THE IMPACT OF INFANT-TODDLER SCREEN TIME ON SELF-REGULATION AND BEHAVIOR CHALLENGES: THE ROLE OF PARENTING STYLE AND SOCIO-ECONOMIC STATUS

Tara O'Malley

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AND BEHAVIOR CHALLENGES:

THE ROLE OF PARENTING STYLE AND SOCIO-ECONOMIC STATUS

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A Thesis

Presented to the

Faculty of

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San Bernardino

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In Partial Fulfillment

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in

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by

Tara O'Malley

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ABSTRACT

As young children are growing up in a digitally enmeshed world, there is growing concern about the developmental impacts of screen time. Given the importance of early rapid brain development, understanding the developmental outcomes of screen time in early childhood is critical. Current research suggests that excessive screen time may lead to delays in physical, cognitive, and language development. However, the impact of screen time on social-emotional development among young children (0-5 years) is not well understood. Therefore, the present study examined the effects of screen time on social-emotional outcomes of 12-to-36-month-old children, specifically, the impact on self-regulation and behavior challenges per parent report. Additionally, the study examined the moderating effects of parenting style and socio-economic status on screen time and each of the outcome variables. Results demonstrated that screen time was significantly associated with self-regulation and behavior challenges. Also, screen time was related to socio-economic status. However, no moderating effects of parenting style and socio-economic status were found. The findings contribute to a more comprehensive understanding of the impact of screen time by specifically examining social-emotional development and by focusing on an age group that has generally not been considered. Future research is necessary to better understand developmentally appropriate screen time practices for young children to ensure optimal development of future generations.

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DEDICATION

       I would like to dedicate this thesis to all the children who have been impacted by the unknown effects of early screen time. I hope that we can make a collective effort as a society to implement best screen time practices with young children to ensure optimal development of future generations.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE:

LITERATURE REVIEW

Screen Time: What We Know

As young children are growing up in a digitally enmeshed environment,

there is widespread concern about the effects of screen time on the developing

brain (Detnakarintra et al., 2020; Reid Chassiakos et al., 2016; Rideout, 2017,

Straker et al., 2018). Early screen time refers to the extent to which infants and

toddlers (ages 0-5 years) engage in electronic screen media, including

smartphones, tablets, video games, television, and computers. Infants and

toddlers around the world engage in more screen time per day than

recommended by public health agencies (Madigan, Racine, & Tough, 2019).

The first five years of life is a critical window for rapid brain development, which

makes infant-toddler screen time particularly risky (Christakis, 2008). Currently,

there is negligible evidence of developmental benefit from screen time during the

early years of life (Swartz, 2008). Given that real-world exploration and socially-

contingent interactions are necessary for optimal development, the displacement

of these activities during screen time puts infants and toddlers at risk for adverse

developmental outcomes (Reid Chassiakos et al., 2016; Schmidt et al., 2008).

Early Screen Time Guidelines and Prevalence

The American Association of Pediatrics (AAP) and the World Health

Organization (WHO) have established clear guidelines for screen time for young

children. For infants under 12 months of age, the AAP and WHO recommend avoiding all screen time. For children ages 2-5 years, the WHO recommends less than 1 hour of screen time per day, while the AAP recommends no more than 2 hours of screen time per day. Yet, the majority of children worldwide exceed these recommendations and engage in excessive screen time (Madigan et al., 2019). For example, in the United Kingdom, 75% of 12-month-olds exceed the guidelines of zero screen time, and rates progressively increase to 2 hours per day by 30 months of age (Barber et al., 2017). In Korea, 48% of toddlers watch more than 1 hour every weekday, and 63% watch more than 1 hour per day on weekends (Chang et al., 2018). In Turkey, 75.6% of children ages 0- to 5-years engage in daily screen time, while 25.7% of these children use multiple devices simultaneously (Kiliç et al., 2019). In France, 76% of children ages 5-40 months are exposed to touch screen devices daily (Cristia & Seidi, 2015). Globally, studies reveal extensive early exposure and excessive duration of screen time for young children.

Reports from the AAP show that young children's use of screen time in the United States (U.S.) is ever-increasing. In 1970, children began watching television at approximately 4-years-old. Now, children begin engaging in screen time (e.g., watching television, mobile devices, etc.) at approximately 4-months-old. In 2011, 52% of children ages 0- to 8-years had access to a mobile device. By 2013, this increased to 75% of 0- to 8-year-olds. In 2015, almost all (96.6%) of 0- to 4-year-olds had used electronic devices, while 75% owned their own

device; most 2-year-olds used electronic devices daily, while most 1-year-olds (92.2%) accessed devices daily (Reid Chassiakos et al., 2018). Findings from Jacquier et al. (2020) on screen time in the U.S. found that infants engage in approximately 1.11 hours per day. A nationally representative survey on screen time in the U.S. found that 2-year-olds average 2.3 hours per day (Radesky et al., 2020). Similarly, Twenge and Campbell (2018) found that 2- to 5-year-olds average 2.28 hours per day. Meanwhile, Barr et al. (2020) found that most parents reported children ages 3- to 5-years engage in more than 5 hours per day. It is important to acknowledge that parents often report inaccurate responses for child screen time (Barr et al., 2020). Nonetheless, it is generally thought that young children engage in more screen time than recommended by AAP and WHO, which leads to concern regarding developmental outcomes.

<p align="center">Early Screen Time and Development</p>

Early screen time is associated with long-term developmental risks (Allen & Vella, 2015; Pagani et al., 2010). Behaviorally, early activities set the foundation for later lifestyle habits. Likewise, early screen time habits set the foundation for subsequent screen time-related behavioral outcomes (Pagani et al., 2010; Radesky et al., 2020). It is largely known that optimal infant-toddler development requires exploration of the natural world, play-based activities, and face-to-face interactions with caregivers (Myers, Keyser, & Cors, 2019; Radesky & Christakis, 2016). For instance, hands-on activities and quality interactions during early years are fundamental for developing interpersonal relationships,

self-regulation, sense of self, reaction to fear, and the ability to develop resilience (Topping et al., 2013). Excessive early screen time displaces opportunities for these critical learning moments. Therefore, the early years (0-5) are a critical window for caregivers to implement developmentally appropriate screen time practices to prevent the prospective adverse effects of excessive screen time (Radesky et al., 2020). While research demonstrates strong relations between early screen time and negative developmental impacts, it is imperative to understand why.

Displacement of play-time in the natural world due to screen time has a cumulative impact on development over time (Schmidt et al., 2008). Research shows that screen time overstimulates the nervous system, which affects overall brain functioning (Myers et al., 2019). Even "educational toys" provide sensory overload with a conglomeration of sounds, movement, colors, and lights all occurring simultaneously. An overabundance of sensory activity may seem fun for children, but it can interfere with genuine learning and growth (Neumman & Neumman, 2013).

Research suggests that early screen time negatively affects several domains of development, including physical, cognitive, and language development. Abundant research focuses on the impact of screen time on physical health. For instance, excessive screen time leads to increased sedentary behavior and decreased physical activity, resulting in higher risk of childhood obesity (Downing et al., 2015; Fang et al., 2019). Screen time also

negatively affects posture, resulting in neck and back pain (Joergensen et al., 2021). In addition, prolonged exposure to screen time results in eye discomfort and headaches due to blue light exposure, less blinking, and adjusting to lighting changes (Jaiswal et al., 2019). Cognitively, studies show that early screen time adversely impacts critical thinking skills, creative problem-solving skills, and executive functioning, as these are learned through human interaction, exploring the natural world, and play-based activities (Christakis, 2008; Myers et al., 2019; Radesky & Christakis, 2016). Regarding language development, early screen time may be especially harmful because the critical sensitive period for language learning is from 0-5 years (Christakis, 2008; Radesky & Christakis, 2016). Studies show that children do not learn language from electronic media (i.e., prerecorded videos) because language acquisition is dependent on socially contingent interactions (Kuhl et al., 2003; Roseberry, Hirsh-Pasek, & Golinkiff, 2014). Children most at risk for language delay are infants engaged in more than 1.2 hours of screen time per day, as well as toddlers engaged in more than 2 hours of screen time per day (Schmidt et al., 2009; Duch et al., 2013). Specifically, each additional hour of screen time is associated with decreases in child vocalizations, duration of vocalizations, conversational turns, and adult word count (Schmidt et al., 2008).

