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Authors

Swit, Cara

Coyne, Sarah

Shawcroft, Jane

et al.

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Problematic media use in early childhood: The role of parent-child relationships and parental wellbeing in families in New Zealand and the United States

Cara S. Swit[1], **Sarah M. Coyne**[2], **Jane Shawcroft**[3], **Megan Gath**[4], **Rachel Barr**[5], **Hailey G. Holmgren**[2], **Laura Stockdale**[2]

[1]Faculty of Health, University of Canterbury, Christchurch, New Zealand 8041.

[2]School of Family Life, Brigham Young University, Provo, UT, USA 84653

[3]Department of Communication, University of California, Davis, USA

[4]Child Well-being Research Institute, University of Canterbury

[5]Department of Psychology, Georgetown University

Abstract

Problematic media use (PMU) during early childhood has the potential to interfere with the healthy functioning of family systems and may be associated with significant long-term problems for the child. However, we know very little about what contributes to early childhood PMU, particularly in the family context. We examine parenting factors as correlates of child PMU in two studies, from two different countries, using two different methods. Study 1 (N=93, Mage=45.3months, SD=10.15, 58%males, 87%mothers) investigated the concurrent role of self-reported parental burnout and parent-child conflict and closeness as correlates of child PMU in an early childhood sample in New Zealand. Study 2 (N=269, Mage=41.17months, SD=3.06 months, 49%males, 95%mothers) investigated observed parental warmth and harsh criticism as predictors of concurrent and longitudinal PMU in an early childhood sample in the United States. Together, findings showed that in both countries approximately 22–25% of young children show symptoms of PMU. After controlling for parent's PMU, parent-child conflict, warmth and parental burnout were not associated with child PMU. Low levels of parent-child closeness and parent's use of harsh criticism were predictive of child PMU. The findings advance our understanding of some of the parenting factors that influence the development of PMU in young children.

Correspondence concerning this article should be addressed to Cara S. Swit, Faculty of Health, University of Canterbury, Christchurch, New Zealand 8041. cara.swit@canterbury.ac.nz.

Conflict of Interest

The authors declare that they have no conflict of interest.

Author credit statement

Cara Swit: Funding acquisition, Conceptualization of Study 1, Methodology, Formal analysis, Writing – original draft, Writing – review & editing, Project management. **Sarah Coyne:** Funding acquisition, Conceptualization of Study 2, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Jane Shawcroft:** Writing – original draft, Writing – review & editing. **Megan Gath:** Writing – original draft, Writing – review & editing. **Rachel Barr:** Funding acquisition, Writing – review & editing, Conceptualization of Study 2. **Hailey Holmgren:** Writing – review & editing, Conceptualization of Study 2, Project Management. **Laura Stockdale:** Funding acquisition, Writing – review & editing, Conceptualization of Study 2, Project Management.

Impact Summary

Prior State of Knowledge: Relatively little is known about problematic media use (PMU) during early childhood. Exposure and use of media during early childhood occurs largely within the home environment making the family context an important risk or protective factor of children's PMU.

Novel Contributions: This manuscript reports the findings from two different countries (New Zealand and the United States), using two different methods (concurrent, longitudinal; survey, observation) to reveal the prevalence of PMU and the impact of parent-child relationships and parental well-being on PMU.

Practical Implications: Existing intervention programs aimed at preventing PMU typically focus on educating parents about the effects of media and strategies for managing children's media use. Our findings suggest parent-child relationship factors should also be embedded in these programs.

Keywords

problematic media use; early childhood; parent-child relationships; parenting factors; parental burnout

Introduction

Media including televisions, video games, tablets, smartphones, and laptops saturate children's environments . Though many children use media in healthy ways, an individual's media use is said to be problematic when it interferes with their daily functioning (Domoff et al., 2019). Exposure and use of media during early childhood occurs largely within the home environment making the family context an important risk or protective factor of children's problematic media use (PMU). Several parenting predictors (e.g., parenting styles, parental mediation, and parent-child attachment) have been causally and correlationally linked to problematic use of the internet in older children and adolescents (see Nannatt et al., 2022 for a recent review). Yet, little is known about the influence of parental factors, and specifically parent-child relationships and parental well-being on children's PMU during early childhood. Sensitive and responsive parent-child relationships and parental well-being are necessary for the healthy neurophysiological, physical, and psychological development of children (e.g. Karreman et al., 2006) but these factors have not been examined together in the context of PMU. Furthermore, most PMU research has been conducted in the U.S. context, with few studies in other countries. To address some of these research gaps, the present studies aimed to advance our understanding about parental factors (i.e., parental problematic media use, parent-child relationships and parental well-being) of PMU during early childhood using different methodologies (i.e. self-report and observations; concurrent and longitudinal) and comparisons between New Zealand and the United States.

Child Problematic Media Use

Broadly defined, PMU is a construct capturing excessive media use that interferes with normative functioning (Domoff et al., 2020). For young children, PMU may manifest as a preoccupation with media use, withdrawal from other activities, increased tolerance for prolonged media use, parent difficulty in placing and enforcing limits on children's media

use, media use as a mechanism to cope with difficult emotions, child dishonesty about media use, loss of relationships and psychosocial problems due to media use (Coyne et al., 2022; Domoff et al., 2019). During middle childhood PMU is associated with increases in anxiety and depression (Malaeb et al., 2021), poor sleep quality (Twenge, et al., 2017) and less familial closeness (Williams & Merten, 2011). Though a growing body of research has shown increased prevalence of problematic use of screen media, predominantly in older samples (Sohn et al., 2019), little is known about the prevalence of PMU in younger samples (i.e. early childhood) and across countries. Thus, greater knowledge of the prevalence and risk and protective factors for PMU during early childhood is critical to strengthen and inform preventive strategies related to problematic use (Domoff et al., 2020).

Research examining antecedents of children's PMU is relatively new, however, the extant research has shown that the development of PMU early in childhood is influenced by a broad range of contexts and processes (Domoff et al., 2020), including child temperament (Coyne, et al., 2021), media emotion regulation (Coyne et al., 2021, 2022), maternal postpartum depression (Holmgren, et al., 2022), and lower levels of educational content (Coyne, et al., 2023). More specifically, parents' own use of media has been shown to negatively impact parent-child interactions (Kildare & Middlemiss, 2017) while parental mediation behaviors have been shown to scaffold children's healthy media use and behaviors (Coyne et al., 2017). However, the predictive influence of the parent-child relationship and parental well-being on child PMU is understudied.

Interactional Theory of Child Problematic Media Use

Understanding the relationship between these contextual and process factors and children's PMU are perhaps best understood through a development-contextual lens. Specifically, the Interactional Theory of Child Problematic Media Use (IT-CPU) framework, drawing from Bronfenbrenner's bioecological theory (Bronfenbrenner & Morris, 1998), conceptualizes the development of PMU in childhood as occurring in relation to *distal*, *proximal*, and *maintaining* factors (Domoff et al., 2020).

