Methods: These scales were tested in an aggregate sample of parents with children 1–10 years old, and with each of three subsamples representing parents of children in infancy (15-25 months old), early childhood (2–5 years old), and middle childhood (5–10 years old).

Results: Overall, the results provide initial support for the scales as a reliable tool for measuring regulatory media use. Both scales for parents and children had a stable three-factor structure that held within each of the three subsamples. Further, both scales had predictive validity, each predicting parenting stress and child screen time.

Discussion: Building upon earlier studies that often focused on single items to measure regulatory purposes, the initial scales appear to capture a multifaceted range of regulatory uses of media. The comprehensive measurement of regulatory media use enabled by these scales can inform more effective and tailored media guidelines and interventions, and the potential applications and implications for future research are discussed.

KEYWORDS

regulatory media use, instrumental media use, self-regulation, parenting stress, screen time

Introduction

Over the past few decades, the development of more accessible and portable screen media devices has led to an increase in their use by parents and young children households (Rideout and Robb, 2020). With their widespread adoption, the use of portable screen devices has generally been addressed in combination with all other screens by health profession guidelines such as the American Academy of Pediatrics (AAP) and World Health Organization (WHO). Both organizations recommend a limit of 1 h of screen media use between ages 2 through 4 (World Health Organization, 2019) or 5 years (AAP Council on Communications and Media, 2016). Despite these guidelines, studies show that children between 2 and 5 years old use media for an average of 2½ h per day, much of it in the form of handheld devices (Rideout and Robb, 2020). To understand the drives of screen media use

in young children, research is needed that examines motivations for mobile and traditional screen use through daily routines.

Parents of young children often use media to fulfill not only their own psychological needs but also a wide range of parenting-related needs (Beyens and Eggermont, 2014), potentially leading to longer daily media use for both parents and children. Here we adopt "*regulatory media use*" to describe parents' use of screen media (e.g., television programs, streaming videos, and mobile phone apps) to regulate their own or their child's emotional state, attention, or behavior, such as using media to mentally check out, escape from stress, or calm a fussy infant. Emotional and behavioral self-regulation (vs. dysregulation) is an important clinical concept that is used to describe how parents and children manage emotional states and problem-solve in the moment, rather than using a maladaptive coping approach (e.g., tantrum, aggression, and avoidance; Blair, 2010; Montroy et al., 2016). Therefore, more research is needed that examines to what degree regulatory needs drive the use of media and mobile devices play in families.

While offering temporary relief from negative emotional responses and behaviors, regulatory media use may not be beneficial in the long run, as it does not address the underlying causes of emotional or behavioral dysregulation (e.g., Radesky et al., 2016b, 2023; Gordon-Hacker and Gueron-Sela, 2020). Moreover, frequent regulatory media use may displace interactive activities that are crucial for the development of self-regulatory skills, especially for young children (e.g., Domoff et al., 2020; Coyne et al., 2021). Notably, opportunities for regulatory media use have been more prevalent with the ubiquity of mobile devices, such as smartphones and tablets (Radesky et al., 2016a; Kildare and Middlemiss, 2017; Floegel et al., 2021). Despite its prevalence, research on regulatory media use is limited, often constrained by coarse measures, such as a binary question asking whether a parent ever uses media to calm their child. This paper seeks to establish a broader conceptualization of regulatory media use that captures a range of media behaviors for both parents and children. Furthermore, we seek to test the degree to which a range of media motivations might correlate with the use of media to calm a child (i.e., the primary form of regulatory media use that has been studied previously; Radesky et al., 2016b, 2023; Coyne et al., 2021; Brauchli et al., 2024). To this end, this paper describes initial efforts in scale development for measuring regulatory media use for parents and children in three subsamples of parents with children collectively spanning ages 1–10 years. First, we review the extant literature on regulatory media use for parents and children.

Regulatory media use for parents

Scholars have advocated for examining parents' media use through a family system lens, highlighting the importance of understanding how parental media use is related to -being of families and individual members (Coyne et al., 2017; Barr et al., 2020, 2024). Research has consistently found that parental media use may be linked with child behavioral problems through less responsive parent-child interactions (Kirkorian et al., 2009; McDaniel and Radesky, 2018). As such, parental media use has emerged as a promising target for interventions, being a modifiable aspect of parenting behavior aimed at enhancing parenting practices, and further, improving child development outcomes.

Parents of young children often turn to screen media as a means of managing their own emotional responses. Studies have indicated that when parents use media to avoid or escape from their own emotional responses, such parental media use may have negative effects on parenting practices (Torres et al., 2021; Zhang et al., 2022). Specifically, parents who engage with media use as an escape from their immediate parental responsibilities with preschool-aged children reported higher levels of parenting stress and guilt compared to those who leverage media to seek out social support or parenting information (Torres et al., 2021). This suggests that while media use can offer a convenient and immediate way for parents to unwind, the potential long-term impact depends on the underlying reasons and contexts of use.

Yet, not all parental media use has negative effects on parent-child interactions. Parents engage with media for various beneficial reasons, such as staying connected with the world outside their home or keeping in touch with loved ones during the challenging early days of parenting (Radesky et al., 2016a; Wolfers, 2021; Coyne et al., 2022; Linder et al., 2022). Moreover, qualitative research has demonstrated that parents with children younger than 7 years old often utilize media to seek out information and social support when dealing with stress (Wolfers, 2021). Such findings suggest that parental media use can even enhance parent-child interactions and overall family wellbeing, highlighting the complexities of parental media use.

Regulatory media use for children

Parents also use media to regulate their young children's emotional responses and behaviors in several ways. Media can serve as a calming tool, allowing parents to manage their child's emotional responses (Zimmerman et al., 2007; De Decker et al., 2012; Bentley et al., 2016; Radesky et al., 2016b; Nikken, 2019). For instance, it can be used as a distractor during new or stressful situations, such as a doctor's appointment. Such media use not only helps to regulate the child's emotional responses and behavior but also provides the parents with temporary relief or time for themselves (Nabi and Krcmar, 2016). Additionally, child media use can control child behavior by keeping them entertained in public places, such as at restaurants (Radesky et al., 2014; Floegel et al., 2021). As such, parents use media for their young children with regulatory purposes across a variety of settings and contexts.

Several cross-sectional studies have found a link between using media to regulate child emotions and the child's development, including worse self-regulation (Radesky et al., 2016b) and problematic media use (Coyne et al., 2021). A study with preschoolers revealed that using media to calm children was associated with their weaker executive functioning (Danet et al., 2022). However, studies have not clarified whether or how regulatory media use for children is causally related to their socio-emotional development. It could be equally possible that weak child self-regulation leads to more regulatory media use for managing children's emotional responses and behavior, and that regulatory media use causes lower self-regulation by displacing opportunities for children to practice self-regulatory skills. To address this

issue, Radesky et al. (2023) explored the bidirectional, longitudinal associations between mobile device use and development in preschoolers. They found that higher emotional reactivity and lower executive functioning in preschoolers predicted a greater likelihood of using mobile devices to calm them at baseline. However, only emotional reactivity was associated bidirectionally and longitudinally with device use for calming at 3- and 6-month follow-ups. These associations were found to be stronger in boys and children with higher levels of surgency defined as higher impulsivity, activity level and reward seeking. Such findings suggest that there may be concurrent and longitudinal relationships between regulatory media use and child socio-emotional development.

Lack of comprehensive measures of regulatory media use

Mixed findings around regulatory media use may be due to differences in how it is measured and interpreted. Prior research has primarily investigated parental media use in a qualitative way, either through interviews about parents' motivations for media use (Torres et al., 2021; Wolfers, 2021) or by observing moment-to-moment parental media use in public (Radesky et al., 2014; Linder et al., 2022), exploring various reasons for parental media use in daily parenting. These qualitative studies have provided rich data to develop quantitative scales to test hypotheses and the generalizability of findings, such as associations between regulatory media use and parent-child dynamics and child development in large representative studies. Based on these qualitative findings, researchers have adopted a nuanced approach by conceptualizing regulatory media use as a set of distinct activities based on specific purposes or aspects of use, rather than treating it as a single, overarching construct (Zhang et al., 2022). Some researchers have sought to expand on prior work by testing more comprehensive measures of the context of parent and child media use (Lunkenheimer et al., 2023). This work involved examining how parents manage, perceive, and regulate both their own and their children's screen media use. These findings highlight the importance of developing a comprehensive scale to measure and differentiate the various aspects of parental media use.

Similarly, previous studies on child regulatory use have relied on relatively simple measures that capture limited variability between and within families. To date, child regulatory media use has been assessed with a single question alongside other media-related reasons (e.g., Cingel and Krcmar, 2013; Nabi and Krcmar, 2016; Nikken, 2019). A few studies focused on child regulatory media use also used a single situation to assess media use for regulatory purposes (e.g., Radesky et al., 2016b, 2023; Coyne et al., 2021; Danet et al., 2022). However, using a simple checkbox or single question could mask variability in regulatory use of media between participants and obscure the association between regulatory media use and child outcomes including behavioral/emotional development. Moreover, there may be various ways or contexts in which parents use media to regulate their child's emotional responses and behavior that have different implications for child development (e.g., occupying children during a daily routine vs. using media to soothe a distressed child). For example, reasons for using media with children may differ across different types of media such that videos are commonly used to keep children occupied, whereas books are used for educational purposes and less frequently for occupying (Kucker et al., 2024). Thus, it is crucial to consider child regulatory media use as potentially multifaceted. Recently, some researchers have attempted to measure child regulatory media use across multiple situations (e.g., Coyne et al., 2021), but psychometric value and usefulness of these measures for assessing child regulatory media use have yet to be examined.

Current study

In the current study, we developed and tested two scales, one for parent regulatory use and one for child regulatory use to characterize different aspects of regulatory media use for parents and children. In the current paper, we evaluated these scales in an aggregate sample of 791 parents drawn from three subsamples of parents with children of different ages: Subsample 1: 15–25 months (n = 251); Subsample 2: 2–5 years (n = 227); Subsample 3: 5–10 years (n = 313). We first identified the internal consistency and factor structure of each scale (parent, child) via exploratory factor analysis using the aggregate sample. Then, we conducted confirmatory factor analysis within each subsample to test if the same factor structure exists in each child age group. Finally, we examined associations between the regulatory media use scales, parenting stress and child screen time, as a means of assessing predictive validity.

Materials and methods

Participants and recruitment

The aggregate sample for this study included 791 parents of children 1–10 years old drawn from three larger studies. We describe the subsamples and recruitment methods for each subsample next.