While there is evidence of early screen time hindering physical, cognitive, and language development, evidence on the impact of early screen time on social-emotional development is limited. Nonetheless, there is a growing

concern about potential short-and long-term detrimental effects of early screen

time on social-emotional development (e.g., the ability to self-regulate and

behavioral challenges).

Early Screen Time and Social-Emotional Development

Given that social-emotional development is foundational to other domains

of development, understanding the impact of early screen time is critical. Social

and emotional processes are formed in the early years and lay the foundation for

subsequent behavioral outcomes (Funk, Curtiss, & McBroom, 2009). Infants and

toddlers must learn emotional and behavioral regulation from interactions with

caregivers, not from screen media, for optimal development (Song et al., 2018).

Due to the displacement of quality social interaction, early screen time may result

in negative social-emotional outcomes, including self-regulation difficulties and

behavior challenges.

<ins>Displacement of Social Interaction</ins>

It is widely known that young children need social interaction for optimal

development (Napier, 2014). Screen time results in displacement of social

interactions, which are fundamental experiences during early childhood (Pagani

et al., 2010). Lack of social activities in early childhood leads to emotional and

behavioral challenges in future years (Lin et al., 2020; Pagani et al., 2010).

Therefore, displacement of quality activities and interaction during screen time is

of utmost concern for infants and toddlers.

Today, young children engage in considerable amounts of solitary screen time without face-to-face human interaction (Napier, 2014). Meanwhile, children with increased social-emotional difficulties are more likely to be given mobile devices to calm down (Radesky et al., 2016). Since tablets and smartphones are small, portable, and easily control child behavior, they are often known as, "electronic babysitters" (Lin et al., 2020). The prevalent use of "electronic babysitters" limits opportunities for necessary play-based activities and quality social interaction (Napier, 2014). Behaviorally, providing infants and toddlers screen time to help them relax and stop crying may be quick and effective in the short-term, especially for parents and caregivers (Ramam et al., 2017). However, this short-term solution may be detrimental to long-term social-emotional development. For instance, responding to a child's cry with screen time displaces opportunity for a soothing voice, facial expressions, and a gentle touch from caregivers to help with emotion regulation (Raman et al., 2017). Every time a child is given screen time to control behavior is a missed opportunity for nurturing, co-regulating experiences with caregivers, which are necessary for learning internal self-regulation techniques (Radesky et al., 2016). Research shows that children at risk for social-emotional delay more frequently engaged in screen time during daily routines, especially during playtime, breakfast, and bedtime (Raman et al., 2017). Overall, incorporating screen time during daily routines displaces opportunities for quality interaction and interferes with the ability to learn emotion regulation techniques and prosocial behaviors.

<u>Social-Emotional Outcomes.</u>

A growing body of research demonstrates excessive screen time for infants and toddlers is associated with negative social-emotional outcomes (Allen & Vella, 2015; Hinkley et al., 2020; Li et al., 2020; Skalická et al., 2015; Twenge & Campbell, 2018). The age at which excessive screen time consistently predicts negative outcomes across the social-emotional developmental domain is 29 months (Pagani et al., 2010). Specifically, more than 1 hour of early screen time per day is predictive of emotional and behavioral challenges, while outcomes progressively worsen with each additional hour per day (Hinkley et al., 2020; Pagani et al., 2010; Twenge & Campbell, 2018). Studies show that early screen time negatively impacts overall social-emotional and behavioral well-being.

Young children who engage in high levels of screen time are more likely to experience emotional challenges, behavioral challenges, and social difficulties. Emotionally, children with greater screen time demonstrate lower self-regulation, less emotional understanding, and less emotional stability (Li et al., 2020; Skalická et al., 2015; Twenge & Campbell, 2018). In addition, children with more screen time are at higher risk for anxiety disorders and depression diagnoses later in life (Lin et al., 2020; Twenge & Campbell, 2018). Behaviorally, children with increased screen time display less curiosity, more distraction, hyperactivity, inattention, aggression, and conduct problems, as well as an inability to finish tasks (Li et al., 2020; Twenge & Campbell, 2018). In social settings, children with

increased screen time display poor self-control (e.g., not remaining calm, excessive arguing, and being difficult to get along with), as well as challenges at school (e.g., losing their temper, the inability to calm down when excited, and difficulty with transitioning between tasks) (Twenge & Campbell, 2018). Furthermore, children with increased screen time are more likely to have peer problems and difficulty making friends (e.g., peer rejection, being teased, being assaulted, and being insulted) (Pagani et al., 2010; Twenge & Campbell, 2018). Taken together, there is increasing research that demonstrates the negative effects of screen time on social-emotional outcomes for young children.

Self-Regulation.

Screen time is associated with self-regulation abilities in early childhood. Developing self-regulation skills in early childhood is especially important because it is highly interrelated with other domains of social-emotional competencies. In general, self-regulation refers to the ability to focus attention, regulate emotions, and control behaviors (Halle & Darling-Churchill, 2016; McClelland & Cameron, 2012). Recent studies show that greater exposure to screen time can be detrimental to self-regulation, both short- and long-term (Cerniglia, Cimino, & Ammanti, 2021; Cliff et al., 2018; Inoue et al., 2016; Lawrence, Naragan, & Choe, 2020; Lillard & Boguszewski, 2015; Radesky et al., 2020).

Electronic devices are often used as emotion-regulation tools for young children by parents, which establishes the need for externally-based (as opposed

9

to internally-based) regulation, which eventually leads to dysregulation and maladaptive development (Cerniglia, Cimino, & Ammanti, 2021). Given that parent-child interactions are crucial for the development of internal processes needed for managing self-regulation, research suggests that electronic devices are not effective in teaching young children (0-5 years) self-regulation skills (Lin et al., 2020; Radesky, Schumacher, & Zuckerman, 2015).

Essentially, screen time and self-regulation are bidirectionally correlated through an ongoing cycle. Parents use screen time to soothe and calm their children, which reduces nurturing parent-child interactions; this leads to more self-regulation challenges, which in turn results in more screen time (Radesky et al., 2020). Furthermore, children with difficult temperaments and existing self-regulation challenges are more likely to be given electronic devices to help soothe them, which puts them at risk for even worse self-regulation abilities later on (Radesky & Christakis, 2016). This ongoing cycle has the potential to result in long-term maladaptive coping mechanisms.

Longitudinal studies demonstrate the earlier a child is exposed to screen time and the longer the duration of early screen time the lower self-regulation abilities tend to be. Cliff et al. (2018) found that higher screen time at age two years was associated with lower self-regulation at age four years, and lower self-regulation at age four years was associated with higher screen time at age six years. Inoue et al. (2016) found that longer television viewing at age three years was significantly related to dysregulation at ages four and five years. Similarly,

Cerniglia et al. (2021) found that screen time at age four years was negatively associated with self-regulation at age eight years. However, Radesky et al. (2020) found that infants and toddlers with self-regulation challenges engaged in significantly more screen time. Specifically, infants with poor self-regulation at age nine months later engaged in significantly more screen time per day at age two years, compared to infants who had high self-regulation abilities at age nine months. Additionally, those with self-regulation challenges generally engaged in more than 2 hours of screen time per day (Radesky et al., 2020). These studies indicate long-term negative effects of early screen time on subsequent self-regulation, which is fundamental for emotional and behavioral development.