Briefly, distal factors are defined as "early risk factors" that "exert their influence on proximal factors" (Domoff et al., 2020, pg. 345). Importantly, distal factors are not the cause of children's PMU, but are perhaps best understood as contextual risk factors that increase the likelihood of proximal factors linked to children's development of PMU (Domoff et al., 2020). For example, parent's own unhealthy media use and behaviors model these behaviors to young children and may also provide a foundation on which normative standards of interactions with media are developed and communicated. In this paper, we include parental PMU as a distal factor in the prediction of child PMU (see Figure 1).

Proximal factors are the antecedents to child PMU and elicit problematic media use behaviors early in childhood (Domoff et al., 2020). Examples include parents' rules about media use (Shawcroft et al., in press), and parental stress (Eales et al., 2021). Most relevant to this paper is parental stress or burnout and parent-child relationships. Feelings of stress may distract parents from monitoring their child's media use, contributing to greater risk of using media in problematic ways (Eales et al., 2021). Moreover, fewer or more negative parent-child interactions may create tension between the parent-child dyad whereby both

parent and child look for opportunities to escape such conflict. In contrast, parental warmth might buffer the development of problematic media behaviors since parents may be more likely to be patient over media transitions and more involved in learning media related skills. Given that media has been shown to serve as a peace keeping tool in responding to or preventing family conflict (Radesky et al., 2016), it is plausible to hypothesize that negative parent-child relationships may be a risk factor in the development of child PMU. Taken together, parental well-being is critical to early positive interactions between parent and child, thus, it is surprising that there is limited research examining this in the context of PMU. In this paper, we include parent-child relationships (i.e. closeness/warmth and conflict/harsh criticism) and parental well-being (i.e. parental burnout) as proximal factors in the prediction of child PMU (see Figure 1).

Finally, within the IT-CPU framework, maintaining factors are defined as the reinforcing and social learning patterns of interaction between the child, parent, and media that explain how PMU is maintained overtime. As shown in the framework, there is likely a bidirectional relationship between proximal and maintaining factors, whereby proximal factors influence the maintenance of PMU, in turn influencing proximal factors. For example, parent-child relationships characterized by negativity may propel the parent and child to seek media to escape these negative interactions. This, in turn, may reinforce screen use as both parent and child begin to associate screen media with less negativity and avoidance of negative interactions. Increased use of media and PMU is also likely to perpetuate fewer and/or more negative parent-child interactions.

Family Systems Theory

This paper specifically focuses on the role of parental factors in the development of children's PMU, and as such, the lens of Family Systems Theory is also of importance in contextualizing the underlying processes examined in this paper. To understand why parenting factors are relevant distal and proximal factors in the development of children's PMU, a systemic perspective, specifically the family systems framework, is perhaps most useful. Specifically, Family Systems Theory is primarily based on the core assumption that families are systems comprised of interconnected individuals, all of whom influence one another (Van Velsor & Cox, 2000). While the IT-CPU framework is primarily focused on the developing child, family systems is centered on the family units, postulating those individual behaviors and characteristics are best understood within the context of family process and relationships (Fingerman & Bermann, 2000).

For example, a recent study examined the role of mother's postpartum depression and dysfunction in mother-child interactions as predictors of children's PMU (Holmgren et al., 2022). In this study, higher levels of maternal postpartum depression were associated with both dysfunction in mother-child interactions and the development of children's PMU. Mother's postpartum depression presumably changed the nature of their, and their child's roles in their relationship, and the rules guiding family media use. Specifically, as mothers used media to cope with their postpartum depression, their children were more at risk for developing PMU.

Parent Factors

While there are many family factors which may influence the development of children's PMU, this paper specifically focuses on parents' own problematic media use, parent-child relationship quality, and parental wellbeing. We conceptualize these factors as distal and proximal factors, which may place children at increased risk for engaging in PMU (see Figure 1). Guided by the Family Systems Theory we argue that parent's PMU, negative parent-child relationships and poor parental well-being reduce opportunities for positive parent-child interactions, which, in turn, increase young children's risk of PMU. Establishing these links between parental factors and child PMU will demonstrate the utility of the Family Systems Theory and the need to understand child PMU at a family system level.

Parent Problematic Media Use—Parent PMU may be an important distal factor in the development of children's PMU for several reasons. First, within a family systems framework, a parent's relationship with media may dictate family rules and attitudes towards media use. In this way, parents who use media in problematic ways may be less concerned or willing to limit their children's media use (Lauricella et al., 2015). Second, prior research has demonstrated a strong link between mother's media use habits, and those of their children (e.g., Wong et al., 2020). Although PMU is more than purely the amount of time an individual spends using media, the relationship between parent screen time and child screen time is likely echoed in the relationship between parent PMU and child PMU.

Parent-child Relationship Quality—The quality of the parent-child relationship may be an important proximal parental factor which may predict children's development of PMU. Research has primarily focused on how the parent-child relationship influences adolescent's media use, specifically finding that poor parent-child relationships were predictive of increased social media use in adolescents (Sampasa-Kanyinga et al., 2020). Concerning children, researchers have found that media use may influence parent-child attachment (one facet of the parent-child relationship; Hood et al., 2021), although the findings are somewhat mixed. Research specifically exploring how parent-child relationships influence children's PMU has found that dysfunctional communication between mothers and young children was related to children's PMU (Holmgren et al., 2022), and that stronger attachment security between primary caregivers and children was associated with less PMU (Shawcroft et al., in press). Associations have also been shown between low parental control over child behavior and development and increased use of giving mobile technology as a tool to calm the child or keep them quiet (characteristics of PMU) (Radesky et al., 2016). Little other research, however, has explored how parent-child relationship quality predicts children's PMU, despite evidence suggesting this relationship may serve as an important risk or protective factor.

Parental Burnout—Parental burnout is broadly defined as exhaustion related to parenting, emotionally distancing from children, and a decreased sense of fulfillment in the parenting role (Mikolajczak & Roskam, 2020). Since the outbreak of the COVID-19 pandemic, the relationship between parental burnout and children's media use has become even more apparent, with multiple studies documenting parents shifting their children's media use to

cope with the overwhelming demands of parenting during lockdowns and school closures (Eales et al., 2021). We conceptualize parental burnout as a proximal risk factor for the development of PMU in children as parental burnout may be a precursor that places children at risk for engaging in processes linked to PMU, such as increased screentime, less parental monitoring of media, or media emotion regulation processes (Coyne et al., 2021; 2022). As research suggests that many parents use media to distract or entertain their children to make time for other household tasks (Cingel & Krcmar, 2013), it is possible that parents with higher burnout who are reporting exhaustion may use media more often for these purposes. Similarly, parents experiencing stress or burnout may also rely on media themselves as a form of distraction, entertainment, or as a way to disconnect from their parenting role (Wolfers, 2021).