Subsample 1

Subsample 1 data were collected from parents of toddlers who were 15–32 months old between February 2022 and March 2023, as a part of a larger study on children's language development and media use. The study received Institutional Review Board approval. Participants were recruited either through CloudResearch (n = 219) or in-person from a lab-based study (n = 33). Inclusion criteria for parents were (1) being 18 years or older, (2) being the primary caregiver of a child aged 15–32 months, (3) their child being primarily exposed to English, and (4) their child having no major diagnosed developmental delay. For the CloudResearch sample, the HIT (Human Intelligence Task, i.e., specific study posting) was visible only to those workers with an approval rate of 95% or higher and had at least 100 HITS approved. Eligible participants were those who had indicated on their platform profile they had a child who was 1 or 2 years old at the time of the

TABLE 1 Summary of demographics for each subsample and the aggregated sample.

	Subsample 1	Subsample 2	Subsample 3	Aggregated sample
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*
Child age (years)*	1.99 (0.36)	3.9 (1.1)	7.3 (1.6)	4.7 (2.6)
Parent age (years)*	32.3(5.5)	35.5 (7.8)	38.3 (5.6)	35.6 (6.8)
Household income group (1–12)*	7.8 (3.0)	7.2 (3.3)	8.4 (3.3)	7.9 (3.3)
	***n* (%)**	***n* (%)**	***n* (%)**	***n* (%)**
Parent race*				
White	201 (85.5)	124 (64.2)	248 (81.6)	573 (74.6)
Black or African-American	27 (11.5)	54 (28.0)	24 (7.9)	105 (13.3)
Asian or Pacific Islander	7 (3.0)	15 (7.8)	18 (5.9)	40 (5.1)
Not listed/Mixed race	13 (5.2)	23 (10.1)	14 (4.6)	50 (6.3)
Parent ethnicity*				
Hispanic/Latino	21 (8.4)	65 (28.6)	26 (8.3)	112 (14.2)
Non-Hispanic/Latino	227 (90.0)	158 (69.6)	278 (88.8)	662 (83.7)
Parent education*				
<4 year college	96 (38.6)	116 (51.5)	92 (30.1)	304 (38.9)
4 year college	85 (34.1)	90 (39.6)	80 (26.1)	255 (32.6)
More than 4 year college	68 (27.3)	21 (9.3)	134 (43.8)	223 (28.5)

Household income group was treated as a continuous variable a 12-point scale with points 1–10 representing increments of $10,000 (e.g., 1 = $0-$9,999, 10 = $90,000-$99,999) and two additional categories, 11 = $100,000-$149,999, 12 = $150,000 or greater). Asterisks indicate statistically significant differences across subsamples using linear regression for continuous variables (child age, parent age, and household income) and chi-square tests for categorical variables (parent race, parent ethnicity, and parent education).

survey. Only those with an IP address within the United States were eligible. Each worker was paid $5 for completing the survey. Extensive data cleaning was used to ensure data quality prior to analysis as per recommendations (Chmielewski and Kucker, 2020). This included a short pre-screener to ensure eligibility, consistent responding to check questions across the questionnaires, and logical responses to open-ended questions. A total of 72 additional participants were dropped prior to analysis for not completing the full set of questionnaires or for failing one or more of these screening checks. The in-person sample completed the same set of questionnaires after the family participated in an in-lab word learning experiment. Each participant was recruited through either an internal database of interested families or social media posts for the region (Stillwater, OK). These participants were compensated $20 combined for the in-lab component plus the questionnaires. Only one additional participant was dropped for not completing the full survey.

In the final analytic sample of 251 parents for Subsample 1, parents were 32.3 years old ($SD = 5.5$) on average. Of these, 27.6% of the parents had a household income above $100,000, 85.5% were White, 61.4% completed at least a bachelor's degree, and 8.4% were Hispanic or Latino. The average age of the target child was 2.00 years old ($SD = 0.4$). Because child age was recorded in years only in Study 3, child age was converted to years in whole numbers for Subsample 1 for subsequent analysis. For example, children 15–23.99 months old were represented as 1-year-olds in regression models that included age. See Table 1 for additional demographic information.

Subsample 2

Subsample 2 involved parents of young children, with data collection via an online survey from May to July 2023. The study received Institutional Review Board approval. Participants were recruited through Prolific. Inclusion criteria for parents were: (1) being 18 years or older, (2) residing with the child for at least 5 days a week, (3) proficiency in English to provide informed consent and complete the survey, and (4) having at least one child born between 2017 and 2019. Out of 243 survey completions, 15 participants were dropped for not meeting quality control criteria (at least 85% correct on seven attention check questions).

The final analytic sample for Subsample 2 included 227 parents, averaging 35.5 years old ($SD = 7.8$). Of these, 25.4% reported a household income above $100,000, 64.2% were White, 51.5% completed at least a bachelor's degree, and 27.6% were Hispanic or Latino. The average age of the target child was 3.9 years ($SD = 1.13$). Because child age was recorded in years only in Study 3, child age was converted to years in whole numbers for Subsample 2 for subsequent analysis. For example, children 25–35.99 months old were represented as 2-year-olds in regression models that included age. See Table 1 for additional demographic information.

Subsample 3

Subsample 3 data were collected from parents of school-age children via an online survey between February and March 2021,

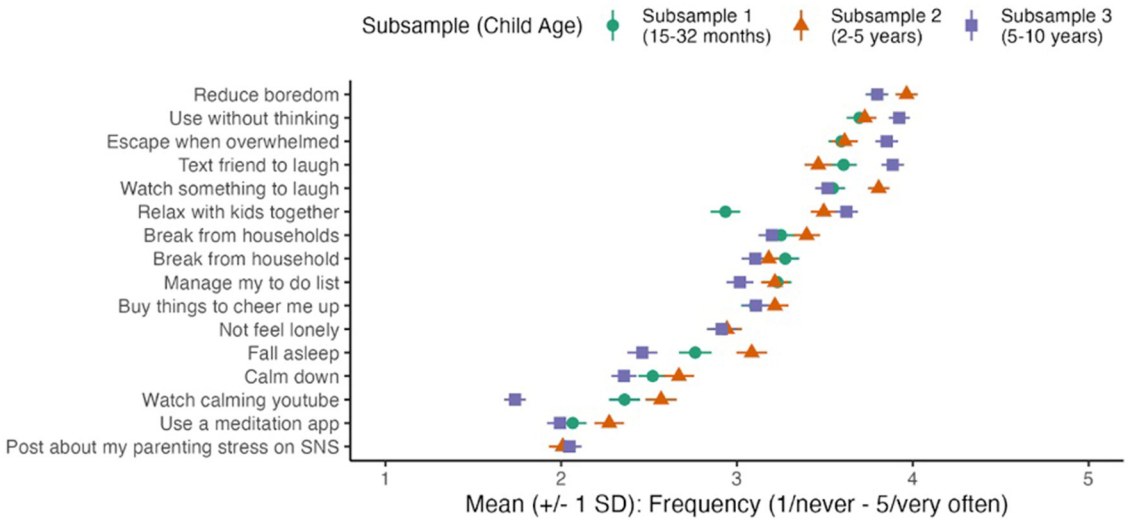

FIGURE 1
Mean and standard deviation for each item in the parent regulatory media use scale. Items were sorted in order of grand mean across the three subsamples.

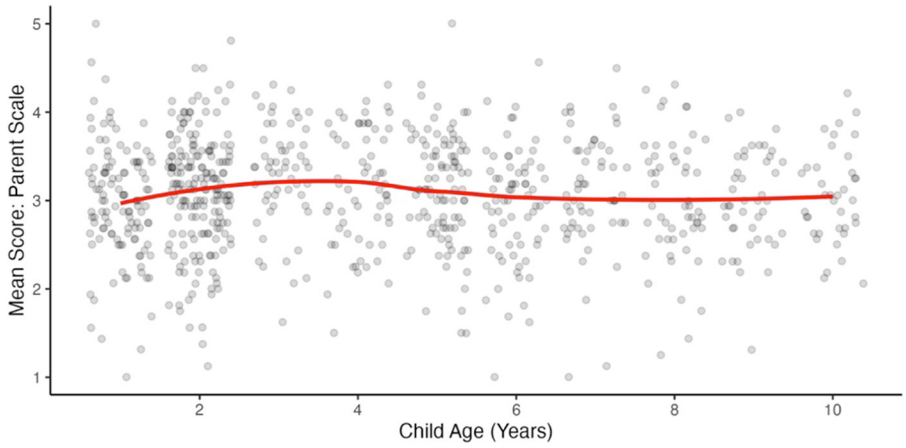

FIGURE 2
Overall score on the parent regulatory media use scale as a function of child age. Each dot represents an individual parent. The line represents the locally estimated sum of squares with a 95% confidence interval band.

as a part of a larger study on family experiences during the COVID-19 pandemic. The study received Institutional Review Board approval. Recruitment methods included postings on a university research participant registry; ads on social media; and flyers distributed by clinicians, parent-teacher organizations, and non-profit organizations. Inclusion criteria for parents were: (1) being 18 years or older, (2) being a parent or legal guardian, (3) having a child aged 5.00–10.99 years, (4) living with the child for most of the week, (5) having English proficiency, and (6) residing in Michigan. Of 413 interested parents, 313 were eligible and provided online informed consent. Ultimately, eight participants were dropped because they completed <½ of the survey.

The final analytic sample for Subsample 3 consisted of 313 parents, with an average age of 35.6 years (SD = 6.8). Of these, 41.1% had a household income above $100,000, 81.6% were White, 69.9% completed at least a bachelor's degree, and 8.3% were Hispanic or Latino. The average age of the target child was 7.3 years (SD = 1.6). See Table 1 for additional demographic information.

Measures

Regulatory media use scales

The regulatory media use scales for parents and children scales were designed to assess the motives behind parents' use of media

to regulate their own or their child's emotional responses and behaviors. Items were developed based on themes and parent experiences identified through qualitative research with parents of young children (Radesky et al., 2016a; Torres et al., 2021). The parent scale comprised 16 items, including "To take a break and relax when my kids are showing difficult behavior and getting on my nerves," "To reduce feelings of boredom," and "To watch a calming YouTube video such as ASMR (Autonomous Sensory Meridian Response)." The child scale consisted of 12 items, including "When your child is upset (crying, yelling, showing big emotional responses) and needs to calm down," "To keep your child occupied as needed (not at a scheduled time of day), when you need to get a few things done or need some time to yourself," and "To help them fall asleep at night." Parents were asked to indicate the frequency with which they used media for each reason on a five-point Likert scale from 1 (never) to 5 (very often). A higher overall score in each scale represents a higher frequency of media use to regulate parents' own or their child's emotions and behaviors. The complete scales tested in this study can be found in Supplementary Tables 1, 2.