Behavior Challenges.

The AAP warns about the potential detrimental effects of screen time on behavioral outcomes. Studies have found that screen time is related to a wide variety of behavior challenges, including aggression and hyperactivity. While current research uses the term "behavior problems", a more appropriate term may be "behavior challenges" which better reflects a strength-based approach as opposed to a deficit approach when discussing children's behavior.

Aggressive Behavior.

Compelling evidence demonstrates a strong association between screen time and aggression (Guerrero et al., 2019; Li et al., 2020; Lin et al., 2020; Tomopoulus et al., 2007). A systematic review and meta-analysis found that young children with high amounts of screen time are more likely to show

aggressive behaviors (Li et al., 2020). Lin et al. (2020) and Neville et al. (2021) looked at the impact of touch screen devices, specifically, and found that 2-year-olds with higher use of touch screen devices show higher levels of aggression. This evidence further holds after controlling for confounding demographic variables (Lin et al., 2020). Interestingly, children from single-child families showed the highest levels of aggression in relation to touch screen device use (Lin et al., 2020). Another study found that noneducational media was related to aggression, while educational media was not related to aggression (Tomopulous et al., 2007). Evidently, the *type* of screen time is associated with aggressive behaviors.

Additional research reported that screen time with mature or violent content is particularly related to aggressive behaviors. Correlational studies show associations between violent media viewing and aggression in young children (Murray & Murray, 2008). Meanwhile, Guerrero et al. (2019) found that increased time playing mature-rated video games leads to increased aggression and rule-breaking. Researchers speculate that exposure to mature or violent media may distort young children's sense of self and understanding of the natural world, resulting in aggressive behaviors (Guerrero et al. 2019).

<u>Hyperactive Behavior.</u>

Another behavior challenge associated with screen time in young children is hyperactivity. Studies show that early television viewing is related to increased hyperactive behaviors (Inoue et al., 2016; Levine & White, 2000). Children as

young as 21 months demonstrate hyperactive behavior in relation to both educational and noneducational screen time; longitudinal follow-up a year later demonstrated similar results (Tomopulous et al., 2007). Similarly, Allen and Villa (2015) found that increased screen time was associated with hyperactivity in children over 2 years of age; longitudinal follow-ups every two years consistently found that increased screen time was related to hyperactivity in children up to 10-years-old. It is important to note that screen time may seem particularly calming for hyperactive children, consequently resulting in parental encouragement of screen time (Andersen & Pampek, 2015). However, the existing evidence suggests that screen time is positively related to hyperactive behavior, both short- and long-term.

<div align="center">Early Screen Time and Parenting</div>

Young children's screen time is strongly influenced by parents (Radesky, Schumacher, & Zuckerman, 2015). Likewise, parents strongly impact children's social-emotional development. Research emphasizes the importance of parental influence in managing children's social-emotional outcomes related to screen time (Halpin et al. 2021; Radesky & Christakis, 2016). Studies demonstrate that quality of parenting can modify the effects of screen time on social-emotional outcomes, particularly through parenting style.

According to Baumrind (1971), general types of parenting practices and behaviors are categorized into three parenting styles: authoritarian, permissive, and authoritative. Authoritarian parents focus on controlling and managing child

behavior with a strict set of rules, no tolerance for disagreement, and often use punishment as disciplinary action. Conversely, permissive parents implement minimal to no restriction of child behavior and allow children autonomy over their choices and actions. Meanwhile, authoritative parents are warm, responsive, and supportive of children with an appropriate balance of affection and discipline (Baumrind, 1971; Estlein, 2016). Studies have shown that authoritarian and permissive parenting styles are both related to negative developmental outcomes, such as aggression, anxiety, dysregulation, and behavior challenges. On the other hand, authoritative parenting style is related to positive developmental outcomes, such as social-emotional competence (Kuppens & Ceulemans, 2018; Radesky & Christakis, 2016). Given the magnitude of developmental impact associated with parenting style, it is important to understand how parenting style impacts young children's screen time.

Parenting Style and Child Screen Time.

Although research is limited, recent studies show that parenting styles are associated with duration of child screen time. In general, parents who enforce rules on managing screen time are more likely to decrease child screen time, while parents who implement few restrictions tend to have children who experience excessive screen time (more than 2 hours per day) (Konok, Bunford, & Miklósi, 2019; Radesky et al., 2015). Detnakarintra et al. (2020) examined longitudinal effects of parenting style and screen time at 18 months with follow-up at ages two, three, and four years. They found that parenting style and screen

14

time are bi-directionally correlated. Nurturing authoritative parenting in early years was related to subsequent lower screen time for children. Relaxed permissive parenting and strict authoritarian parenting during early years were related to subsequent higher screen time for children (Detnakarintra et al., 2020). Further research is necessary in order to decipher specific influences of each parenting style on children's screen time.

Parenting Style and Social-Emotional Outcomes.

Recent evidence suggests that parenting style is indicative of social-emotional outcomes related to screen time. Halpin et al. (2021) found that strict authoritarian and relaxed permissive parenting styles were both associated with greater intensity and frequency of screen time-related behavior difficulties. In addition, they found that authoritarian and permissive parenting styles were related to lower parental confidence in managing child behavior. It is speculated that high parental confidence in upholding child screen time guidelines is related to nurturing authoritative parenting style, which in turn, results in lower duration of screen time and social-emotional difficulties associated with screen time (Halpin et al., 2021). Nonetheless, more research is necessary for understanding how parenting style impacts screen time-related developmental outcomes.

Parenting Style as a Moderator Variable.

Research indicates that parenting style has the ability to modify the impact of screen time on child behavior and development (Radesky et al., 2015). For instance, Linebarger et al. (2014) found that authoritative parenting style altered

the developmental risks of screen time exposure for high-risk children. Essentially, warm and responsive caregiving can happen along with high infant-toddler screen time, and the developmental outcomes may still be positive. On the other hand, inconsistent parenting along with high infant-toddler screen time results in negative developmental outcomes (Linebarger et al., 2014; Radesky & Christakis, 2016). Therefore, enhancing parenting style may be an effective strategy for reducing developmental risks associated with early exposure to screen time (Radesky & Christakis, 2016; Xu et al, 2014).

<center>Early Screen Time and Socio-Economic Status</center>

SES has significant effects on early screen time and child development. According to the United States Census Bureau (2020) and the Pew Research Center (2020), household income levels are categorized as low SES (< $40,100), middle SES ($40,100 - $120,400), and high SES (> $120,400). Research suggests that young children from low SES households disproportionately engage in more screen time because it is a safe and affordable activity to keep children busy and entertained when other resources are not available (Carson & Kuzik, 2017; Jordan, 2005; Radesky et al., 2014). Meanwhile, young children from low SES families are already at greater risk for developing social-emotional difficulties, due to the chronic stressors of poverty (Radesky et al., 2016; Cooper, Masi, & Vick, 2009; Tomopulous et al., 2010). Specifically, children from low-income households are more likely to experience both short-and long-term difficulties with self-regulation and externalizing behaviors, such as hyperactivity,

<center>16</center>

peer problems, and conduct problems (Allen & Vella, 2015; Cooper et al., 2009; Radesky et al., 2020). Interestingly, Radesky et al. (2016) suggests that the strong correlations between social-emotional difficulties and low SES are partially explained by the parents' increased use of screen time to calm their children.

Since children from low SES areas are already at high-risk for negative developmental outcomes, as well as increased levels of screen time, they are particularly susceptible to social-emotional developmental risks associated with early screen time exposure. Thus, there is a clear need to address this potential relation.