The Current Studies

Recognizing how factors, such as parental burnout, and parent-child relationship quality are associated with the prevalence of PMU behaviors during early childhood is crucial to the prevention of PMU and for the development of effective intervention programs. In addition to helping to fill these gaps in the current literature, this paper also expands on prior research in the sample employed in both studies. Specifically, most research on child PMU has been done with samples from the United States, with a few from Europe and parts of Asia. Recent research has confirmed gender, age and cultural differences in individual's problematic internet use (Baloğlu et al., 2020) and media use (Rideout & Robb, 2020) and gender differences have been found in the types of media used by boys and girls (Mesquita & Reimão, 2007). These samples often do not include diverse or representative groups, with only a small number of minority groups represented. Further, parenting behaviors and parent-child interactions (in general, not specific to media parenting) vary as a function of culture (Bornstein, 2012) and are likely to change across the years (e.g., children become more independent and autonomous with age, which in turn, may result in fewer parent-child interactions and less parental supervision), potentially putting older children at risk for higher PMU compared to younger children. This paper extends previous research and fills current research gaps by drawing from a sample in a multicultural context in New Zealand and conducting comparisons and extensions with a sample from the United States. As such, the aims of the current paper were (a) to examine and compare the prevalence of parent-reported child PMU in two culturally diverse countries - New Zealand and the United States, (b) to examine parent-child relationship quality (Study 1: closeness and conflict, Study 2: warmth and harsh criticism) and parental well-being (Study 1: parental burnout) as correlates of concurrent (Study 1 and 2) and longitudinal (Study 2) child PMU within an early childhood sample, and (c) to explore age and gender differences in child PMU across the two samples. Based on the literature reviewed, we predicted parent-child conflict and harsh criticism and parental burnout would be associated with higher rates of child PMU. In contrast, due to the protective nature of higher parenting quality, we predicted that parent-child closeness and warmth would be associated with less child PMU. We expected these findings both cross-sectionally and longitudinally after controlling for parent's PMU. Given our nascent understanding of PMU in early childhood we have exploratory age and gender hypotheses and predicted that older boys would have higher rates of PMU.

COVID-19 as a Context That May Contribute to Child PMU

Data from both studies were collected during the COVID-19 pandemic (2020–2021). Thus, parent-child relationships, parental burnout, and child PMU were collected during global lockdowns and extended periods of isolation. COVID-19 increased demands on families who experienced social isolation and disruptions to school and extracurricular activities, putting parents at greater risk of stress and burnout (Swit & Breen, 2022). Researchers reported that during the height of COVID-19 related lockdowns, children's patterns of media use changed, and more children demonstrated heightened levels of PMU (Eales et al., 2021). Differences in the rate of COVID infections with New Zealand experiencing significantly higher rates of overall vaccination and lower death rates make the cross-country comparisons unique.

Study 1

Study 1 will examine how parent-child closeness and conflict and parental burnout are related to the development of child PMU in an early childhood sample recruited in New Zealand. We predict that parent-child closeness will be associated with lower levels of child PMU. Additionally, we predict that parent-child conflict and high parental burnout will be associated with higher levels of PMU by children. We expected to find higher levels of child PMU in older boys.

Materials and Methods

Participants

Participants were 93 children (*M age* = 45.30 months, *SD* = 10.15, 42% girls) and their parents (*M age* = 34.73 years, *SD* = 5.90, 87% mothers) from three community-based early childhood centers (ECCs) in three urban, moderate-sized communities in the South Island of New Zealand. The ECCs were located in decile three, five and eight communities suggesting a diverse sample of socio-economic status. Participation rates at all ECCs exceeded 80%. The sample was composed of the following ethnic groups: 71% Caucasian, 16% Māori, 3% Pacific Islander, and the remaining 10% from Southeast Asia and European countries. Regarding parent's education, 28.6% had completed high school qualifications, 28.6% had completed a diploma or certificate, 36.3% had completed a bachelor's college degree, and 6.6% had completed a Master's degree or higher.

Procedures

This study was approved by the University of Canterbury Human Research Ethics committee [approval number 2020/04/ERHEC], and parents provided written informed consent prior to participation. Each of the measures were administered and completed during a clinical interview, whereby a trained research assistant read aloud each item and selected parent's response in a pre-loaded Qualtrics survey loaded on a tablet. This inclusive approach to survey completion ensured all parents had the opportunity to participate in the project, including parents with low literacy levels. When both parents participated in the study (*n* = 4 families), only one parent's data was used for this paper (i.e., the parent who was first to complete the clinical interview). Each of the measures described below

were administered as part of a larger study exploring social and emotional developmental influences during early childhood. Data was collected during 2020–2021 with 17% of parent data collected during COVID-19 nationwide lockdowns. During these lockdowns, clinical interviews were conducted via Zoom or over the phone. Parents received a grocery voucher for their participation.

Measures

Assessment of Parent Problematic Media Use—Problematic media use was assessed using a seven-item scale developed by CAFÉ Consortium, a group of researchers that study early childhood media use (Barr, et al., 2020). Parents responded to each item on a five-point Likert-type scale from 0 *(Strongly disagree)* to 5 *(Strongly agree)*. Example items include “I sometimes feel addicted to new mobile media like smartphones or tablet devices”, “I sometimes feel overwhelmed by how much I have to do on my phone or mobile device”, and “I need to stay connected to friends and social media almost constantly because it is expected.” Items are summed and higher scores indicate more PMU behaviors. Reliability tests for the full measure produced a Cronbach’ s Alpha of .67. Removal of the item “I find it easy to multitask between my children and using a phone or mobile device” increased reliability to .75.

Assessment of Child Problematic Media Use—Parents reported on children’s PMU using the nine item Problematic Media Use Measure Short Form (PMUM-SF, Domoff et al., 2019). The PMUM-SF was designed to assess nine domains of media interference, typically associated with addiction or problematic use in children under twelve, including loss of interest in other activities, preoccupation with media, withdraw, tolerance, deception, and serious problems due to use. Parents responded to each item on a five-point Likert-type scale from 0 *(Never)* to 4 *(Always)*. Example items include “When my child has had a bad day, screen media seems to be the only thing that helps him/her feel better” and “The amount of time my child wants to use screen media keeps increasing.” Items are summed and higher scores are indicative of increased PMU by young children. Reliability tests for this sample produced a Cronbach’s Alpha of .85.

Assessment of Parent-Child Relationship Quality—Caregiver-child Relationship Scale-Short Form (Pianta, 2001) was used to assess parent-child closeness (8 items; e.g., “I share an affectionate, warm relationship with my child”) and conflict (7 items; e.g., “My child and I always seem to be struggling with each other”). Parents responded to each item on a 5-point Likert-type scale from 0 (*definitely does not apply*) to 4 (*definitely applies*). Items are summed for each subscale, with greater scores being indicative of caregivers having a greater sense of closeness or conflict with their child. One item on the closeness subscale was reverse coded. Reliability test for this sample produced a Cronbach’s Alpha of .62 and .80 for parent-child closeness and conflict respectively.