Parenting stress scale

Parenting stress was measured by the Parenting Stress Scale. The PSS is an 18-item self-report questionnaire that represents positive and negative themes of parenthood. Items include, "I am happy in my role as a parent," "Caring for my child(ren) sometimes takes more time and energy than I have to give," and "The major source of stress in my life is my child(ren)." Items are rated on 5-point Likert scales with response options ranging from 1 (strongly disagree) to 5 (strongly agree). The original investigation found good reliability ($\alpha = 0.83$). A higher score represents a higher level of self-reported parenting stress.

Child screen time

Child screen time was measured differently in Subsamples 1, 2, and 3. In Subsamples 1 and 2, parents reported the amount of their child's media use on both a typical weekday and a typical weekend as a numeric value using a slider scale that ranged from 0 to 8 h in 15-min increments. Parents used these slider scales for each of several activities, including TV/video viewing and digital app/game play. We computed the average daily time spent on TV/video and digital apps/games by averaging across both media activities and weighting by the number of days for weekdays (5 days/week) and weekends (2 days/week).

In Subsample 3, parents were asked to report their child's typical daily media usage, including TV, streaming video, live TV, and social media, on a scale ranging from 0 (none) to 8 (5 or more hours). The responses were averaged across media types to produce an overall score for each participant. To align with the continuous measure used in Subsamples 1 and 2, we used the midpoint of each time range in Subsample 3 (e.g., "16–30 min" became 23 min, "1–2 h" became 1.5 h). Therefore, child screen time was recalculated for minutes per week for all three subsamples, with a higher number indicating a greater amount of child screen time.

TABLE 2 Regression model of child age predicting the overall score on the parent regulatory media use scale (16 items).

	β (*SE*)
Child age	0.31 (0.15)
Child age (quadratic)	−0.28 (0.15)
Parent age	−0.14 (0.04)***
Parent race: Black or African American	0.38 (0.10)***
Parent race: Asian or Pacific Islanders	0.01 (0.16)
Parent race: Not listed or Mixed race	−0.05 (0.15)
Parent ethnicity: Hispanic/Latino	0.17 (0.11)
Intercept	−0.08
F-value	4.57***
R^2	0.03

Standardized betas are reported. Base group of the race category is White.
***p < 0.001.

Statistical analyses

First, we computed Cronbach's alpha to assess the internal consistency across all items and the overall homogeneity (Tavakol and Dennick, 2011) for the parent scale and the child scale. A higher alpha score indicates greater homogeneity, suggesting that the scale items more consistently measure the same underlying concept.

Next, we examined the overall parent and child scale scores as a function of child age. Given media use is sometimes found to vary non-linearly across age (Anand and Krosnick, 2005), we included both linear and quadratic terms for child age. We also included demographic characteristics as covariates if they (1) differed significantly by subsample as a proxy for child age (Table 1 and Supplementary Table 3), and (2) were significantly correlated with the dependent variable (Supplementary Tables 4, 5).

Third, we conducted an exploratory factor analysis (EFA) to identify the underlying factor structure of each scale, employing data from the aggregated sample across the three subsamples. We used the principal axis factoring approach with direct oblimin (oblique) rotation. In line with previous research finding that the popular Kaiser criterion (i.e., eigenvalue > 1.0) alone is insufficient (Velicer and Jackson, 1990), we also examined the scree plot to determine the optimal number of factors (see Supplementary Figures 1, 2). We followed recommendations by Howard (2016) to exclude items with low factor loadings (below 0.40 on the primary factor) or with cross-loading (loadings above 0.30 on other factors or a difference of <0.20 between the primary factor and other factors).

Subsequently, we conducted confirmatory factor analysis (CFA) using data drawn from each of the three subsamples. Thus, CFA was used to test whether the factor structure of the aggregated sample that was identified through EFA remained consistent in each child age group. We employed multiple fit indices alongside Chi-Square statistics to evaluate the model, as Chi-Square statistics can be influenced by sample size (Hu and Bentler, 1999). The additional fit indices considered were the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI),

TABLE 3 Summary of exploratory factor analysis for the parent regulatory media use scale (aggregated sample).

Item	Factor loadings		
	Factor 1	Factor 2	Factor 3
Escape (Factor 1)			
To take a break and relax when my kids are showing difficult behavior and getting on my nerves	**0.84**	−0.03	−0.07
To calm down in the moment, so that I don't yell at my kids or overreact to them	**0.73**	−0.02	0.19
Entertain (Factor 2)			
Without even thinking about it, I grab my phone when I'm bored or upset	0.10	**0.63**	−0.12
To reduce feelings of boredom	−0.08	**0.62**	−0.01
Calm (Factor 3)			
To use a meditation app (such as Calm or Headspace)	−0.01	−0.04	**0.72**
To watch a calming YouTube video such as ASMR	0.05	−0.05	**0.69**
Other Items (did not load on a factor)			
To watch something that will make me laugh	−0.06	0.43	0.27
When others in my household are stressing me out, I take a break and get on my phone	0.50	0.37	0.03
To not feel as lonely during the day	0.20	0.37	0.18
To help me fall asleep (for example, listening to music or watching videos)	0.10	0.15	0.34
To text or contact a friend who can help me out or make me laugh	−0.03	0.37	0.18
To manage my "to do list," which reduces my stress	0.04	0.12	0.34
To mentally "check out" or escape when the day has been overwhelming	0.40	0.37	−0.12
To post something about my current parenting stresses on social media	0.13	0.09	0.37
To buy things online, which generally cheers me up	0.01	0.31	0.33
To relax with my kids by watching a show together	−0.04	0.23	0.30

Significant factor loadings over 0.40 with a numerical difference between the primary factor and any alternative factors <0.20 appear in bold. N = 768, after dropping 23 with missing values on one or more indicators.

and the Tucker-Lewis Index (TLI). Acceptable and good fit were indicated by CFI and TLI values >0.90 and 0.95, respectively, combined with RMSEA values <0.08 (Hu and Bentler, 1999).

Lastly, we assessed predictive validity by testing associations between each factor in both parent and child scales and other relevant variables. First, we calculated each factor score by averaging the items included in the factors identified in the exploratory factor analysis. Then, for the parent scale, we examined associations with parenting stress. For the child scale, we explored associations with parenting stress as well as child screen time. A similar process was used to identify demographic covariate, but with the overall score of each scale (i.e., 16 items for the parent scale, 12 items for the child scale). In addition, we calculated correlations between factors within each scale (parent and child scale) and across the two scales.

Results

Parent regulatory media use scale

The mean score for the parent scale across all 16 items and subsamples was 3.08 ($SD = 0.63$) out of 5, roughly equivalent to "Sometimes." The original scale with all 16 items demonstrated satisfactory internal consistency overall ($\alpha = 0.82$) and within each subsample (Subsample 1: $\alpha = 0.82$; Subsample 2: $\alpha = 0.83$; Subsample 3: $\alpha = 0.81$). However, there was substantial variability among the 16 items and across the three subsamples, as illustrated in Figure 1.

Associations with demographic characteristics

We examined whether child age predicted the overall score of the 16 items on the parent scale. The overall score of the 16 items on the parent scale is plotted as a function of child age in Figure 2. The regression model included parent race, parent ethnicity and parent age as covariates because they differed across the subsamples (Table 1) and significantly predicted the dependent variable (see Supplementary Tables 4, 5). Results from the regression model can be found in Table 2. Parents' overall regulatory media use score (16 items) did not vary as a function of child age. However, there was a significant effect of race such that Black/African American parents reported using media for regulatory purposes more frequently than White parents ($\beta = 0.38$, $p < 0.001$). In addition, the overall score of the 16 items on the parent scale decreased with parent age ($\beta = -0.14$, $p < 0.001$).

10.3389/fdpys.2024.1377998

Exploratory factor analysis

A three-factor structure emerged from EFA for the parent scale with high factor loadings within each factor and minimal cross-loading (Table 3). This model explained 36% of the variance among the items in the parent scale. Factor 1, "Escape" (α = 0.77), represents media use to take a break or calm down to manage parenting stress. Factor 2, "Entertain" ($\alpha = 0.55$) represents media use to reduce parents' boredom. Factor 3, "Calm" (α = 0.69), characterizes media use for relaxation and calming purposes, such as watching calming YouTube videos. Descriptive statistics, including the mean, standard deviation, and reliability for each factor in each subsample, are presented in Table 4. Two items (i.e., "to watch something that will make me laugh," "to text or contact a friend who can help me out or make me laugh") were on the borderline of our established criteria for inclusion in Factor 2. A *post-hoc* analysis tested whether including these two items in the factor would improve its reliability (see Supplementary Table 6). However, it did not markedly increase the reliability with these additional items ($\alpha = 56$), so we kept the original selection criteria, including only the two items in Factor 2.

Confirmatory factor analysis

We conducted CFA to assess the extent to which the 3-factor structure in the parent scale was an acceptable fit for data within each of the three subsamples. The model resulting from the EFA demonstrated acceptable fit for preschool-age (Subsample 2) and school-age children (Subsample 3) but did not quite meet our criteria for acceptability for the infant subsample (Subsample 1) on all 3 indicators. See Table 5.

Predictive validity: predicting parenting stress

We first computed a Pearson correlation between the overall score of the 16 items on the parent scale and parenting stress to measure the relation between these two variables. The overall score of the 16 items on the parent scale was correlated with parenting stress (r = 0.24, $p < 0.001$). Next, we fit a multiple regression model to predict parenting stress from the three factors identified through EFA. We did not include any demographic covariates in the model, as none of the demographic variables were significant predictors of parenting stress (see Supplementary Table 7). Table 6 presents the results of the multiple regression analysis. The overall model was significant [$F_{(3,764)} = 26.72$, $p < 0.001$], explaining 9% of the variance in parenting stress. Of the three factors in the parent scale, only one factor, using media to escape from family stress, was a significant predictor of increased parenting stress (Escape: β = 0.30, $p < 0.001$). This was not true for parent-reported use of media to entertain themselves or to use calming media (Entertain: β = −0.05, $p = 0.187$; Calm: $\beta = 0.02$, $p = 0.641$).

Child regulatory media use scale

The mean score for the child scale across all 12 items and subsamples was 2.20 ($SD = 0.71$), roughly equivalent to "Rarely." Similar to the findings in the parent scale, internal consistency for all 12 items in the child scale was satisfactory (α = 0.87). This

TABLE 4 Descriptive statistics of factors in the parent regulatory media use scale.