SES as a Moderator Variable.

Research speculates that SES may modify the developmental impact of screen time on social-emotional outcomes in young children. For instance, Allen and Villa (2015) found evidence of SES as a potential moderator of cross-sectional and longitudinal correlations between screen time and well-being. Findings suggest that children from low SES families are at greater risk for adverse developmental effects of excessive screen time, including self-regulation and behavioral difficulties. On the other hand, children from middle to high SES families may have extra resources (i.e., increased social support) to help reduce the adverse effects of excessive screen time (Allen & Vella, 2015). Fundamentally, SES may have a strong enough effect to alter social-emotional outcomes of early screen time.

Present Study

      As young children are growing up in a digitally enmeshed world, there is growing concern about the developmental impacts of early screen time. Given the importance of early rapid brain development, understanding the developmental outcomes of screen time in early childhood is critical. Current research suggests that excessive screen time may lead to delays in physical, cognitive, and language development. However, the research on the impact of screen time on young children's (0-5 years) socio-emotional outcomes is quite limited. Given that social-emotional development is foundational to other domains of development, understanding the impact of screen time on young children's social-emotional outcomes is critical. Therefore, the present study considers the impact of screen time on social-emotional outcomes among 12- to 36-month-olds through parent report. Specifically, this study examines the relations among infant-toddler screen time, self-regulation, and behavior challenges. Additionally, it examines the intervening effects of parenting style and SES on screen time and each of the outcome variables.

      The following hypotheses will be addressed in the present study:

H1: Screen time is negatively related to a child's self-regulation.

H2: Screen time is positively related to a child's behavior challenges.

H3: Screen time is related to type of parenting style.

H4: Screen time is negatively related to SES.

H5: Parenting style will moderate the relationship between screen time and self-

18

regulation abilities.

H6: Parenting style will moderate the relationship between screen time and

behavior challenges*.*

H7: SES will moderate the relationship between screen time and self-regulation.

H8: SES will moderate the relationship between screen time and behavior

challenges *(See Figure 1 below).*

Figure 1. Proposed Model and Illustration of Hypotheses.
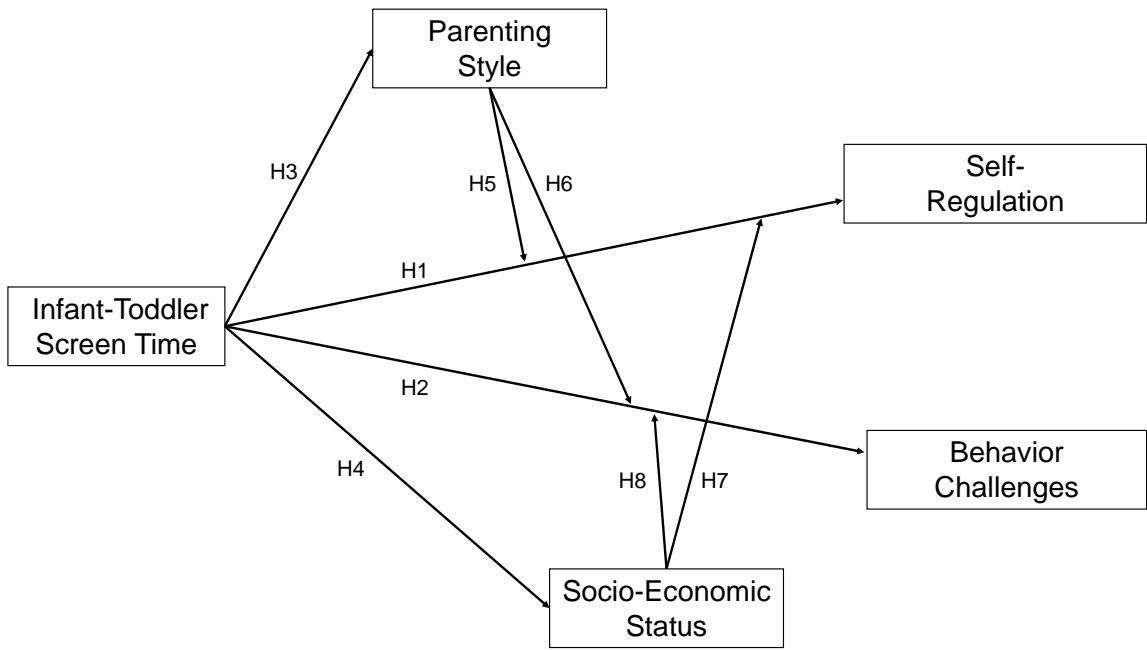
CHAPTER TWO:

METHOD

Participants

Participants (*N* = 158) consisted of parents and caregivers of 12-to-36-month-old infant-toddlers. The total number of survey respondents was 232, however, 74 potential participants were removed from this study. Specifically, data from six individuals were not included because the reported age of the child was outside of this study's parameters. The remaining 68 respondents were not included in data analyses because of missing data (e.g., the individual did not fully complete the screen time survey and/or the parenting measure).

The sample (M_{age} = 33 years, age range: 23 – 43 years) consisted of 144 females, 13 males, and one reported "prefer not to say". Participant race and ethnicity consisted of 2.5 percent Asian – Eastern, 0.6 percent Asian – Indian, 0.6 percent Black/African American, 11.4 percent Hispanic/LatinX, 0.6 percent Middle Eastern, 1.9 percent Native American, 81.6 percent White/Caucasian, and 3.8 percent Mixed Race. In regards to parent education level, 0.6 percent completed less than high school, 3.2 percent completed their high school diploma, 16.5 percent completed some college, 12 percent completed an associate's or vocational degree, 35.4 percent completed a bachelor's degree, 3 percent completed some graduate school, and 29.7 percent completed a graduate or professional degree. When asked about average household income, 3.8 percent indicated making less than $30,000, 5.7 percent had incomes

between $30,000 and $49,999, 14.6 percent had incomes between $50,000 and

$74,999, 13.9 percent had incomes between $75,000 and $99,999, 18.4 percent

had incomes between $100,000 and $149,999, 16.5 percent had incomes

between $150,000 and $200,000, and 27.2 percent had incomes greater than

$200,000. A Gpower analysis determined that 88 participants were needed for

statistical power for the proposed model (Faul & Erfelder, 1992) (See Table 1

below for full demographics).

Table 1. *Demographic Characteristics of Participants*

Characteristic	Category	n	%
Parent Age	23 - 31 years	47	34.6%
	32 - 35 years	47	34.6%
	36 - 43 years	42	30.9%
Infant-Toddler Age	12 - 24 months	41	25.9%
	25 - 36 months	117	74.1%
Parent Biological Sex	Female	144	91.1%
	Male	13	8.2%
	Prefer not to say	1	.6%
Infant-Toddler Biological Sex	Female	78	49.4%
	Male	80	50.6%
Ethnic Background	Asian - Eastern	4	2.5%
	Asian - Indian	1	0.6%
	Black / African American	1	0.6%
	Hispanic / LatinX	18	11.4%
	Middle Eastern	1	0.6%
	Native American	3	1.9%
	White / Caucasian	129	81.6%

	Mixed Race	6	3.8%
	Other	1	1%
Parent Education Level	Less than High School	1	0.6%
	High School Diploma	5	3.2%
	Some College	26	16.5%
	Associate's or Vocational Degree	19	12%
	Bachelor's Degree	56	35.4%
	Some Graduate School	4	3%
	Graduate or Professional Degree	47	29.7%
Parent Marital Status	Single	4	2.5%
	Live with Partner	15	9.5%
	Married	138	87.3%
	Divorced	1	0.6%
Total Household Income	Less than $30,000	6	3.8%
	$30,000 - $49,999	9	5.7%
	$50,000 - $74,999	23	14.6%
	$75,000 - $99,999	22	13.9%

$100,000 - $149,999	29	18.4%
$150,000 - $200,000	26	16.5%
More than $200,000	43	27.2%

Note. Reported number of participants may not sum to the total N as individuals were free to not respond to items on all measures (*N* = 158). Ethnic background item was check-all-that apply. Totals of percentages are not 100 for every characteristic because of rounding.