Assessment of Parental Burnout—Parental burnout was assessed with the Parental Burnout Assessment (PBA) (Roskam et al., 2019), a 23-item self-report questionnaire consisting of four subscales: Parental Exhaustion (9 items) (e.g., I’m so tired out by my role as a parent that sleeping doesn’t seem like enough; I have the impression that I’m looking

after my child(ren) on autopilot), Contrast with previous parental self (6 items) (e.g., I'm no longer proud of myself as a parent; I don't think I'm the good father/mother that I used to be to my child(ren)), loss of pleasure in one's parental role (5 items) (e.g., I can't stand my role as father/mother anymore; I can't take being a parent any more), and emotional distancing from one's children (3 items) (e.g., I'm no longer able to show my child(ren) how much I love them; I do what I'm supposed to do for my child(ren), but nothing more). Each of the items were rated on a 7-point Likert-type scale from 0 (*Never*) to (*Everyday*). All items are summed to obtain a total parental burnout score, with greater scores being indicative of higher parental burnout. Reliability was high for this sample, $\alpha = .93$.

Study 1 Results

Preliminary Analyses

All data analyses were conducted with SPSS 28.0 software package. Data reliability estimates, assessment of normality, and descriptive statistics were examined. Outliers greater than 3SD above or below the population mean on any of the study variables ($n = 3$) were Winsorized to +/−3SD of the mean. Measures of skew (−1.08 - .88) and kurtosis (−.29 - .62) suggested no concerns about non-normality of the data (Kline, 2016).

Next, a series of bivariate correlations were computed between the study variables along with means and standard deviations (Table 1). These were computed for the population sample because no significant gender differences were found for children's PMU ($t(91) = .84$, $p = .40$). As can be seen in Table 1 and in keeping with past studies that have relied on parent reports of media use, parent and child problematic media use were highly correlated. As expected, positive associations between child PMU and high parent-child conflict and parental burnout and a negative association between child PMU and parent-child closeness were found. Unexpectedly, no association was found between child age and child PMU.

Prevalence of PMU in Children

To investigate the prevalence of PMU in this early childhood sample, we allocated children into high and low categories of PMU. This was computed by giving a score of 0 (never, rarely), or 1 (sometimes, often, always) for each item and then summing the items. Any child showing evidence of five or more out of nine symptoms was rated as showing PMU (as suggested by Domoff, et al., 2020). Overall, 22 children (23.7% of the total sample) demonstrated at least five problematic media use symptoms within the past month, as reported by parents, indicating PMU. The difference in the prevalence of PMU between boys (n = 15) and girls (n = 7) was not statistically significant ($\chi 2 = 1.21(1)$, $p = .27$). We also found no statistically significant age differences between high and low groups ($r = .05$, $p = .63$).

Unique Contribution of Parenting to the Prediction of Low and High PMU in Children

Next, we ran a hierarchical linear regression to explore the unique contribution of parent-child closeness and conflict and parental burnout to the prediction of child PMU. Parents' concurrent PMU served as a control variable. As can be seen in Table 2, after controlling for parents' PMU, parent-child closeness significantly predicted children's PMU. Lower

levels of parent-child closeness predicted higher levels of problematic media use in this sample of parent-child dyads. With an adjusted R^2 of .16, low parent-child closeness and parent's PMU explain 16% of the variance in children's PMU. Contrary to our hypothesis, parent-child conflict and parental well-being and were not significant correlates of child PMU.

Study 1 has established that some aspects of parenting (most notably low levels of parent-child closeness) were associated with child PMU in a non-United States sample. However, it is limited by the cross-sectional and self-report nature of the data. Study 2 extends these findings by using observational data of parent-child interactions in a different country (the United States) to examine more closely and objectively what aspects of parent-child interactions (warmth and harsh criticism) predict child PMU. By using a longitudinal design (over 1 year), Study 2 also responds to the call to examine factors relevant to the IT-CPU using longitudinal analyses (Domoff et al., 2020). Study 2 was pre-registered using the Open Science Framework (doi: osf.io/xnry7)

Study 2

Study 2 examined how parenting is related to the development of PMU in early childhood. We utilized both observational and questionnaire data. We predicted that higher parental warmth would be associated with lower levels of PMU. Additionally, we predicted that parent's use of harsh criticism would be associated with higher levels of PMU by children.

Materials and Methods

Participants

The participants for this study were taken from Project M.E.D.I.A., an ongoing, longitudinal study of child development in a media saturated world. In 2017 (wave 1) 500 primary caregivers and their infants under the age of one were recruited for participation in this study. All participants lived in the Denver, Colorado area in the United States. Participants were recruited through mailers sent to the participant home through the Colorado Office of Health and Vital Records, which identified all in the local area who had given birth in the past year (27.5% of the 500 families). Research assistants visited potential participants' homes to invite participation. Sixty-six percent of participants who research assistants were able to reach at home and had a child in the home under the age of one participated in Wave 1 of Project M.E.D.I.A. Participants were also recruited using additional methods, including flyers in pediatrician offices, free clinics, social services offices, businesses focused on entertainment for young children, public parks and play spaces, and referral from a friend who participated (22.7%). Finally, 49.8% of the sample was recruited through an external data collection company (Qualtrics). These participants were recruited through targeted social media and online (blog) outreach and direct outreach via email and phone to local physicians' offices.

We utilized data collected at 3.5 years (Wave 4, 2020) and 4.5 years (Wave 5, 2021) for the current study, since this is when PMU emerges (Domoff et al., 2020). We collected in-home data for just over half the sample: thus, this data is used in the current study as it

contains the parental observation measures. The final sample for this paper included these 269 infant-primary caregiver dyads (*M* age = 41.17 months *SD* = 3.06 months, 131 males, 111 females, 1 missing). Primary caregivers were primarily female (females = 232, males = 11), approximately 63% were Caucasian, 8.2% Black, 21% Hispanic or Latino, 4.9% Asian American, and 7% Mixed or Other. Approximately 72.8% of primary caregivers were married, 13% were single-never married, 10% had an unmarried partner living with them, 2% were divorced, and 2% were separated from their partner. Approximately 17.3 % of primary caregivers had completed high school qualifications or equivalent or less, 32.5% had completed some college or a vocational degree, 32% had completed a bachelor's degree, 18% had completed a graduate degree. 8.2% of primary caregivers reported a combined household income below $20,000, 22.2% reported a household income above $20,000, but below $50,000, 27.2% reported a household income above $50,000, but below $80,000, 12.7% reported more than $80,000, but less than $100,000, and 19.3% reported a household income above $100,000. 26.3% received public assistance at the time of data collection, 4.9% received public assistance in the past year, but were not currently receiving public assistance, and 18.5% had received public assistance in the past, but not in the last year. Retention rate was 94% between Waves 4 and 5.