	Subsample 1 (15–32 months)		Subsample 2 (2–5 years)		Subsample 3 (5–10 years)		Aggregated sample	
	M (*SD*)	Cronbach's alpha	*M* (*SD*)	Cronbach's alpha	*M* (*SD*)	Cronbach's alpha	*M* (*SD*)	Cronbach's alpha
Escape (Factor 1)	2.90 (1.14)	0.78	2.93 (1.15)	0.79	2.73 (1.16)	0.74	2.84 (1.16)	0.77
Entertain (Factor 2)	3.75 (0.92)	0.62	3.85 (0.80)	0.49	3.86 (0.88)	0.55	3.82 (0.87)	0.55
Calm (Factor 3)	2.21 (1.18)	0.76	2.42 (1.15)	0.70	1.87 (0.99)	0.60	2.12 (1.12)	0.69

TABLE 5 Model fit measures for confirmatory factor analysis of the regulatory media use scales.

Scale	Subsample	χ^2	*df*	CFI	TLI	RMSEA (90% CI)
Parent scale	Subsample 1	315.03	15	0.948	0.871	0.111 (0.073–0.153)
	Subsample 2	228.52	15	0.967	0.918	0.078 (0.027–0.129)
	Subsample 3	285.41	15	0.967	0.918	0.080 (0.035–0.128)
Child scale	Subsample 1	86.30	51	0.964	0.954	0.053 (0.034–0.071)
	Subsample 2	97.33	51	0.951	0.936	0.069 (0.048–0.090)
	Subsample 3	136.18	51	0.906	0.878	0.075 (0.060–0.089)

χ^2, χ^2 after Satorra-Bentler correction; df, degrees of freedom; CFI, Comparative Fit Index; TLI, TuckerLewis Index; RMSEA, Root Mean Square Error of Approximation; CI, Confidence Interval.

TABLE 6 Regression model of the factors in the parent regulatory media use scale predicting parenting stress.

	β *(SE)*
Escape	0.30 (0.04)***
Entertain	−0.05 (0.03)
Calm	0.02 (0.03)
Intercept	0.03 (0.03)
F-value	26.72***
R^2	0.09

Standardized betas are reported.
***p < 0.001.

consistency was also found within each subsample (Subsample 1: $\alpha = 0.87$; Subsample 2: $\alpha = 0.89$; Subsample 3: $\alpha = 0.79$). Again, however, there was substantial variability across the 12 items and the three subsamples, as shown in Figure 3.

Associations with demographic characteristics

Mirroring the analysis of the parent scale, we tested the degree to which child age predicted the overall score of the 12 items in the child scale. The overall score of the 12 items in the child scale is plotted as a function of child age in Figure 4. In this case, the regression model included parent age, parent race, parent ethnicity, parent education, and household income, each of which differed across the subsamples (Table 7) and significantly predicted the dependent variable (see Supplementary Tables 4, 5). The overall model was significant, $F_{(10,735)} = 15.49$, $p < 0.001$ and explained 16% of the variance. Model results revealed significant linear and quadratic effects of child age: (linear: $\beta = 0.56$, $p < 0.001$; quadratic: $\beta = -0.71$, $p < 001$). The negative quadratic term reflects the inverted-U pattern evident in Figure 4 showing that child regulatory behaviors were more frequently reported between 2 and 5 years than for either younger or older groups. In addition, there was a significant effect of parent race and parent education on the overall score of the 12 items on the child scale. Black/African American parents reported using media for regulatory purposes for their children more frequently than did White parents (Black/African American: $\beta = 0.84$, $p < 0.001$). In addition, the overall score of the 12 items on the child scale were lower for parents with an advanced degree than those with a 4-year degree ($\beta = -0.22$, $p = 0.01$).

Exploratory factor analysis

Similar to the analysis with the parent scale, we conducted EFA to identify if there are any distinct factors within the child scale. As a result, a three-factor structure emerged, accounting for 52% of the variance among the items (Table 8). Factor 1, "Regulate" ($\alpha = 0.85$), represents the use of media to regulate a child's emotional responses and behavior. Factor 2, "Occupy" ($\alpha = 0.76$), represents the use of media to occupy a child so the parent can take a break or get things done. Factor 3, "Sleep" ($\alpha = 0.83$), represents the use of media to help a child fall or stay asleep. All items were retained. Descriptive statistics, including the mean, standard deviation, and reliability for each factor in each subsample, are presented in Table 9.

Confirmatory factor analysis

The model from the EFA demonstrated acceptable fit on at least two of the three indicators within each of the three subsamples. See Table 5. These findings suggest that the three-factor structure in the scale is robust across different child age groups.

Predictive validity: predicting parenting stress and child screen time

We first computed a Pearson correlation between overall score of the 12 items on the child scale and parenting stress, which indicated these variables were significantly correlated ($r = 0.21$, $p < 0.001$). Next, we fit a multiple regression model to predict parenting stress from the three factors identified through EFA. As with the parenting scale, no demographic covariates were included in this model predicting parenting stress. See Table 10 for the results of the multiple regression. The overall model was significant, $F_{(3,769)} = 10.98$, $p < 0.001$, and explained 4% of the variance. Parent-reported media use to regulate a child's emotional responses and behaviors and to occupy a child significantly predicted greater parenting stress (Regulate: $\beta = 0.12$, $p = 0.007$; Occupy: $\beta = 0.10$, $p = 0.007$). In other words, parents who report having their children use media as a way to regulate their children's emotional responses and behaviors and to occupy them reported greater parenting stress. This was not true for the factor capturing parent-reported use of media to help children sleep ($\beta = 0.02$, $p = 0.647$).

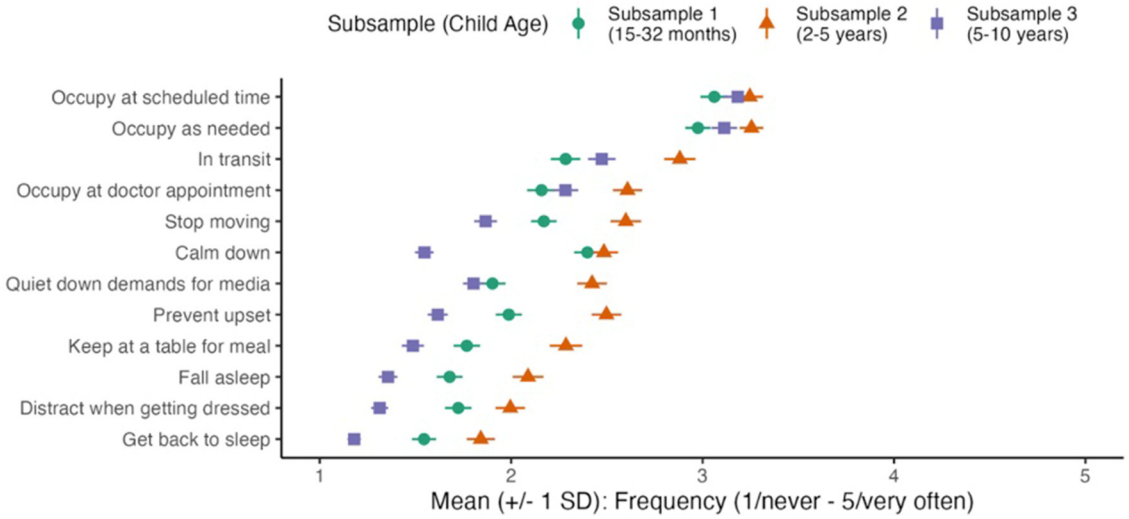

FIGURE 3
Mean and standard deviation for each item in the child regulatory media use scale. Items were sorted in order of grand mean across the three subsamples.

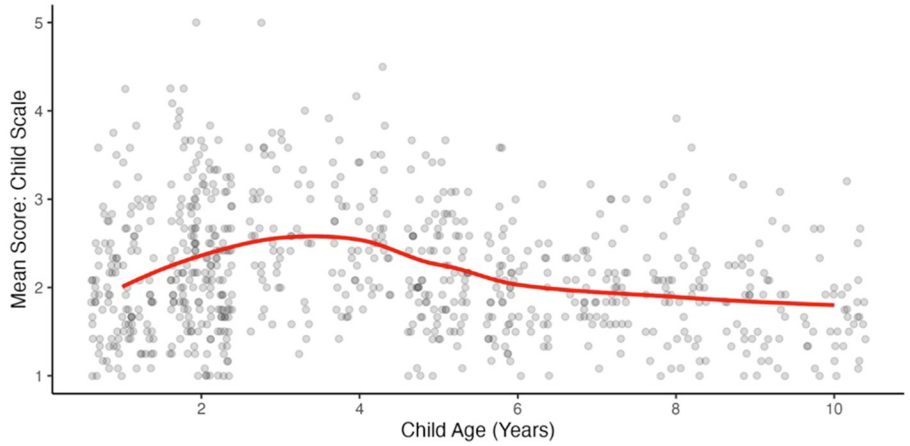

FIGURE 4
Overall score on the child regulatory media use scale as a function of child age. Each dot represents an individual parent. The line represents the locally estimated sum of squares with a 95% confidence interval band.

Next, we computed predictive validity using child screen time as a dependent variable. The overall score of the 12 items on the child scale score was significantly correlated with child screen time ($r = 0.14$, $p < 0.001$). As with parenting stress, we fit a multiple regression model with the three factors identified through EFA. We also included child age, parent age, and parent race as covariates because they were unevenly distributed across the three subsamples and predicted child screen time (see Supplementary Table 7). See Table 10 for the results of the multiple regression. The overall model was significant, $F_{(8,729)} = 7.94$, $p < 0.001$, and explained 7% of the variance. Results showed that parent-reported media use to regulate a child's emotional responses and behaviors significantly predicted greater child screen time ($\beta = 0.10$, $p = 0.032$). This was not true for the factors capturing parent-reported use of media to occupy their children or to help their children sleep (Occupy: $\beta = 0.03$, $p = 0.385$; Sleep: $\beta = 0.08$, $p = 0.073$). Additionally, child screen time increased as a function of child age ($\beta = 0.23$, $p = < 0.001$).

Associations between factors in the parent regulatory media use scale and child regulatory media use scale

Correlations among the factors in the parent and child scales are presented in Table 11. Notably, most of the factors within each scale were significantly correlated (parent: $r = 0.24$ to 0.31; child: $r = 0.13$ to 0.56). The only exception was the correlation between

TABLE 7 Regression model of child age predicting the child regulatory media use scale.