Measures

The present study consisted of an online survey including informed consent, a demographics questionnaire (see Appendix A) and a series of survey items to measure each variable.

Screen Time Questionnaire.

The Screen Time Questionnaire consisted of four items regarding amount of daily screen time, type of content, and level of parent-child interaction during screen time. Amount of screen time was determined by an item adapted from Inoue et al. (2016) and Twenge and Campbell (2018). The item asked, "On an average day, about how much time does your child spend in front of an electronic screen media device, such as a smartphone, tablet, computer, video game, and television?" Responses included: 1 = "none", 2 = "less than 1 hour per day", 3 = "1 - 2 hours per day", 4 = "2 - 3 hours per day", 5 = "3 - 4 hours per day", 6 = "4 - 5 hours per day", and 7 = "5 hours or more per day". Type of content and level of parent-child interaction during screen time were measured through three questions that were developed following an extensive literature review. Please refer to Appendix B for full survey items.

Infant-Toddler Social and Emotional Assessment (ITSEA).

The ITSEA is a parent-report measure of social-behavioral challenges and competencies for young children ages 12-36 months (Carter & Briggs-Gowen, 2005). The ITSEA examines four primary domains (Dysregulation, Externalizing, Internalizing, and Competence) with 17 subscales and a total of 166 items. Only

items from the Dysregulation and Externalizing Domains were employed in this study. As a result, 57 items from the ITSEA were utilized; 34 for Dysregulation and 23 for Externalizing.

Self-regulation abilities were assessed by the Dysregulation Domain of the ITSEA, which reflected the extent to which a child manages intense emotional responses (Carter & Briggs-Gowen, 2005). The Dysregulation Domain contained four subscales: negative emotionality (13 items), sensory sensitivity (7 items), eating (9 items), and sleep (5 items). A sample item from the Dysregulation Domain is, "Hard to soothe when upset."

Behavior challenges were assessed by the Externalizing Domain of the ITSEA, which reflected the extent to which a child acts out in the external world. The Externalizing Domain contained three subscales: activity/impulsivity (6 items), aggression/defiance (11 items), and peer aggression (6 items). A sample item from the Externalizing Domain is, "Hits, shoves, kicks, or bites children, not including siblings." Participants rated ITSEA items on a 3-point Likert scale where 0 = "not true", 1 = "somewhat true/sometimes", and 2 = "very true/always". Please refer to Appendix C for full survey items.

The child self-regulation score is the sum of responses of each item comprising the Dysregulation Domain. Only one item ("accepts new foods right away") was reverse-scored. Higher scores of the Dysregulation Domain indicated lower self-regulation abilities, while lower scores indicated higher self-regulation abilities. Likewise, child behavior challenge scores were calculated by

summing the responses to each of the items that make up the Externalizing

Domain. Higher scores of the Externalizing Domain indicated higher behavior

challenges, while lower scores indicated lower behavior challenges. Before

conducting analyses, scores were converted to *t*-scores ($M = 50$, $SD = 10$), as

recommended by the ITSEA Examiner's Manual (Carter & Briggs-Gowen, 2006).

Psychometric analyses of the ITSEA from a standardized sample ($N =$

600) demonstrated adequate to excellent reliability and validity among domains

and subscales (Carter & Briggs-Gowan, 2005). Cronbach's alpha coefficients

yielded acceptable to high internal consistency for the overall measure ($.85 \leq a \leq$

.90), the Dysregulation Domain ($.62 \leq a \leq .83$), and the Externalizing Domain ($.66$

$\leq a \leq .79$). Pearson's correlations yielded high to very high test-retest reliability

for the overall measure ($.76 \leq r \leq .91$), the Dysregulation Domain ($.81 \leq r \leq .92$),

and the Externalizing Domain ($.81 \leq r \leq .90$). Validity evidence for the internal

structure was calculated using confirmatory factor analysis, as well as domain

and subscale intercorrelations. The confirmatory factor analysis demonstrated

support for theoretically related items. Intercorrelations between domains and

subscales showed moderate to strong relations for the Dysregulation Domain

and subscales ($.32 \leq r \leq .47$) and the Externalizing Domain and subscales ($.50 \leq$

$r \leq .69$) (Carter & Briggs-Gowan, 2005).

Parenting Practices Questionnaire (PPQ).

Parenting style was assessed by the PPQ, a parent-report measure based

on Baumrind's conception of authoritative, authoritarian, and permissive

parenting styles (Robinson et al., 1995). The PPQ consisted of three dimensions

with a total of 62 items; 27 for Authoritative, 20 for Authoritarian, and 15 for

Permissive. Authoritative items tapped four aspects of this parenting style:

warmth and involvement (11 items), reasoning/induction (7 items), democratic

participation (5 items), and good natured/easy going (4 items). An Authoritative

sample item is, "I give comfort and understanding when my child is upset."

Similarly, the Authoritarian items measured four aspects of this parenting style:

verbal hostility (4 items), corporal punishment (6 items), nonreasoning, punitive

strategies (6 items), and directiveness (4 items). An Authoritarian sample item is

"I spank when my child is disobedient." Lastly, the Permissive items evaluated

three aspects of the parenting style: lack of follow through (6 items), ignoring

misbehavior (4 items), and self-confidence (5 items). A Permissive sample item

is, "I find it difficult to discipline my child."

Participants rated PPQ items on a 5-point Likert Scale where 1 = "never",

2 = "once in a while", 3 = "about half of the time", 4 = "very often", and 5 =

"always". Please refer to Appendix D for full survey items. A parenting style

score was calculated for each category (i.e., authoritative, authoritarian, and

permissive) by finding the average for the items that comprise each parenting

style. The highest of the three scores indicated the predominant parenting style

(i.e., authoritative, authoritarian, or permissive).

Psychometric analyses of the PPQ from a standardized sample ($N =$

1251) demonstrated good to excellent internal consistency reliabilities with the

following Cronbach's alpha coefficients: Authoritative (a = .91); Authoritarian (a = .86); Permissive (a = .75). Validity evidence for dimensions and internal structures were calculated using principle axes factor analysis and oblimin rotation, with Authoritative items accounting for 47.4% of variance, Authoritarian items accounting for 46.8% of variance, and Permissive items accounting for 40.3% of variance. These results demonstrated support for theoretically related items, suggesting that dimensions and subsets of items were consistent with Baumrind's three parenting styles. In addition, subsets (of items) for each dimension were shown to be predictive of distinctive developmental outcomes (Robinson, Mandleco, Olsen, & Hart, 1995). See Appendix D for PPQ items.

Procedure

The current study collected data from a convenience sample. Participants were recruited through virtual snowball sampling techniques and professional networking. Specifically, flyers were electronically distributed via social media platforms and email to friends, students, faculty, and colleagues, which could then be shared with other potential participants. Participants were asked to complete a survey on an external web-link through an online database (Qualtrics). Once directed to Qualtrics, participants were asked to complete an informed consent form, the demographics questionnaire, and the measures described above.

Data Analysis

Once surveys were collected, the data were cleaned, assumptions and outliers were assessed, and missing data were examined. To address H1- H4, Pearson correlations and Biserial correlations were calculated. To test the moderation effects for H5-H8, stepwise moderated regression analyses were conducted in Statistical Package for the Social Sciences (SPSS) version 28.