Procedure

Wave 4 of Project M.E.D.I.A. was collected in 2020 during the COVID-19 global pandemic. As a result, all in-home appointments were conducted via Zoom. Participant families were mailed paper packets with study materials before appointments. Primary caregivers provided informed consent and were compensated with a $200 gift card and an additional $25 for full participation of all tasks of the in-home. Additionally, participants completed an online questionnaire through Qualtrics. Participants were compensated $50 in Visa or Amazon gift cards for completing the online survey. All participants were proficient in English. All procedures were approved by the Institutional Review Board of Brigham Young University [application number F16089 titled Project M.E.D.I.A.]. W ave 5 was conducted in family homes for in-home tasks and online for all questionnaire data. For simplicity, we will refer to these waves as Wave 1 and Wave 2 throughout the rest of the paper.

Measures

Parent Problematic Media Use (Wave 1)—Problematic use of social media and mobile phones were measured using a modified version of the Problematic use of Mobile Phones (PUMP) scale (Merlo et al., 2013). Participants were asked to read each question and rate how strongly they agreed with each item on a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). A sample item included, "I have ignored the people I'm with in order to use my cell phone." Reliability was adequate, $\alpha = .77$.

Child Problematic Media Use (Wave 1 and 2).

Parents reported on children's problematic media use using the nine item Problematic Media Use Measure Short Form (PMUM-SF, Domoff et al., 2019). Refer to Study 1 for a detailed description of this measure. Reliability was adequate at both waves (Wave 1: $\alpha = .88$; Wave 2: $\alpha = .87$).

Quality of Parent Child Interactions (Wave 1).—The quality of parent-child interactions was recorded using the free-play portion of the Early Growth and Development Indicator-Indicator of Parent Child Interaction (IGDI-IPCI, Baggett & Carta, 2006; Hackworth et al., 2017). In this task, designed for children between 2 and 42 months, parents and children engage in an unstructured free play while their interactions are recorded for four minutes. The IGDI-IPCI coding schema measures the frequency of global parent-child interactions across two parent domains (supportive, intrusive) and two child domains (engagement, stress). We utilized the parenting codes for the current study. Videos are coded in 30 second epochs for the frequency of target behaviors. The presence of one behavior did not exclude other behaviors from being present during the same 30 second interval. The two parent centered behaviors used in this study include warmth (e.g., smiling, laughing, praising, or complimenting the child), and harsh criticism or contempt (sarcasm or eye rolling, name calling, criticism).

There were two undergraduate coders and one undergraduate coding lead that acted as the gold standard. The coding lead received extensive training from researchers who had previously published using the IGDI-IPCI coding schema (e.g., Barr et al., 2014; Hackworth et al., 2017). Each coder coded at least 25 videos during the reliability process to get to an overall 85% reliability with each individual code. Coders were required to be within one of the coding leader's totals to become reliable for each code. To maintain reliability, each coder was then required to code one group of 10 videos weekly. Then 2 out of every 10, or 20% of the videos, were randomly selected and compared with the gold standard reliability codes to ensure inter-rater reliability, and to watch for coder drift. Coders were considered unreliable on a set of 10 videos if they were below 85% in a particular code or the overall video codes. Coders were required to maintain an overall 85% reliability rate. All coders maintained an average reliability of 96.25%.

Study 2 Results

Preliminary Analyses

Bivariate correlations were conducted to examine cross-sectional and longitudinal associations between the major variables (see Table 3).

Prevalence of PMU in Children

Following the procedures described in Subsection 8.2, 22% of children aged 3.5 years (Wave 1) demonstrated at least five problematic media use symptoms within the past month, as reported by parents, indicating PMU, while 25% of children aged 4.5 years (Wave 2) showed PMU. Analyses were examined first with symptoms and then with high PMU cutoffs. There were no major differences between the two analyses, so we elected to report the symptom results here given there is more variability in the data.

Unique Contribution of Parenting to the Prediction of PMU in Children

We utilized path analysis in Mplus (version 8.7) to model parental warmth and harsh criticism at Wave 1 as predictors of child PMU at Wave 2. Both child and parent PMU at

Wave 1 were used as covariates. Income, race, and child age were also included as covariates in the model.

To test for moderation, a fully unconstrained model was compared with one constrained by gender. There were no significant gender differences, thus, the model was run as a single group (Wald's test (overall) = 3.36 (8), $p = .91$).

The model was fully saturated and fit statistics are not provided. The final model can be viewed in Figure 2. Overall, parental harsh criticism was cross-sectionally associated with higher child PMU symptoms at Wave 1, $\beta = .19$, $p = .01$. However, there was no cross-sectional relationship with parental warmth, $\beta = .01$, $p = .89$. Additionally, there were no longitudinal associations between early parenting and child PMU at Wave 2 (Warmth: $\beta = -.04$, $p = .49$; Harsh criticism: $\beta = -.07$, $p = .22$). In terms of controls, parental PMU, $\beta = .12$, $p = .037$, child age, $\beta = .17$, $p = .002$, and child PMU at Wave 1, $\beta = .52$, $p < .001$, were significantly associated with child PMU at Wave 2.

Discussion

This study explored associations between parent-child relationships, parental well-being, and children's PMU. Our results indicate that among our samples of culturally diverse families in New Zealand and the U.S. between 22–25% of 2- to 5-year-old children displayed at least five symptoms related to PMU in the last month. Low levels of parent-child closeness and parent's use of harsh criticism were related to children's PMU. To our knowledge, this is the first study that has examined the prevalence of child PMU in two different early childhood samples in two countries including a non-US sample. More importantly, our findings provide evidence that symptoms of PMU are evident in children as young as two years of age. We did not find gender differences in child PMU across the two studies, however, differences in older and younger children's PMU were found in Study 2, with older children having higher levels of PMU one year later. The prevalence and increases in child PMU reported in this study highlight the need for longitudinal research starting early in childhood. In particular, it is important to identify possible precursors, correlates and predictors of child PMU as well as the stability of child PMU over time and to identify optimal periods for prevention and intervention to effectively curtail the development of child PMU.