	β *(SE)*
Child age	0.56 (0.16)***
Child age (quadratic)	−0.71 (0.15)***
Parent age	−0.02 (0.04)
Household income	−0.04 (0.04)
Parent race: Black or African American	0.84 (0.10)***
Parent race: Asian or Pacific Islanders	0.26 (0.15)
Parent race: Not listed or Mixed race	0.26 (0.13)
Parent ethnicity: Hispanic/Latino	0.18 (0.10)
Parent education: <4 year college	0.02 (0.08)
Parent education: advanced (>4 year college)	−0.22 (0.09)*
Intercept	−0.13 (0.06)*
F-value	15.49***
R^2	0.16

Standardized betas are reported. Base group of the race category is White. Base group of the parent education category is 4 year college.
***p < 0.001; *p < 0.05.

the factors in the parent scale for reducing boredom and using calming media [$r_{(765)} = 0.02$, $p = 0.67$]. In addition, most of the correlations between the parent and child factors were significant. Specifically, the more parents used media to escape from their own family stress, the more they allowed their child to use media to regulate their child's emotional responses and behaviors, occupy their child, and help their child sleep [Regulate: $r_{(765)} = 0.41$, $p < 0.001$; Occupy: $r_{(765)} = 0.27$, $p < 0.001$, Sleep: $r_{(765)} = 0.22$, $p < 0.001$]. The frequency with which parents use media to reduce their own boredom was also correlated with the frequency with which they allowed their children to use media to regulate their children's emotional responses and behaviors and occupy their children [Regulate: $r_{(765)} = 0.12$, $p < 0.001$; Occupy: $r_{(765)} = 0.22$, $p < 0.001$]. In addition, the more parents used calming media for themselves, the more they allowed their child to use media to regulate their child's emotional responses and behaviors, occupy their child, and help their child sleep [Regulate: $r_{(765)} = 0.40$, $p < 0.001$; Occupy: $r_{(765)} = 0.09$, $p = 0.02$, Sleep: $r_{(765)} = 0.35$, $p < 0.001$].

Discussion

In this study, we aimed to evaluate psychometric properties of two newly developed scales designed to measure the multifaceted aspects of regulatory media use for parents and children. We focused on three subsamples representing parents of infants (15–32 months old), preschool-age children (2–5 years old), and school-age children (5–10 years old). Through exploratory factor analysis on the aggregated sample, we identified factors within each scale, which were subsequently confirmed in each age-specific subsample. Of particular interest were factors representing media use to regulate parents' and children's emotional responses and behaviors. These factors showed acceptable internal consistency and were related to parenting stress (parent and child scales) and child screen time (child scale). Additionally, we found significant correlations between the factors within each scale (parent and child) and across the scales.

Measuring regulatory media use for parents

The scale developed to measure parents' regulatory media use demonstrated reliable psychometric properties, as indicated by its overall reliability of $\alpha = 0.82$ for the full set of 16 items. This high reliability indicates a robust internal consistency within the scale, highlighting its effectiveness in assessing how parents use media for regulatory purposes in their everyday life. However, there was substantial variability among the individual items in the scale, as well as across the three subsamples. Such variability indicates that the extent to which parents use media for regulatory purposes may vary by specific situational contexts, varying ages of their children, or other demographic differences that vary across subsamples. These nuances led to further exploration of the scale's associations with demographics, as well as potential distinct factors within the scale.

We examined whether demographics significantly predict parents' overall regulatory media use. Child age did not emerge as a significant predictor. This finding suggests that the developmental stage of children may not greatly impact how parents use media themselves for their own regulatory purposes. Instead, our analysis revealed that both parent race and parent age were significant predictors of parents' regulatory media use. Specifically, Black/African American parents reported using media more frequently for their own regulatory purposes compared to White parents. However, it is worth noting that our subsequent analyses did not find a significant association between race and overall parenting stress. This could indicate that media serves as a more commonly used resource for Black/African American parents compared to White parents, not necessarily driven by underlying group differences in wellbeing. Nevertheless, it is necessary to delve deeper into the underlying reasons for these differences in the future research. Such an exploration can include determining whether these differences are associated with attitudinal variations, higher need for emotion regulation support due to systemic discrimination, or differences in media content and design features (e.g., use of targeted, engagement-prolonging digital design), to name a few. Additionally, our results showed a decrease in the overall score on the parent scale with increasing parent age. This suggests that younger parents are more likely to use media as a regulatory tool for themselves, possibly due to greater familiarity with or reliance on digital technologies. Overall, these findings highlight the complex ways in which parents use media for regulatory purposes. The associations with demographic factors such as parent race and age highlight the nuanced nature of media use in parenting, necessitating a more detailed exploration of these dynamics in future studies.

The EFA of the parent scale identified a three-factor structure: using media to escape from family stress, to entertain themselves,

TABLE 8 Summary of exploratory factor analysis for the child regulatory media use scale (aggregated sample).

Item	Factor loadings		
	Factor 1	Factor 2	Factor 3
Regulate (Factor 1)			
To prevent your child from getting overwhelmed or upset in a difficult or new situation	**0.73**	−0.02	0.06
To keep them at the table or help them eat at mealtime	**0.72**	−0.05	−0.07
To distract them while you get them dressed or ready for school	**0.71**	−0.06	0.00
To quiet down your child's demands for their favorite apps, video games, or shows	**0.66**	0.02	0.02
To stop your child from moving around too much when they are being too active or hyper	**0.65**	0.12	−0.01
When your child is upset (crying, yelling, showing big emotions) and needs to calm down	**0.65**	0.03	0.09
To keep your child occupied at doctor's appointments	**0.54**	0.06	−0.01
When in transit (riding in your car or on public transit) with your child	**0.43**	0.08	0.05
Occupy (Factor 2)			
To keep your child occupied as-needed (not at a scheduled time of day), when you need to get a few things done or need some time to yourself	−0.02	**1.00**	0.01
To keep your child occupied at a scheduled time of day, while you get things done (such as making dinner)	0.12	**0.57**	0.05
Sleep (Factor 3)			
To help them fall asleep at night	−0.06	0.00	**0.91**
To help them fall back to sleep when they've woken up in the middle of the night	0.16	0.00	**0.72**

Significant factor loadings over 0.40 with a numerical difference between the primary factor and any alternative factors < 0.20 appear in bold. N = 773, after dropping 18 with missing values on one or more indicators.

and to calm themselves. The first factor highlights the role of media use as a respite from the pressures and challenges of family life. This aligns with previous findings that suggest media can serve as a temporary escape providing parents with a chance to recover and take some rest (Radesky et al., 2016a; Torres et al., 2021; Zhang et al., 2022; Lunkenheimer et al., 2023). The second factor for the current study indicates that media is also used as a tool for entertainment, motivated by intentional or habitual pleasure-seeking or boredom reduction. The third factor captures the deliberate choice of media content that provides soothing or relaxation. This represents a strategic use of media to manage one's emotional state, particularly in seeking tranquility or reducing anxiety.

The results of the CFA in this study largely supported the EFA findings on the parent scale, particularly in terms of its structural consistency across three distinct age groups of children. However, the findings were not as robust in the infant subsample. This discrepancy may be due to the unique challenges faced by parents of infants, such as greater variability in their work schedules and access to and use of out-of-home childcare (Corkin et al., 2018). Despite these differences, the consistent factor structure within each age group suggests that the ways in which parents use media to regulate themselves (i.e., to escape family stress, reduce boredom, and utilize calming media) are common experiences among parents of young children, regardless of the specific age of their children. This pattern indicates that parents' regulatory use of media is an integral part of their daily lives (Livingstone, 2007), possibly serving as coping mechanisms for themselves. That is, the frequent reliance on media for regulatory purposes may reflect the persistent stressors or challenges parents encounter during the early years of their child's life. Despite relatively low consistency in the factor structures with the infant subsample, there was still high internal consistency among the original set of 16 items in the infant sample. This finding may suggest that while the overall scale is useful, it may reflect a more general tendency toward regulatory media use in this group rather than a constellation of distinct motivations. Future research should aim to replicate these findings and refine the scale, with a particular focus on items that capture meaningful variation among parents of young children.

Additionally, the overall parent scale score predicted parenting stress, particularly through one of its factors focusing on media use as an escape from family stress. This finding provides predictive validity, indicating parents who report more parenting stress overall are indeed more likely to report using media to self-regulate, and in particular to escape from family stress. Additional analyses found that parents with younger children reported frequent media use for themselves to escape from household stress. Moreover, this finding aligns with recent research showing that parent stress is positively associated with parental media use to regulate their own emotions and to ease the burden of caregiving (Lunkenheimer et al., 2023). This group of parents often use media as a means to momentarily distance themselves from the immediate demands

10.3389/fdpys.2024.1377998

TABLE 9 Descriptive statistics of factors in the child regulatory media use scale.

	Subsample 1 (15–32 months)		Subsample 2 (2–5 years)		Subsample 3 (5–10 years)		Aggregated sample	
	M (*SD*)	Cronbach's alpha	*M* (*SD*)	Cronbach's alpha	*M* (*SD*)	Cronbach's alpha	*M* (*SD*)	Cronbach's alpha
Regulate (Factor 1)	2.04 (0.79)	0.87	2.47 (0.85)	0.86	1.80 (0.62)	0.77	2.01 (0.82)	0.85
Occupy (Factor 2)	3.02 (0.96)	0.72	3.25 (0.86)	0.66	3.15 (1.12)	0.82	3.14 (1.01)	0.76
Sleep (Factor 3)	1.61 (0.94)	0.80	1.94 (1.09)	0.87	1.27 (0.65)	0.71	1.58 (0.94)	0.83

TABLE 10 Regression model of the factors in the child regulatory media use scale predicting parenting stress and child screen time.

	Model 1	Model 2
	Parenting stress	Child screen time
	β *(SE)*	β *(SE)*
Regulate	0.12 (0.04)**	0.10 (0.15)*
Occupy	0.10 (0.04)**	0.03 (0.04)
Sleep	0.02 (0.04)	0.08 (0.07)
Child age		0.23 (0.04)***
Parent age		0.02 (0.04)
Parent race: Black or African American		0.14 (0.11)
Parent race: Asian or Pacific Islander		−0.08 (0.17)
Parent race: Not listed or Mixed race		0.10 (0.15)
Intercept	0.02 (0.03)	−0.02 (0.04)
F-value	10.98***	7.94***
R^2	0.04	0.07

Standardized betas are reported. The base group of the race category is White.
***p < 0.001; **p < 0.01; *p < 0.05.

TABLE 11 Bivariate correlations between factors in the parent regulatory media use scale and child regulatory media use scale.

	Parent scale			Child scale		
	1	2	3	4	5	6
Parent scale						
1. Escape						
2. Entertain	0.31***					
3. Calm	0.24***	0.02				
Child scale						
4. Regulate	0.41***	0.12***	0.40***			
5. Occupy	0.27***	0.22***	0.09*	0.40***		
6. Sleep	0.22***	−0.02	0.35***	0.56***	0.13***	

***p < 0.001; *p < 0.05.

and stress of managing a household with young children (Torres et al., 2021). Therefore, the parent scale (and particularly its escape factor) effectively captures the extent to which parents, especially those with younger children, use media and the reasons for their media use.