CHAPTER THREE:

RESULTS

The current study investigated whether amount of daily screen time is related to social-emotional outcomes of young children, specifically self-regulation and behavior challenges among 12-to-36-month-olds through parent report. Additionally, it examined the moderating effects of parenting style and SES on screen time and each of the outcome variables.

The independent variables were 1) infant-toddler screen time, 2) parenting style, and 3) SES, which was determined by total household income. Among the participants, the most frequently reported screen time category was 1-2 hours per day. Based upon responses of the participants on the PPQ, the most frequently reported parenting style was authoritative. Finally, the most frequently reported income category was "more than $200,000". The dependent variables were 1) infant-toddler self-regulation, and 2) infant-toddler behavior challenges. Data from all 158 participants were included in the analyses. To measure H1-H4, Pearson and Biserial correlations were calculated. To measure H5-H8, stepwise moderated regression analyses were conducted in Statistical Package for Social Sciences (SPSS) ver. 28, using dummy coding. Please refer to Table 2 below for descriptive statistics of study variables.

Table 2. *Descriptive Statistics for Study Variables*

Variable	Category	n	%
Screen Time (hours/day)	None	9	5.7%
	Less than 1 hour per day	32	20.3%
	1-2 hours per day	58	36.7%
	2-3 hours per day	24	15.2%
	3-4 hours per day	22	13.9%
	4-5 hours per day	5	3.2%
	5 or more hours per day	8	5.1%
Level of Parenting Style	Authoritarian	0	0%
	Permissive	0	0%
	Authoritative	158	100%
	Low Authoritative	77	48.1%
	High Authoritative	76	48.7%
	Medium SES ($30,000 -		
Socio-Economic Status	$149,999)	60	46.5%
	High SES ($150,000 and		
	above)	69	53.5%

Note. Frequencies and percentages of study variables (*N* = 158). As shown,

74.1% engage in one or more hours of screen time per day, and 37.4%

engage in two or more hours of screen time per day. The dichotomized

dummy variables created were: Low Authoritative, High Authoritative; Medium

SES, High SES. SES categories were created from income categories in

Table 1.

H1: Screen Time is Negatively Related to a Child's Self-Regulation

A bivariate Pearson correlation was conducted to examine the relationship between screen time and self-regulation. As shown in Table 3, results indicate that infant-toddler screen time is negatively related to infant-toddler self-regulation; r(156) = -.248, p < .01. Increased child screen time is associated with decreased self-regulation abilities (See Table 3 after H4).

H2: Screen Time is Positively Related to a Child's Behavior Challenges

A bivariate Pearson correlation was conducted to examine the relationship between screen time and behavior challenges. Results indicate that infant-toddler screen time is positively related to infant-toddler behavior challenges; r(156) = .281, p < .001. Increased child screen time is associated with increased behavior challenges (See Table 3 after H4).

H3: Screen Time is Related to Type of Parenting Style

The originally stated hypothesis could not be evaluated because all parents reported authoritative. There were no authoritarian and no permissive parents in this study. Therefore, a new variable was created to dichotomize the authoritative parenting variable into a high authoritative group and a low authoritative group. Then, a Biserial correlation was calculated to examine the relationship between screen time and level of authoritative parenting. This correlation was not significant; r(156) = .038, p >.05. No association between screen time and level of authoritative parenting was found (See Table 3 after

H4).

H4: Screen Time is Negatively Related to SES

SES was determined by total household income. A Pearson's correlation was conducted to examine the relationship between screen time and SES. Results demonstrate that infant-toddler screen time is negatively related to total household income; $r(156) = -.373$, $p < .01$. Increased child screen time is associated with lower total household income (See Table 3 below).

Table 3. *Pearson and Biserial Correlation Analyses of Study Variables*

Screen Time Correlations with…	*df*	*r*	*p*
Self-Regulation	156	-0.248	0.002*
Behavior Challenges	156	0.281	< .001*
Level of Authoritative Parenting	156	0.038	> .05
Total Household Income	156	-3.73	< .001*

Note. Results for H1-H4 (*N* = 158). * Correlation is significant at the 0.01

level (2-tailed).

H5: Parenting Style will Moderate the Relationship Between Screen Time and Self-Regulation Abilities

The originally stated hypothesis could not be evaluated because all parents reported authoritative. There were no authoritarian and no permissive parents in this study. Hence, we created a new variable dichotomizing the authoritative parenting variable into a high authoritative group and a low authoritative group. Scores were split at the median, and five participants with the median score were dropped from this analysis. A stepwise moderated regression analysis was conducted where the dependent variable, self-regulation, was predicted by 1) screen time, 2) level of authoritative parenting, and 3) the interaction between screen time and level of authoritative parenting (moderator). Results were not significant; $F(1, 149) = .997$, $p = .32$. The change from Model 1 (two separate predictors) to Model 2 (interaction predictor) did not account for any unique variance above and beyond Model 1 (See Table 4 below).

Table 4. *H5 Stepwise Moderated Regression Analysis Predicting Self-Regulation*

Variables	R	R²	ΔR2	F	b	t
<u>Model 1</u>	0.264	0.07		5.64		
Screen Time (hours/day)					0.252	3.2
Level of Authoritative Parenting					-0.082	-1.05
<u>Model 2</u>	0.276	0.076	0.006	4.09		
Screen Time (hours/day)					0.183	1.75
Level of Authoritative Parenting					-0.269	-1.327
Screen Time x Level of Authoritative Parenting					0.215	0.998

Note. H5 Model 1 and Model 2 summaries and slope coefficients are listed.

No significant moderation effects were found.

H6: Parenting Style will Moderate the Relationship Between Screen Time and Behavior Challenges

Similar to H5, the originally stated hypothesis could not be evaluated because all parents reported authoritative. Thus, we created a new variable dichotomizing the authoritative parenting variable into a high authoritative group and a low authoritative group. Scores were split at the median, and five participants with the median score were dropped from this analysis. A stepwise moderated regression analysis was conducted where the dependent variable, behavior challenges, was predicted by 1) screen time, 2) level of authoritative parenting, and 3) the interaction between screen time and level of authoritative parenting (moderator). Results were not significant; $F(1, 149) = 2.39$, $p = .124$. Model 2 (interaction predictor) did not account for any unique variance above and beyond Model 1 (See Table 5 below).

Table 5. *H6 Stepwise Moderated Regression Analysis Predicting Behavior Challenges*

Variables	R	R^2	$\Delta R2$	F	b	t
Model 1	0.308	0.095		7.87		
Screen Time					0.276	3.55
Level of Authoritative Parenting					-0.141	-1.81
Model 2	0.33	0.109	0.014	6.09		
Screen Time					0.171	1.66
Level of Authoritative Parenting					-4.24	-2.13
Screen Time x Level of Authoritative Parenting					3.26	1.55

Note. H6 Model 1 and Model 2 summaries and slope coefficients are listed.

No significant moderation effects were found.

H7: SES will Moderate the Relationship Between Screen Time and Self-Regulation

Due to an overwhelmingly high SES sample, the originally stated hypothesis could not be evaluated as planned. Thus, we created a new dummy variable with a high SES group and medium SES group. According to the U.S. Department of Health and Human Services Poverty Guidelines (2023), only six participants reported Low SES; they were dropped from this analysis to maintain even groups. Scores were split at the median, and 22 participants with the median score were dropped from the analysis.

A stepwise moderated regression analysis was conducted where the dependent variable, self-regulation, was predicted by 1) screen time, 2) SES, and 3) the interaction between screen time and SES (moderator). Results were not significant; $F(1, 125) = .86$, $p = .355$. Model 2 (interaction predictor) did not account for any unique variance above and beyond Model 1. SES did not moderate the relationship between screen time and self-regulation (See Table 6 below).