Across both studies, we found that two aspects related to parenting – low parent-child closeness and high parental harsh criticism - were related to child PMU, however, only cross-sectionally. In Study 1, low parent-child closeness significantly predicted child PMU. Conceptually, parent-child closeness describes the extent to which parents and children are emotionally and behaviorally connected and includes behaviors such as talking to each other and sharing thoughts and feelings. When parents and children do not share such connections, they may seek these elsewhere. Media may displace parent-child closeness by providing an outlet whereby the parent and child interact and feel connected to other individuals (i.e. connecting with friends and family) or factitious characters (i.e. watching videos or playing games). This, in turn, reduces the amount of quality time the parent and child spend together or may increase family conflict, both of which are characteristics of PMU (Domoff et al.,

2020). The role of parent's PMU is also relevant to this finding. In both cohorts, parent's PMU remained the strongest correlate of concurrent child PMU. Parents who are highly distracted by media may be less available and responsive to their child and may model these unhealthy media behaviors for their child. The link between parent-child closeness, or lack thereof, and child PMU may also be related to a third variable or mediators not measured in the current study. For example, child externalizing behaviors (McDaniel & Radesky, 2018) are associated with caregiver stress and burden (Krahé et al., 2015), which in turn may further amplify children's externalizing behaviors in a reciprocal manner. Children may seek media as a coping or distraction tool, reinforcing their lack of behavioral self-regulation when emotionally heightened. Other examples include difficult child temperament (Coyne et al., 2021), or lack of parental monitoring (in general and around media). We encourage future research to explore these possibilities.

We also found that harsh criticism from parents (in Study 2) was cross-sectionally associated with child PMU. Closer examination of the items on the PMU scale might help explain these findings. For example, conflict in the home (likely involving harsh criticism) may create an atmosphere where conflict in general is more likely – and around media more specifically. Additionally, children may feel they need to hide or sneak media from parents who are harsh in their parenting. This may be a protective strategy to avoid an argument or criticism. Additionally, children may use media as a coping mechanism and a way to escape interactions with parents that are negative. Though these symptoms may be adaptive at the time, over time they may significantly increase the risk of developing a problematic relationship with media (e.g., Gentile, et al., 2017). This has been found to be true in adults whereby emotion dysregulation may lead some individuals to use the internet and smartphones as a technique for coping with and regulating negative emotions, increasing their risk for problematic media use (Rozgonjuk & Elhai, 2021). We did not find a longitudinal effect between harsh criticism from parents and PMU over one year in the current study. However, we did find that early PMU was related to later PMU. Thus, early harsh parenting may set the scene for consistent PMU throughout early development. It is also possible that harsh parenting may be related to a third variable not measured in the current study that may explain this relationship. For example, child and parent self-regulation, or lack thereof, may contribute to greater use of reactive and harsh parenting behaviors. As a result, parent and child may reach for media as a self-regulatory tool or as a way to escape from the disordered relationship. Other examples of mediators include lack of parental monitoring (in general and around media), or child stress. We encourage future research to explore these possibilities.

These results align well with the IT-CPU and Family Systems Theories (Domoff, et al., 2020). More specifically, low parent-child closeness and parent's use of harsh criticism represent important risk factors associated with children's PMU in these early childhood samples. Based on the IT-CPU, these factors could serve as distal, proximal, and/or maintaining factors and future research is needed to disentangle the functions of parental-child closeness and harsh criticism in contributing to children's PMU. For instance, parent's harsh criticism may hinder the parent-child relationship (Chang et al., 2003) and feelings of closeness, leaving the child feeling disconnected from the family unit. As a result, the child might seek out media to avoid interactions with the parent and to seek connections

elsewhere. The lack of significant longitudinal effects found in this study may be due to the constant shifting in parent and child behaviors during the early childhood developmental period. Parent and child behaviors, including parenting and media specific behaviors are far from stable during early childhood. Similarly, children may still be required to seek their parent's permission to access media and/or devices, potentially limiting our understanding of the concurrent and longitudinal antecedents of child PMU.

Moreover, parents who lack emotional and behavioral connection to their child may be more prone to using harsh criticism in their parenting (while Study 1 did not include a measure of harsh criticism, we did examine parent-child conflict and it is likely that an overlap exists between these two constructs). This is partially supported by the significant bivariate correlation between parent-child conflict and parent-child closeness found in Study 1. The interaction between parent-child closeness and parent's use of harsh criticism may also drive the child to use media to escape the family unit. These interpretations are speculative based on theory and require further exploration in future research. Longitudinal research is also needed to identify how parent-child relationships and other variables interact to maintain child PMU over time and across developmental periods.

Unexpectedly, parental conflict and warmth was neither cross-sectionally nor longitudinally associated with child PMU. This went against hypotheses for both studies and differ from our cross-sectional findings regarding parent-child closeness and parental harsh criticism. While all four parenting factors (parent-child conflict, parent-child closeness, harsh criticism, parental warmth) theoretically could be linked to child PMU, it is possible that parental conflict and warmth simply does not predict early markers of child PMU. Many parents are frustrated around their child's media use and feel less equipped to manage every day media habits (Coyne et al., 2023). However, being responsive and showing warmth in general may not easily transfer over to problems to media susceptibility this early in childhood. Thus, the effect of parent-child conflict and warmth may be best understood as an indirect parenting factor or distal factor (as shown in the IT-CPU and Family Systems Theories (Domoff, et al., 2020). Additionally, both studies used general measures around parent-child conflict and parental warmth and responsiveness that were not media specific. Thus, parental factors related to media specific behaviors, in particular, parental warmth and responsiveness might be protective of the development of PMU among young children. This type of research may involve coviewing (or coplaying) which tends to have positive effects in general, depending on the content and context viewed or played (Barr & Linebarger, 2017). Thus, we expect this type of media specific parenting might be protective and we hope future longitudinal research explores this hypothesis. Additionally, PMU tends to be quite variable among young children, with a high amount of within-person variability (Coyne, et al., 2022). Thus, it is possible that early parental factors might serve as risk or protective for child PMU over time as such behavior becomes more stable. We encourage future research to continue to examine both parent-child relationships and PMU in children over the course of development.

We were also surprised that parental burnout did not significantly predict child PMU. Despite a positive bivariate correlation between parental burnout and child PMU, albeit weak, this association was no longer significant after controlling for parent's PMU.

While speculative, the moderate positive bivariate association between parental burnout and parent's PMU may serve as the pathway in which parental well-being influences child PMU. When parents are burnt out, they look for resources to help them cope (Mikolajczak & Roskam, 2018). Using media themselves and allowing children to use media offers parents respite or a 'breather' from day-to-day parenting tasks, potentially putting children at greater risk of developing PMU. Given that we examined parental well-being cross-sectionally, and there is a paucity of research examining parental well-being as a precursor of child PMU, future research could examine aspects of parental well-being (e.g., parental burnout, parental stress, positive affect, social connection) longitudinally to disentangle the bidirectional relationship and causal order of associations between parent's PMU, parent-child relationships, parental well-being, and child PMU. It is also possible that media use may influence parenting behaviors and subsequently parent-child relationships. More specifically, media use may trigger emotions and stressors in the parent that negatively impact the relationship with their child. This has been corroborated by parent- and adolescent- reports of parenting when distracted by a phone whereby greater difficulties in managing phone use while parenting contributes to greater parenting laxness and over reactivity (McDaniel et al., 2018) and lower parent-child warmth (Stockdale et al., 2018). It is unclear whether the distractibility of the parent or the media content leads to such effects or alternatively, whether parenting behaviors propel parents to use more or less media. Both are plausible and future research should continue to explore the various and complex ways in which parent and child media use interacts with parenting behaviors and parent-child interactions.