Measuring regulatory media use for children

The scale developed to assess regulatory media use for children also demonstrated reliable psychometric properties, as indicated by its overall reliability of $\alpha = 0.87$ across 12 items. Similar to

the parent scale, there was substantial variability both across the items and across the three age groups. This variability suggests potential patterns in how parents utilize media to regulate their children, particularly in specific contexts and across different child age ranges. These nuances led to an additional investigation into its correlations with demographic variables and the possibility of unique factors within the scale.

In our analysis examining demographic predictors of the overall score of child regulatory media use, we found that child age was a significant predictor. There were both linear and quadratic associations between child age and the overall score on the child scale. This finding suggests that parents' use of media as a regulatory tool does not uniformly increase or decrease with a child's age. Rather, this type of media use increases during infancy and toddlerhood and reaches its peak during early childhood, an age range where behavior management can be the most challenging. This pattern can be linked with developmental changes in negative emotionality and self-regulation. Young children's negative emotionality begins to develop during their first 2 years of life (Rothbart and Bates, 2006; Lipscomb et al., 2011; Brauchli et al., 2024), and it peaks around early childhood. High levels of negative emotionality in childhood are linked to various behavioral problems, including internalizing (Ghassabian et al., 2014; Rodrigues et al., 2022) and externalizing behavior problems (Lipscomb et al., 2012; White et al., 2013; Perry et al., 2018). While it is an important developmental task for young children to master their emotional and behavior responses, young children often depend on external support to acquire those skills (Kopp, 1989; Coyne et al., 2021). A recent longitudinal study showed that there was a bidirectional relationship between 1 and 3-year-old children's screen time and their negative affect (Brauchli et al., 2024), suggesting that parents were using media to regulate their young children's negative emotions. Subsequently, there tends to be a decrease in the frequency and intensity of negative emotionality and externalizing behavior from preschool to late elementary school (Murphy et al., 1999; Sallquist et al., 2009), likely due to development of language skills (Skibbe et al., 2011, 2019; Vallotton and Ayoub, 2011), impulse inhibition (Fujita, 2011; Hofmann et al., 2012), and other contributors to self-regulation facilitated by prefrontal cortex development (Gillespie et al., 2018; Jadhav and Boutrel, 2019). Within early childhood, different aspects of self-regulation develop at varying times and rates; typically, emotional regulation develops before behavioral self-regulation (Howse et al., 2003). As self-regulation develops during early childhood, parents may find themselves using media less frequently to manage their children's emotional responses and behaviors than before.

Additionally, parent race and parent education were also significant predictors of the overall child scale score. This finding implies that structural factors may play an important role in shaping parental attitudes and practices regarding media use with children. These attitudes and practices may include many different aspects, from how appropriate and effective parents perceive media to be for their children (Rideout and Robb, 2020), to their access to various media devices, their familiarity with different types of media content, and their access to other parenting resources that may influence parental stress and burnout, such as affordable childcare (e.g., Kroshus et al., 2023). Prior studies have demonstrated that the lack of parent resources, including money, time, and energy, find it difficult to limit their children's media use (Evans et al., 2011; Minges et al., 2015; Nikken and Opree, 2018). Therefore, it is likely that parents who lack other means to provide alternative activities due to financial or other life pressure may be more likely to use media to regulate their children's emotions and behaviors. Overall, these findings highlight the complexity of structural factors associated with how parents use media with their children. This complexity underscores the need for future research to extend its focus beyond simply representative samples. Therefore, it is essential to examine diverse populations, acknowledging the varied socioeconomic, cultural, and individual contexts that shape family media use. Such an approach will ensure that findings are more universally applicable as well as be sensitive to the needs of different family dynamics.

The EFA identified a three-factor structure within this scale: using media to regulate children, to occupy children, and to help children sleep. The first factor reflects the strategic use of media to manage a child's emotional state or behavior. This strategic use captures how parents employ media as a tool to manage their child's emotional responses and behaviors, and is consistent with previous literature (Bentley et al., 2016; Radesky et al., 2016b). In addition, this factor may be associated with young children's socio-emotional development. Existing literature has found that the concurrent and longitudinal associations between using media to calm down young children and their socio-emotional development, including socio-emotional difficulties (Radesky et al., 2016a), as well as executive functioning and emotional reactivity (Radesky et al., 2023). In our scale development study, we did not examine the potential associations between this "Regulate" factor and children's socio-emotional development because appropriate measures of the latter were not available in each cohort. Future work should explore these associations and their implications for child development.

The second factor demonstrates media use for keeping the child occupied when parents need to be physically absent or are busy with other tasks. This type of media use has been described as a "babysitter" in previous studies (De Decker et al., 2012; Knowles et al., 2015; Bentley et al., 2016; Nikken, 2019). Within the context of parent-child dynamics, this type of media use fulfills the parents' practical needs and goals at specific times of day, while the first factor, to regulate a child's emotional responses and behaviors, is more related to the child's in-the-moment needs (Nikken, 2019).

The third factor captures media use in establishing or supporting a child's sleep routines. While previous research has found that media use either before or in the middle of the night to help children fall back to sleep when they wake up may be associated with lower quality sleep (Garrison et al., 2011; Hisler et al., 2020), this factor demonstrates that parents do use media to some extent to regulate their children's sleep. Future research should examine whether such regulatory media use is associated with sleep onset, quality, and duration. Together, these three factors in the child scale highlights the multifaceted role that media plays in the lives of young children.

The CFA in our study found an acceptable fit of the three-factor structure within each age group on at least one metric of model fit. This consistency suggests that the child scale effectively captures different aspects of regulatory media use for children

with a wide range of ages. The child scale is consistent with prior research but advances the field that has predominantly relied on single item measurement. The development of a more sensitive and reliable child scale in the present study will improve measurement of child regulatory media and allow researchers to better predict child outcomes.

We further tested the predictive validity by examining associations between identified factors in the child scale and both parenting stress and child screen time. First, parents who reported higher parenting stress reported more frequent media use to regulate their child's emotional responses and behaviors, as well as to occupy them. This finding aligns with the previous research (Elias and Sulkin, 2019), which shows that parents often use media to fulfill their own needs. It suggests that parents experiencing parenting-related stress might rely more heavily on media as a regulatory tool for their children, possibly due to heightened reactivity to child behavior or a lack of alternative resources or coping strategies (Shin et al., 2021). Additionally, greater parent-reported child media use to regulate a child's emotional responses and behaviors was the only factor that predicted an increase in overall child screen time. Parents, particularly of young children, are gatekeepers of their child's media use, initiating and terminating it. Hence, parents who frequently use media to regulate their child are more likely to allow extended child screen time, such as watching TV/video or playing apps/games. In contrast to the intentional use of media to occupy children, this may be due to the on-demand nature of media use as a tool for emotion regulation, to which children may become habituated and keep expecting when they feel distressed. The findings may also suggest that using media for children at predictable times of the day might be a strategy for limiting overall child screen time, whereas using media to regulate children's emotional responses or behaviors could potentially lead to increased screen time. The overarching implication of these findings is that significant associations exist between parenting stress, child screen time, and the two factors (regulate and occupy), indicating that the child scale effectively captures the dynamics of parents using media for regulating their child's emotional responses and behaviors and for occupying them.

Associations between regulatory media use for parents and children

There were significant correlations between parent and child factors. The high level of internal consistency across all items in each scale (parent: 16 items, child: 12 items), combined with significant correlations between factors, suggest that there are consistent patterns in how parents use the response scale. Significant correlations between factors in the parent and child scales could indicate consistent patterns in each family's regulatory media use for all members in the household. That is, this consistency might demonstrate shared attitudes or role modeling of behaviors related to media use within the family context, highlighting how parents' media habits may be closely linked to those of their children. However, it may also simply reflect common method variance given both scales were completed by the same person within a single online survey.

Despite high correlations among the parent and child factors, EFA/CFA and predictive validity results for the two scales suggest there is some heterogeneity in the reasons a given parent uses media for themselves or their child that differentially predict factors such as parenting stress and child screen time. Overall, the parent and child scales provide novel insights into the varied regulatory roles of media in families with young children. It highlights the importance of understanding the reasons behind parent and children's media use and their potential associations with their development and daily routines.

Limitations and future directions

The current work represents an initial step in developing a valid, reliable measure that captures a range of regulatory uses of media for parents and children across a wide age range. Our results illustrate the possible utility of such a measure among parents of infants, young children, and school-age children. The results also capture more variability than past work regarding the frequency and nature of regulatory media use. These contributions notwithstanding, future work should seek to overcome some limitations in the current study. First, the reliance on parent-reported data for all measures, while practical, may introduce biases or inaccuracies in reporting. Future work should incorporate objective measures to complement and validate the self-reported data. For example, predictivity validity could be established using direct observations of parents' and children's media use.

Another limitation is that we did not collect data on parent and child gender. It is possible that fathers and mothers different in the extent to which they use media to regulate their child's emotional responses and behaviors. In addition, child gender may be associated with parental regulatory media use for their children, based on gender differences in self-regulation (Weinberg et al., 1999; Veijalainen et al., 2021) and emotion socialization (Root and Rubin, 2010; Chen et al., 2020). Future work should examine whether the extent to which parents use media for regulatory purposes with and around their young children differ by parent or child gender.

Other limitations arise from the limited scope and generalizability of this research. For example, the three studies included in the current paper were limited in the types of measures available for predictive validity. For example, future research could include measures other than parenting stress, such as other measures of parent wellbeing as well as child behavior and family dynamics. Such research would help to test the degree to which parent-reported reasons for using media with and around their children has value above and beyond global estimates of children's amount of media use. Moreover, future work should seek to establish the generalizability of the measure, such as testing reliability and validity within subpopulations in the US and cross-culturally.

A final set of limitations reflect the complexity of media use within the family system. While our scales capture variability in the frequency and nature of regulatory uses of media, they do not capture other perceived functions of media use, such as helping families bond through shared media use or educating

parents and children through the use of educational/informative media (but see Koch et al., under review). There is some evidence to suggest regulatory use of media may be especially problematic, particularly for infants and young children (Radesky et al., 2016a, 2023; Coyne et al., 2021). Meanwhile, using media to get parenting support and advice may be more beneficial (Torres et al., 2021). A more comprehensive picture of the motivations driving parents' media use with and around young children will help to contextualize such media use and inform guidance aimed at encouraging healthy media practices. Similarly, we were not able to examine the types of media content and design features used, particularly for children. The potential impact of media use on children depends in part on the types of content and design (Radesky et al., 2014; Radesky and Hiniker, 2022). Thus, it will be important for future research to examine the degree to which different media motivations (including regulatory media use) result in use of different media content and design features.