Table 6. *H7 Stepwise Moderated Regression Analysis Predicting Self-Regulation*

Variables	R	R^2	ΔR^2	F	b	t
<u>Model 1</u>	0.241	0.058		3.87		
Screen Time					0.147	1.57
SES					0.142	1.52
<u>Model 2</u>	0.254	0.064	0.006	2.87		
Screen Time					0.432	1.35
SES					0.357	1.43
Screen Time x SES					-0.426	-0.929

Note. H7 Model 1 and Model 2 summaries and slope coefficients are listed.

No significant moderation effects were found.

H8: SES will Moderate the Relationship Between Screen Time and Behavior Challenges

Similar to H7, the originally stated hypothesis could not be evaluated as planned due to an overwhelmingly high SES sample. Thus, we created a new dummy variable with a high SES group and medium SES group. Scores were split at the median, and 22 participants with the median score were dropped from the analysis. To keep even groups, six Low SES participants were dropped from the analysis. A stepwise moderated regression analysis was conducted where the dependent variable, behavior challenges, was predicted by 1) screen time, 2) SES, and 3) the interaction between screen time and SES (moderator). Results were not significant; $F(1, 125) = .34$, $p = .559$. Model 2 (interaction predictor) did not account for any unique variance above and beyond Model 1. SES did not moderate the relationship between screen time and behavior challenges (See Table 7 below).

Table 7. *H8 Stepwise Moderated Regression Analysis Predicting Behavior Challenges*

Variables	R	R²	ΔR²	F	b	t
Model 1	0.238	0.056		3.77		
Screen Time					0.184	1.96
SES					0.096	1.02
Model 2	0.243	0.059	0.003	2.62		
Screen Time					0.364	1.13
SES					0.232	0.93
Screen Time x SES					-0.269	-0.59

Note. H8 Model 1 and Model 2 summaries and slope coefficients are listed.

No significant moderation effects were found.

CHAPTER FOUR:

DISCUSSION

Overview

Given our digitally-oriented world, there is a need for research that examines the impact of screen time on developing children. Current literature (e.g., Joergensen et al., 2021; Radesky & Christakis, 2016) shows that excessive screen time has negative effects on physical, cognitive, and language development. However, there is limited research on the effects of screen time on social-emotional development of infants and toddlers. Given that social-emotional development is foundational to other domains of development, understanding the impact of screen time on young children's social-emotional development is necessary. Therefore, the goal of the current study was to examine the effects of screen time on social-emotional outcomes of 1-to-3-year-old children, specifically, the impact on self-regulation and behavior challenges per parent report. Additionally, the study examined the moderating effects of parenting style and SES on screen time and each of the outcome variables.

Findings and Implications

The current results demonstrated that increased screen time has negative effects on self-regulation and behavior challenges. Specifically, increased daily screen time is associated with lower self-regulation abilities and increased behavior challenges. Also, increased screen time was associated with

decreased SES (total household income). However, there was no significant

association with parenting style. Furthermore, parenting style and SES did not

moderate the relation between screen time and the two outcome variables (i.e.,

self-regulation and behavior challenges).

The lack of a moderation effect for parenting styles may be the result of all

participants reporting an authoritative parenting style; thus, even though the

authoritative parenting scores were dummy-coded to produce a dichotomous

variable, it still did not result in enough variance to evaluate the moderating effect

of parenting style. Also, as indicated above, a notable number of respondents

(41 of the original 232) did not complete the parenting style measure. Although it

is unclear why each parent did not respond to the survey, it certainly may be the

case that this produced a lack of a variability on the parenting style variable as a

whole. Finally, the lack of significant moderation effects in the current study may

be explained by the predominantly high SES and high education sample.

Research has shown that families with higher income and parents with higher

education are more authoritative in general (Jaradat, 2012). Thus, the current

sample may be unrepresentative. Nonetheless, the current results are

noteworthy as this study is one of the few that examined whether screen time

impacts the social-emotional development of infants and toddlers within the

context of parenting practices.

Importantly, this study provides evidence that infants and toddlers

experience excessive screen time. Results show that 71.4% of the sample

exceeded the recommended screen time guidelines of WHO (less than 1 hour per day) and 37.4% exceeded the guidelines of AAP (2 hours or less per day). Two or more hours of screen time per day has shown negative impacts on self-regulation in infants as young as 9-months-old (Radesky et al., 2020). This raises the utmost concern for the potential negative social-emotional outcomes that screen time will have on this generation of children. Longitudinally, there is evidence of early screen time negatively impacting self-regulation abilities in children of various ages (Cerniglia et al., 2021, Cliff et al., 2018, Inoue et al., 2016, & Radesky et al. 2020). This raises further concern that this generation of children may experience negative outcomes as a result of early screen time in multiple developmental domains over time. Future research is needed to determine the appropriate balance of screen time and other daily activities in young children's lives to promote optimal development.

Overall, the present findings are an important extension of screen time research that has demonstrated impacts on physical, cognitive, and language development (Cerniglia, Cimino, & Ammanti, 2021; Joergensen et al., 2021; Radesky & Christakis, 2016). For example, research shows that prolonged exposure to screen time is associated with: 1) sedentary lifestyle/less physical activity resulting in increased childhood obesity, 2) bad posture resulting in neck and back pain, and 3) eye discomfort/headaches due to blue light exposure, less blinking, and poor adjustment to light stimulation changes (Downing et al., 2015; Fang et al., 2019; Jaiswal et al., 2019; Joergensen et al., 2021). Further,

research shows that excessive screen time hinders critical thinking skills, problem solving skills, creative skills, and executive functioning because it displaces critical human interaction, exploration of the natural world, and play-based activities with caregivers that are necessary for developing these cognitive skills (Christakis, 2008; Myers et al., 2019; Radesky & Christakis, 2016). Finally, screen time is known to be harmful for language learning particularly during the sensitive period of language-learning years (ages 0-5); young children need face-to-face human interaction and do not effectively learn language from electronic media (Christakis, 2008; Radesky & Christakis, 2016; Schmidt et al., 2009). Thus, while the effects of excessive screen time on certain developmental domains is known, this project contributes to a more comprehensive understanding by specifically examining social-emotional development.

The current project also represents an important extension of research by focusing on an age group that has generally not been considered. Most research on the impact of early screen time on self-regulation and behavior challenges examined children ages 2-years and older (Cerniglia et al., 2012; Cliff et al., 2018; Inoue et al., 2016; Lin et al., 2020; Neville et al., 2021). However, only two studies have examined children younger than 2-years-old. Relevant to the current study, Radesky et al. (2020) studied infants between ages 9-months and 2-years. Results indicated that screen time and self-regulation are bidirectionally correlated through an ongoing cycle: parents use screen time to calm down their children, which reduces nurturing parent-child interactions, which leads to more

self-regulation challenges, and in turn results in more screen time. This ongoing cycle is indicative of long-term maladaptive coping mechanisms. Also, similar to the present study, Tomopulous et al. (2007) found that children at 21-months and 31-months exhibited behavior challenges associated with both educational and noneducational screen time. The current study adds to this body of research demonstrating the adverse effects of early screen time on self-regulation and behavior challenges in children as young as 12-months-old.

Regarding SES, the current study is consistent with previous research demonstrating that increased screen time is associated with lower SES. Previous work in this area indicates that young children from low SES households disproportionately engage in excessive screen time because it is a safe and affordable activity to keep children busy and entertained when other resources are not available (Carson & Kuzik, 2017; Radesky et al., 2014; Jordan, 2005). On the other hand, the present study did not find SES to be a moderator variable, which is inconsistent with previous research reported by Allen and Vella (2015) demonstrating that SES may have intervening effects on social-emotional outcomes. However, research in this particular area is extremely limited and more research will be essential. Also, using parent education as a more reliable indicator of SES will be beneficial in future parenting research (Davis-Kean, Tighe, & Waters, 2021). It is also important to note that the current study's sample lacked low SES participants and consisted mainly of medium SES and high SES participants. Therefore, the current findings may not be generalizable.