There are several implications of this research related to the prevention of child PMU and the resources and support available for parents. Firstly, our findings highlight the importance of parent-child relationships to preventing children's PMU. While existing intervention programs aimed at reducing child screen time and PMU often include parenting components, these are typically focused on educating parents about the effects of media use and strategies for managing their child's media use (e.g., Maniccia et al., 2011). The association between parent-child closeness, harsh criticism and child PMU suggests that any parenting intervention program aimed at fostering positive parenting may impact child PMU in addition to the other positive effects of reducing harsh parenting (e.g., Knerr et al., 2013). Parenting programs aimed at reducing screen time and PMU could also expand more broadly than technology-specific management strategies to consider more general parenting skills focused on reducing harsh criticism and encouraging more positive parent-child emotional and behavioral connection. Overall, our results confirm the importance of considering parenting skills in any efforts to reduce child PMU. Child media use in early childhood occurs largely within the home environment and understanding and targeting parental motivations for PMU within the household is key.

Finally, the moderate association between children's PMU at Waves 1 and 2 in Study 2 indicates that early media usage may be critical in establishing longer term patterns of usage. Even though we did not find longitudinal associations between parenting and child PMU, the contribution of harsh criticism to earlier child PMU could establish dysfunctional patterns of media usage that are maintained over time. Our results indicate that a quarter of 2- to 5-year-old children show some PMU. This highlights the importance of targeting

psychoeducation and media literacy resources to parents as soon as possible during early childhood.

This study included many strengths including samples from two different countries (New Zealand and the United States), the inclusion of multiple aspects of parenting, multiple methodologies (questionnaire and observational) and the inclusion of longitudinal data. However, there were some notable limitations. Both studies were relatively small in nature and included a majority White and relatively well-educated sample. Thus, we hope future research examines these associations in more diverse and larger populations. Further, both studies relied on parent reports of children's PMU. While parents have been identified as reliable reporters of these behaviors, future research assessing PMU should be supplemented with clinical interviews to understand the impact of media on children's daily functioning (Domoff et al., 2020) or by using observational methods (Coyne, et al., 2021) or passive sensing and time use measures (Barr et al., 2020) to identify early precursors to PMU and to identify the bidirectional nature and interplay between parental factors and child PMU. As suggested by the IT-CPU framework and the Family Systems Theory, there are various distal, proximal, and maintaining factors that independently serve as risk or protective factors for child PMU, or may interact with each other to increase children's susceptibility to PMU. Indeed, it is very likely that there are other variables not included in our analysis that help explain the links between parental factors and child PMU. We welcome future research to continue to examine the role of parental factors in predicting child PMU.

Despite these limitations, the current studies contribute to our growing knowledge base about the correlates and predictors of young children's PMU. Research on PMU during early childhood when these behaviors first emerge is nascent. This study demonstrates that between 22–25% of children showed clinical levels of PMU (as suggested by Domoff, et al., 2019) and the prevalence was similar in both New Zealand and the United States. Parenting factors, and specifically, parent's use of harsh criticism, may be a risk factor for young children's PMU. Cultivating parent-child closeness may reduce the development of problematic media behaviors during early childhood and will also support the adaptive functioning of the family unit.

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Biographies

Dr. Cara S. Swit is a Senior Lecturer of Child and Family Psychology at the University of Canterbury. Her research interests are in child social development, parent-child interactions,

child and parental mental health and wellness. Dr. Swit is a leader in advancing child-centred methodologies in developmental research.

Dr. Sarah M. Coyne is a professor of child development in the School of Family Life at Brigham Young University. Her research interests include media, body image, gender, mental health, and child development. She regularly speaks to families about using media in positive ways.

Jane Shawcroft is a PhD student at UC Davis in the Department of Communication. Her research focuses on understanding how media and technology play a role in the social, physical, mental, and emotional health of children and adolescents. In particular, she is interested in finding ways that society, educators, parents, and other invested individuals can leverage media and technology to support positive outcomes for children, adolescents, and families.

Megan Gath is the Senior Data Manager for the Child Well-being Research Institute at the University of Canterbury. Her research interests are in parenting and the home environment in relation to child development and well-being.

Rachel Barr, Ph.D. is Professor of Psychology at Georgetown University and Director of the Georgetown Early Learning Project. She is interested in how children bridge the gap between what they learn from media and how they apply that information in the real world and published research on the effects of content and context of media on early learning.

Hailey Holmgren is a research associate and project manager for Project MEDIA at Brigham Young University. Her research interests include family media use and parenting behaviors surrounding child media use and child outcomes.

Laura Stockdale, PhD is a research associate with Brigham Young University in the School of family life. Her research focuses on understanding how media and technology play a role in the social, physical, mental, and emotional health of children and adolescents. Laura is currently completing a master's in Clinical Mental Health Counseling and hopes to be able to help families and kids in the future navigate the spaces between media and mental health.

Data Availability Statement

The data that support the findings of Study 1 are available from the corresponding author, Cara S. Swit, upon reasonable request. The data to support the findings of Study 2 are available by contacting Sarah M. Coyne.

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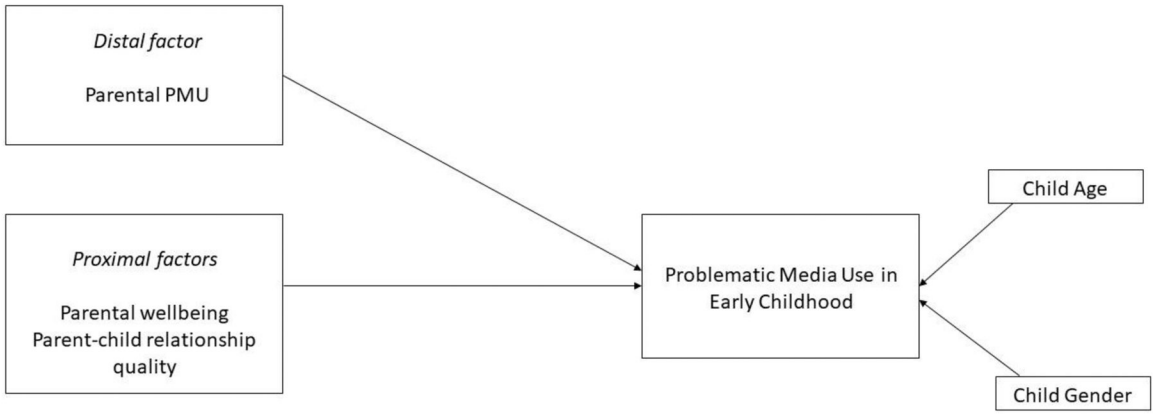