Although not a limitation *per se*, another future direction involves refining and establishing generalizability of the scales. For example, only six out of a full set of 16 items were included in the three identified factors of the parent scale. It implies that several items within the parent scale captured behaviors or attitudes that did not align with other items in the scale. For the child scale, all the items in the child scale were included in the three identified factors of the child scale. Moving forward, our ongoing and future work will seek to refine these scales to maximize reliability and validity while minimizing participant burden. This process involves making adjustments or removing some items in the scales as necessary to better capture and focus on regulatory media use for parents and children.

Conclusions

Building upon earlier studies that often focused on single items to measure regulatory purposes (Nikken, 2019; Coyne et al., 2021; Radesky et al., 2023), the scales we tested in this paper are designed to capture more variability in regulatory uses of media with and around children. These initial scales appear to capture a multifaceted range of regulatory uses of media. This approach facilitates more detailed representations of how media is used in various situations to regulate emotional responses and behaviors, both for parents and children. From a practical standpoint, more comprehensive measurement of regulatory media use may inform more effective media guidelines and interventions tailored to specific regulatory needs and situations.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by University of Wisconsin-Madison, Georgetown University, Southern Methodist University, and University of Michigan Medical School. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

BS: Formal analysis, Writing—original draft, Writing—review & editing. HK: Funding acquisition, Supervision, Writing—review & editing. RB: Funding acquisition, Writing—review & editing. SK: Funding acquisition, Writing—review & editing. CT: Conceptualization, Writing—review & editing. JR: Conceptualization, Funding acquisition, Writing—review & editing.

Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. This research was supported by grants from the National Institutes of Health (P01 HD109907 to RB, HK, and JR; R15HD101841 to SK), the School of Human Ecology at the University of Wisconsin-Madison (to HK), the Department of Psychology at Georgetown University (to RB), and the Lynn and Stuart White gift fund (to JR).

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fdpys.2024.1377998/full#supplementary-material

References

AAP Council on Communications and Media (2016). Media and young minds. *Pediatrics* 138:2591. doi: 10.1542/peds.2016-2591

Anand, S., and Krosnick, J. A. (2005). Demographic predictors of media use among infants, toddlers, and preschoolers. *Am. Behav. Scientist* 48, 539–561. doi: 10.1177/0002764204271512

Barr, R., Kirkorian, H., Coyne, S., and Radesky, J. (2024). *Early Childhood and Digital Media*. Cambridge: Cambridge University Press.

Barr, R., Kirkorian, H., Radesky, J., Coyne, S., Nichols, D., Blanchfield, O., et al. (2020). Beyond screen time: a synergistic approach to a more comprehensive assessment of family media exposure during early childhood. *Front. Psychol.* 11:1283. doi: 10.3389/fpsyg.2020.01283

Bentley, G. F., Turner, K. M., and Jago, R. (2016). Mothers' views of their preschool child's screen-viewing behaviour: a qualitative study. *BMC Publ. Health* 16:718. doi: 10.1186/s12889-016-3440-z

Beyens, I., and Eggermont, S. (2014). Putting young children in front of the television: antecedents and outcomes of parents' use of television as a babysitter. *Commun. Quart.* 62, 57–74. doi: 10.1080/01463373.2013.860904

Blair, C. (2010). Stress and the development of self-regulation in context. *Child Dev. Perspect.* 4, 181–188. doi: 10.1111/j.1750-8606.2010.00145.x

Brauchli, V., Sticca, F., Edelsbrunner, P., von Wyl, A., and Lannen, P. (2024). Are screen media the new pacifiers? The role of parenting stress and parental attitudes for children's screen time in early childhood. *Comput. Hum. Behav.* 152:108057. doi: 10.1016/j.chb.2023.108057

Chen, C., Chen, S., Wen, P., and Snow, C. E. (2020). 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. *Comput. Hum. Behav.* 112:106462. doi: 10.1016/j.chb.2020.106462

Chmielewski, M., and Kucker, S. C. (2020). An MTurk crisis? Shifts in data quality and the impact on study results. *Soc. Psychol. Personal. Sci.* 11, 464–473. doi: 10.1177/1948550619875149

Cingel, D. P., and Krcmar, M. (2013). Predicting media use in very young children: the role of demographics and parent attitudes. *Commun. Stud.* 64, 374–394. doi: 10.1080/10510974.2013.770408

Corkin, M. T., Peterson, E. R., Andrejic, N., Waldie, K. E., Reese, E., and Morton, S. M. B. (2018). Predictors of mothers' self-identified challenges in parenting infants: insights from a large, nationally diverse cohort. *J. Child Fam. Stud.* 27, 653–670. doi: 10.1007/s10826-017-0903-5

Coyne, S. M., Radesky, J., Collier, K. M., Gentile, D. A., Linder, J. R., Nathanson, A. I., et al. (2017). Parenting and digital media. *Pediatrics* 140(Suppl.2), S112–S116. doi: 10.1542/peds.2016-1758N

Coyne, S. M., Shawcroft, J., Gale, M., Gentile, D. A., Etherington, J. T., Holmgren, H., et al. (2021). Tantrums, toddlers and technology: temperament, media emotion regulation, and problematic media use in early childhood. *Comput. Hum. Behav.* 120:106762. doi: 10.1016/j.chb.2021.106762

Coyne, S. M., Shawcroft, J., Gale, M., Reich, S. M., Linder, L., McDaniel, B., et al. (2022). Digital distraction or accessible aid? Parental media use during feedings and parent-infant attachment, dysfunction, and relationship quality. *Comput. Hum. Behav.* 127:107051. doi: 10.1016/j.chb.2021.107051

Danet, M., Miller, A. L., Weeks, H. M., Kaciroti, N., and Radesky, J. S. (2022). Children aged 3-4 years were more likely to be given mobile devices for calming purposes if they had weaker overall executive functioning. *Acta Paediatr.* 111, 1383–1389. doi: 10.1111/apa.16314

De Decker, E., De Craemer, M., De Bourdeaudhuij, I., Wijndaele, K., Duvinage, K., Koletzko, B., et al. (2012). Influencing factors of screen time in preschool children: an exploration of parents' perceptions through focus groups in six European countries: parents' perceptions of screen time in preschool children. *Obes. Rev.* 13, 75–84. doi: 10.1111/j.1467-789X.2011.00961.x

Domoff, S. E., Borgen, A. L., and Radesky, J. S. (2020). Interactional theory of childhood problematic media use. *Hum. Behav. Emerg. Technol.* 2, 343–353. doi: 10.1002/hbe2.217

Elias, N., and Sulkin, I. (2019). Screen-assisted parenting: the relationship between toddlers' screen time and parents' use of media as a parenting tool. *J. Fam. Iss.* 40, 2801–2822. doi: 10.1177/0192513X19864983

Evans, C. A., Jordan, A. B., and Horner, J. (2011). Only two hours? A qualitative study of the challenges parents perceive in restricting child television time. *J. Fam. Iss.* 32, 1223–1244. doi: 10.1177/0192513X11400558

Floegel, D., Elias, N., and Lemish, D. (2021). Young children's mobile device use in public places: immersion, distraction, and co-use. *Stud. Media Commun.* 9, 30. doi: 10.11114/smc.v9i1.5236

Fujita, K. (2011). On conceptualizing self-control as more than the effortful inhibition of impulses. *Personal. Soc. Psychol. Rev.* 15, 352–366. doi: 10.1177/1088868311411165

Garrison, M. M., Liekweg, K., and Christakis, D. A. (2011). Media use and child sleep: the impact of content, timing, and environment. *Pediatrics* 128, 29–35. doi: 10.1542/peds.2010-3304

Ghassabian, A., Székely, E., Herba, C. M., Jaddoe, V. W., Hofman, A., Oldehinkel, A. J., et al. (2014). From positive emotionality to internalizing problems: the role of executive functioning in preschoolers. *Eur. Child Adolesc. Psychiatr.* 23, 729–741. doi: 10.1007/s00787-014-0542-y

Gillespie, S. M., Brzozowski, A., and Mitchell, I. J. (2018). Self-regulation and aggressive antisocial behaviour: insights from amygdala-prefrontal and heart-brain interactions. *Psychol. Crime Law* 24:243. doi: 10.1080/1068316X.2017.1414816

Gordon-Hacker, A., and Gueron-Sela, N. (2020). Maternal use of media to regulate child distress: a double-edged sword? Longitudinal links to toddlers' negative emotionality. *Cyberpsychol. Behav. Soc. Netw.* 23, 400–405. doi: 10.1089/cyber.2019.0487

Hisler, G. C., Hasler, B. P., Franzen, P. L., Clark, D. B., and Twenge, J. M. (2020). Screen media use and sleep disturbance symptom severity in children. *Sleep Health* 6, 731–742. doi: 10.1016/j.sleh.2020.07.002

Hofmann, W., Schmeichel, B. J., and Baddeley, A. D. (2012). Executive functions and self-regulation. *Trends Cogn. Sci.* 16, 174–180. doi: 10.1016/j.tics.2012.01.006

Howard, M. C. (2016). A review of exploratory factor analysis decisions and overview of current practices: what we are doing and how can we improve? *Int. J. Hum. Comput. Interact.* 32, 51–62. doi: 10.1080/10447318.2015.1087664

Howse, R. B., Calkins, S. D., Anastopoulos, A. D., Keane, S. P., and Shelton, T. L. (2003). Regulatory contributors to children's kindergarten achievement. *Early Educ. Dev.* 14, 101–120. doi: 10.1207/s15566935eed1401_7

Hu, L., and Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct. Eq. Model.* 6, 1–55. doi: 10.1080/10705519909540118

Jadhav, K. S., and Boutrel, B. (2019). Prefrontal cortex development and emergence of self-regulatory competence: the two cardinal features of adolescence disrupted in context of alcohol abuse. *Eur. J. Neurosci.* 50, 2274–2281. doi: 10.1111/ejn.14316

Kildare, C. A., and Middlemiss, W. (2017). Impact of parents mobile device use on parent-child interaction: a literature review. *Comput. Hum. Behav.* 75, 579–593. doi: 10.1016/j.chb.2017.06.003

Kirkorian, H. L., Pempek, T. A., Murphy, L. A., Schmidt, M. E., and Anderson, D. R. (2009). The impact of background television on parent-child interaction. *Child Dev.* 80, 1350–1359. doi: 10.1111/j.1467-8624.2009.01337.x

Knowles, A.-M., Kirk, A. F., and Hughes, A. (2015). Parents' perceptions of their children's sedentary behaviour. *Qualit. Res. Sport Exer. Health* 7, 449–465. doi: 10.1080/2159676X.2015.1008026

Koch, F. S., Barr, R., and Sundqvist, A. (under review). *Joint Media Engagement Instrument*.