Figure 1:
Distal and proximal factors in the prediction of child PMU

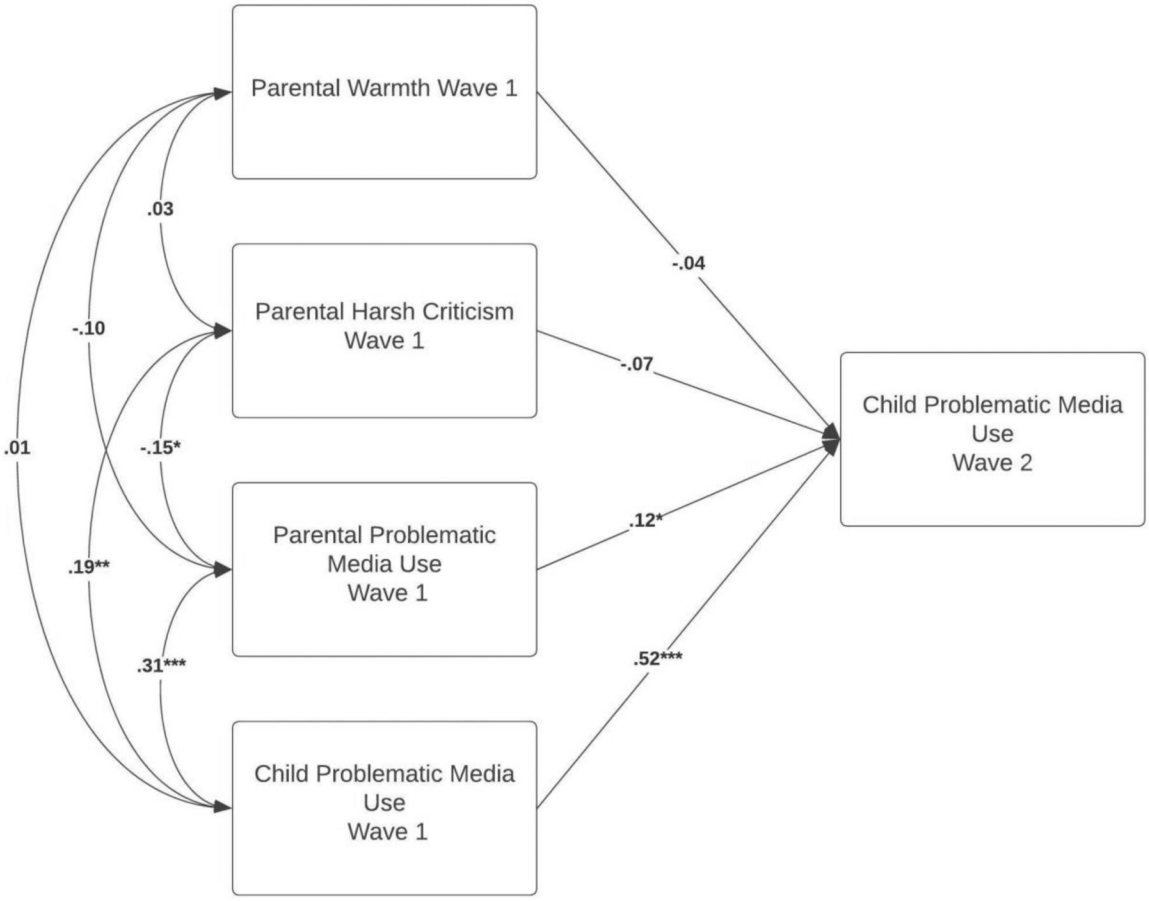

Figure 2: Longitudinal associations between parenting and child problematic media use

Notes: Standardized values are shown. Additionally, not all covariates and paths are shown. All additional statistics can be obtained by contacting the author directly.

*$p < .05$; **$p < .01$, ***$p < .001$

Table 1.

Correlations between parent reports of children's problematic media use, parent-child relationship quality, and characteristics of parental burnout for the population sample.

Variable	1	2	3	4	5	6	7
1.Age	-						
2.Gender[a]	−.02	-					
3.PMU – child	.06	−.09	-				
4.PMU – caregiver	.02	−.06	.36***	-			
5.Conflict	−.12	−.02	.26**	.38***	-		
6.Closeness	.20†	.15	−.27**	−.19†	−.22*	-	
7.Parental burnout	−.02	.09	.30**	.47***	.41***	−.22*	-
Mean	45.30	-	8.47	11.09	1.27	3.72	19.00
SD	10.15	-	5.60	4.61	.76	.29	11.13
Range	25–65	-	0–22	3–28	0–3.14	2.86–4	0–53.80

Note. N = 93.

[a]Gender: 0 = male, 1 = female

†p < 0.10

*p < 0.05

**p< 0.01

***p < 0.001

Table 2.

Hierarchical Regression Analyses of Parental Burnout and Parent-Child Relationship Quality Predicting Child PMU

		Model 1			Model 2			Model 3		
		β	**t**	**p**	**β**	**t**	**p**	**β**	**t**	**p**
	Intercept									
Step 1: control variable	Parent PMU	.36	3.62	**<.001** ***	.28	2.55	**.01** **	.26	2.29	**.03** *
Step 2: parental well-being	PBA				.15	1.39	.17	.08	.71	.48
Step 3: parent-child relationship	Closeness							-.20	−1.97	**.05** *
	Conflict							.08	.75	.45
	Model fit	R = .36			R = .38			R = .44		
		Adjusted R^2 = .12			Adjusted R^2 = .13			Adjusted R^2 = .16		
	Model comparison	ΔR^2 = 0.13, F(1, 91) = 13.10, p < .001			ΔR^2 = 0.02, F(2, 91) = 7.58, p < .001			ΔR^2 = 0.05, F(4, 91) = 5.22, p < .001		

Note: PMU = problematic media use; PBA = parental burnout assessment

† p < 0.10

* p < 0.05

** p< 0.01

*** p < 0.001

Table 3.

Bivariate correlations

	1.	2.	3.	4.	5.	6.	7.	8.
1.Parental Warmth (1)	--							
2.Parental Harsh Criticism (1)	.03	--						
3.Child problematic media use (1)	.01	.18**	--					
4.Child problematic media use (2)	−.03	.01	.57***	--				
5.Parent problematic media use (1)	−.10	−.16*	.31***	.29***	--			
6.Income (1)	.08	−.18**	.02	.07	.16*	--		
7.Child Age (1)	.04	.06	.11	.22***	−.03	.10	--	
8.Race (1)	−.13	.04	−.03	.02	−.01	−.24***	−.11	--
9.Sex (1)	−.04	.05	−.05	−.10	.17*	.07	−.09	.02

Notes.

* $p < .05$;

** $p < .01$,

*** $p < .001$;

Number after variable refers to wave; For Race 1 = White, 2 = Non-White, For Sex 1 = male, 2 = female