Kopp, C. B. (1989). Regulation of distress and negative emotions: a developmental view. *Dev. Psychol.* 25, 343–354. doi: 10.1037/0012-1649.25.3.343

Kroshus, E., Hawrilenko, M., Tandon, P. S., Browning, A., Steiner, M. K., and Christakis, D. A. (2023). Structural inequities in self-compassion and parental burnout. *Mindfulness* 14, 1192–1203. doi: 10.1007/s12671-023-02104-9

Kucker, S. C., Perry, L. K., and Barr, R. (2024). Variability and patterns in children's media use and links with language development. *Acta Paediatr.* 2024, 1–8. doi: 10.1111/apa.17100

Linder, L., McDaniel, B. T., and Jaffe, H. (2022). Moment-to-moment observation of parental media use and parent-child interaction: quality and media multitasking. *Hum. Behav. Emerg. Technol.* 2022, 1–9. doi: 10.1155/2022/4896637

Lipscomb, S. T., Leve, L. D., Harold, G. T., Neiderhiser, J. M., Shaw, D. S., Ge, X., et al. (2011). Trajectories of parenting and child negative emotionality during infancy and toddlerhood: a longitudinal analysis. *Child Dev.* 82, 1661–1675. doi: 10.1111/j.1467-8624.2011.01639.x

Lipscomb, S. T., Leve, L. D., Shaw, D. S., Neiderhiser, J. M., Scaramella, L. V., Ge, X., et al. (2012). Negative emotionality and externalizing problems in toddlerhood: overreactive parenting as a moderator of genetic influences. *Dev. Psychopathol.* 24, 167–179. doi: 10.1017/S0954579411000757

Livingstone, S. (2007). Strategies of parental regulation in the media-rich home. *Comput. Hum. Behav.* 23, 920–941. doi: 10.1016/j.chb.2005.08.002

Lunkenheimer, E., Dunning, E. D., Diercks, C. M., and Kelm, M. R. (2023). Parental regulation of parent and child screen-based device use. *Int. J. Behav. Dev.* 47, 410–422. doi: 10.1177/01650254231179978

McDaniel, B. T., and Radesky, J. S. (2018). Technoference: longitudinal associations between parent technology use, parenting stress, and child behavior problems. *Pediatr. Res.* 84, 210–218. doi: 10.1038/s41390-018-0052-6

Minges, K. E., Owen, N., Salmon, J., Chao, A., Dunstan, D. W., and Whittemore, R. (2015). Reducing youth screen time: qualitative metasynthesis of findings on barriers and facilitators. *Health Psychol.* 34, 381–397. doi: 10.1037/hea0000172

Montroy, J. J., Bowles, R. P., Skibbe, L. E., McClelland, M. M., and Morrison, F. J. (2016). The development of self-regulation across early childhood. *Dev. Psychol.* 52, 1744–1762. doi: 10.1037/dev0000159

Murphy, B. C., Eisenberg, N., Fabes, R. A., Shepard, S., and Guthrie, I. K. (1999). Consistency and change in children's emotionality and regulation: a longitudinal study. *Merrill-Palmer Quart.* 45, 413–444.

Nabi, R. L., and Krcmar, M. (2016). It takes two: the effect of child characteristics on U.S. parents' motivations for allowing electronic media use. *J. Child. Media* 10, 285–303. doi: 10.1080/17482798.2016.1162185

Nikken, P. (2019). Parents' instrumental use of media in childrearing: relationships with confidence in parenting, and health and conduct problems in children. *J. Child Fam. Stud.* 28, 531–546. doi: 10.1007/s10826-018-1281-3

Nikken, P., and Opree, S. J. (2018). Guiding young children's digital media use: SES-differences in mediation concerns and competence. *J. Child Fam. Stud.* 27, 1844–1857. doi: 10.1007/s10826-018-1018-3

Perry, N. B., Calkins, S. D., Dollar, J. M., Keane, S. P., and Shanahan, L. (2018). Self-regulation as a predictor of patterns of change in externalizing behaviors from infancy to adolescence. *Dev. Psychopathol.* 30, 497–510. doi: 10.1017/S0954579417000992

Radesky, J., and Hiniker, A. (2022). From moral panic to systemic change: making child-centered design the default. *Int. J. Child-Comput. Interact.* 31:100351. doi: 10.1016/j.ijcci.2021.100351

Radesky, J., Kaciroti, N., Weeks, H. M., Schaller, A., and Miller, A. L. (2023). Longitudinal associations between use of mobile devices for calming and emotional reactivity and executive functioning in children aged 3 to 5 years. *J. Am. Med. Assoc. Pediatr.* 177:62. doi: 10.1001/jamapediatrics.2022.4793

Radesky, J., Kistin, C., Eisenberg, S., Gross, J., Block, G., Zuckerman, B., et al. (2016a). Parent perspectives on their mobile technology use: the excitement and exhaustion of parenting while connected. *J. Dev. Behav. Pediatr.* 37, 694–701. doi: 10.1097/DBP.0000000000000357

Radesky, J., Kistin, C., Zuckerman, B., Nitzberg, K., Gross, J., Kaplan-Sanoff, M., et al. (2014). Patterns of mobile device use by caregivers and children during meals in fast food restaurants. *Pediatrics* 133, e843–e849. doi: 10.1542/peds.2013-3703

Radesky, J., Peacock-Chambers, E., Zuckerman, B., and Silverstein, M. (2016b). Use of mobile technology to calm upset children: associations with social-emotional development. *J. Am. Med. Assoc. Pediatr.* 170:397. doi: 10.1001/jamapediatrics.2015.4260

Rideout, V. J., and Robb, M. (2020). *The Common Sense Census: Media Use By Kids Age Zero to Eight, 2020*. San Francisco, CA: Common Sense Media.

Rodrigues, E. R., Hassan, R., and Schmidt, L. A. (2022). Negative emotionality and internalizing behaviors in preschool children: moderating role of inhibitory control. *Child Psychiatr. Hum. Dev.* 53, 1110–1118. doi: 10.1007/s10578-021-01189-4

Root, A. K., and Rubin, K. H. (2010). Gender and parents' reactions to children's emotion during the preschool years. *New Dir. Child Adolesc. Dev.* 2010, 51–64. doi: 10.1002/cd.268

Rothbart, M. K., and Bates, J. E. (2006). "Temperament," in *Handbook of Child Psychology, 6th Edn, Vol. 3*, eds. W. Damon, R. Lerner, and N. Eisenberg (Hoboken, NJ: Wiley), 99–166.

Sallquist, J. V., Eisenberg, N., Spinrad, T. L., Reiser, M., Hofer, C., Liew, J., et al. (2009). Positive and negative emotionality: trajectories across six years and relations with social competence. *Emotion* 9, 15–28. doi: 10.1037/a0013970

Shin, E., Choi, K., Resor, J., and Smith, C. L. (2021). Why do parents use screen media with toddlers? The role of child temperament and parenting stress in early screen use. *Infant Behav. Dev.* 64:101595. doi: 10.1016/j.infbeh.2021.101595

Skibbe, L. E., Connor, C. M., Morrison, F. J., and Jewkes, A. M. (2011). Schooling effects on preschoolers' self-regulation, early literacy, and language growth. *Early Childh. Res. Quart.* 26, 42–49. doi: 10.1016/j.ecresq.2010.05.001

Skibbe, L. E., Montroy, J. J., Bowles, R. P., and Morrison, F. J. (2019). Self-regulation and the development of literacy and language achievement from preschool through second grade. *Early Childh. Res. Quart.* 46, 240–251. doi: 10.1016/j.ecresq.2018.02.005

Tavakol, M., and Dennick, R. (2011). Making sense of Cronbach's alpha. *Int. J. Med. Educ.* 2, 53–55. doi: 10.5116/ijme.4dfb.8dfd

Torres, C., Radesky, J., Levitt, K. J., and McDaniel, B. T. (2021). Is it fair to simply tell parents to use their phones less? A qualitative analysis of parent phone use. *Acta Paediatr.* 110, 2594–2596. doi: 10.1111/apa.15893

Vallotton, C., and Ayoub, C. (2011). Use your words: the role of language in the development of toddlers' self-regulation. *Early Childh. Res. Quart.* 26, 169–181. doi: 10.1016/j.ecresq.2010.09.002

Veijalainen, J., Reunamo, J., and Heikkilä, M. (2021). Early gender differences in emotional expressions and self-regulation in settings of early childhood education and care. *Early Child Dev. Care* 191, 173–186. doi: 10.1080/03004430.2019.1611045

Velicer, W. F., and Jackson, D. N. (1990). Component analysis versus common factor analysis: some issues in selecting an appropriate procedure. *Multivar. Behav. Res.* 25, 1–28. doi: 10.1207/s15327906mbr2501_1

Weinberg, M. K., Tronick, E. Z., Cohn, J. F., and Olson, K. L. (1999). Gender differences in emotional expressivity and self-regulation during early infancy. *Dev. Psychol.* 35, 175–188. doi: 10.1037/0012-1649.35.1.175

White, B. A., Jarrett, M. A., and Ollendick, T. H. (2013). Self-regulation deficits explain the link between reactive aggression and internalizing and externalizing behavior problems in children. *J. Psychopathol. Behav. Assess.* 35, 1–9. doi: 10.1007/s10862-012-9310-9

Wolfers, L. N. (2021). Parental mobile media use for coping with stress: a focus groups study. *Hum. Behav. Emerg. Technol.* 3, 304–315. doi: 10.1002/hbe2.252

World Health Organization (2019). *Guidelines on Physical Activity, Sedentary Behaviour and Sleep for Children Under 5 Years of Age*. World Health Organization. Available online at: https://iris.who.int/handle/10665/311664 (accessed March 27, 2024).

Zhang, J., Madigan, S., and Browne, D. (2022). Caregivers' psychological distress, technology use, and parenting: the importance of a multidimensional perspective. *Comput. Hum. Behav.* 134:107324. doi: 10.1016/j.chb.2022.107324

Zimmerman, F. J., Christakis, D. A., and Meltzoff, A. N. (2007). Television and DVD/Video viewing in children younger than 2 years. *Archiv. Pediatr. Adolesc. Med.* 161:473. doi: 10.1001/archpedi.161.5.473