Nonetheless, the present study adds to the small body of literature examining SES as an important variable when considering the effects of screen time on developmental outcomes.

With respect to parenting style, the current results are not comparable with previous research demonstrating that parenting style is associated with infant-toddler screen time (Halpin, et al., 2021) and may moderate the negative impacts of screen time on the young developing brain (Radesky, et al., 2016). Previous work shows that authoritative parenting style may help alleviate the developmental risks of screen time exposure for high-risk children (Linebarger et al., 2014), while inconsistent parenting paired with high levels of infant-toddler screen time may result in negative developmental outcomes (Linebarger et al., 2014; Radesky & Christakis, 2016). As noted above, the insignificant findings in this project may be result of a very skewed distribution of self-reported parenting style. However, future work will need to address this important developmental issue to better understand how parenting may moderate the effects of screen time.

Limitations.

Although the current study provides evidence for negative effects of early screen time on self-regulation and behavior challenges, and for an association between increased early screen time and SES, there are several limitations that must be noted. First, a convenience sample (obtained online) was utilized for this project. Although surveys were electronically distributed in various ways, the

snowball approach resulted in a highly educated and high SES group of participants that limits the generalizability of the findings in a notable manner. One potential explanation for why the snowball approach did not produce a representative sample is that the data collection procedure was initiated in a university setting where potential participants were more likely to be highly educated and to have a higher income. Because these individuals were the first to be solicited, they may have then forwarded the research opportunity to others with similar demographic characteristics. Ultimately, this may have led to an unrepresentative sample with regard to SES and parenting style. Second, many parents (41) did not answer the parenting style items (but did complete the remainder of the survey). Although these participants were not included in the current analyses, it would be interesting to compare their screen time practices with the respondents who did complete the parenting survey. Finally, as is true of some self-report survey measures, there is no way to ensure that parents completed the parenting survey with 100% honesty and accuracy. Future research will need to address these methodological limitations as we seek a better understanding of the impact of early screen time.

It is important to emphasize that this study took place during the COVID-19 pandemic, which may have impacted data that was collected. While families adjusted to a new way of life, unexpectedly working from home, homeschooling their children, and managing the stress of the pandemic, it may have predisposed parents and caregivers to handing a smartphone or tablet to infants

and toddlers more often than usual. Therefore, the current findings need to be considered within that framework.

<u>Future Directions.</u>

Screen time studies may be improved by implementing multiple methodologies for data collection. For example, observational methodology and collecting data at different time points (e.g., using a daily/weekly log) will be important considerations in future work. In addition, longitudinal work will be crucial to understanding the ongoing and lasting impacts of screen time.

Future research on the topic would also benefit from examining additional variables related to social-emotional outcomes. For instance, understanding outcomes related to type of content consumed (e.g. video chat, educational/noneducational) will help researchers determine whether certain types of content are developmentally appropriate or not at various ages. Examining parent-child interaction during screen time (e.g. cuddling, conversing, eye contact) will help researchers determine best screen time parenting practices with young children. Investigating the reasons why parents choose to provide infants and toddlers screen time (e.g. "babysit", sensory play, decompression time) will help researchers understand underlying reasons as to why excessive screen time is so prevalent. In general, there is a lack of research that examines such variables.

Finally, future work can consider more sensitive measures for the variables of interest. For example, using parental educational level as the SES

indicator may be valuable since amount of education is foundational to SES

differences in previously reported parenting and family research (Davis-Kean,

Tighe, & Waters, 2021). Similarly, more psychometrically sound measures of

parenting style will be important to develop and incorporate in future work.

Ultimately, we must better understand developmentally appropriate screen time

practices for young children to ensure optimal development of future generations

and so that recommendations can be provided to professionals and parents.

APPENDIX A:

DEMOGRAPHICS QUESTIONNAIRE

Please fill out the following basic demographic information:

1. Your age: _____ years

2. Your infant/toddler's age: _____ months

3. What was your biological sex assigned at birth?

   o Male

   o Female

   o Intersex

   o Prefer not to answer

4. What is your gender identity?

   o Woman

   o Man

   o Non-binary

   o Prefer not to answer

   o Prefer to self-describe: _____

5. What was your infant/toddler's biological sex assigned at birth?

   o Female

   o Male

   o Intersex

   o Prefer not to answer

6. What is your ethnic background? (Check all that apply)

   o Asian - Eastern

   o Asian - Indian

- o Black/African American

- o Hispanic/Latino

- o Middle Eastern

- o Native American

- o White /Caucasian

- o Mixed race

- o Other _____

7. What is your current marital status?

- o Single

- o Live with partner

- o Separated

- o Married

- o Divorced

- o Widower

8. Please indicate your highest level of education completed:

- o Less than high school

- o High school diploma

- o Some college

- o Associates or vocational degree

- o Bachelor's Degree

- o Some graduate school

- o Graduate or professional degree

9. What is your current occupation? _____

10. Please indicate the total number of persons living in your household:

    _____

11. Please indicate your **total family household income** (previous year)

    before taxes.

    o Less than $30,000

    o $30,000 - $49,999

    o $50,000 - $74,999

    o $75,000 - $99,999

    o $100,000 - $149,999

    o $150,000 - $200,000

    More than $200,000

APPENDIX B:

SCREEN TIME QUESTIONNAIRE

(ADAPTED FROM INOUE ET AL., 2016 AND TWENGE & CAMPBELL, 2018)

Please answer the following questions to the best of your ability:

1. On an average day, about how much time does your infant/toddler spend in front of a screen media device, such as a smartphone, tablet, computer, video game, and/or television?

   o None

   o Less than 1 hour per day

   o 1-2 hours per day

   o 2-3 hours per day

   o 3-4 hours per day

   o 4-5 hours per day

   o 5 hours or more per day

2. On an average day, what type(s) of screen media content does your child engage in? (Check all that apply)

   o Watching videos

   o Reading

   o Listening to music

   o Playing games

   o Browsing internet

   o FaceTime/Video-chatting

   o Social media

   o Making art or music

   o None

3. How often do you co-view screen media with your child?

   o   None of the time

   o   Some of the time

   o   All of the time

4. In what ways do you interact with your child during screen time? (Check

   all that apply)

   o   No interaction

   o   Physical contact (e.g. sitting on lap)

   o   Discussion of content

   o   Observe child interacting with the screen

APPENDIX C:

INFANT-TODDLER SOCIAL AND EMOTIONAL ASSESSMENT (ITSEA):

EXTERNALIZING DOMAIN AND DYSREGULATION DOMAIN

(BRIGGS-GOWAN & CARTER, 1998)

Instructions:

Many statements describe normal feelings and behaviors, but some describe feelings and behaviors that may be challenges. Please do your best to respond to every item. Please choose ONE response that best describes your child's behavior in the LAST MONTH. Please rate each item based on the following scale: (0 = Not True/Rarely True, 1 = Somewhat True/Very True, 2 = Often)

Externalizing Domain (23 items)

Activity/Impulsivity Subscale (6 items)

1. Gets hurt so often that you can't take your eyes of him or her. ____

2. Restless and can't sit still. ____

3. Gets very wound up or silly when playing. ____

4. Constantly moving. ____

5. Is very loud, shouts, or screams a lot. ____

6. Goes from toy to toy faster than other children his or her age. ____

Aggression/Defiance Subscale (11 items)

7. Is destructive, breaks, or ruins things on purpose. ____

8. Hits, bites, or kicks me (or other parent). ____

9. Acts aggressive when frustrated. ____

10. Acts bossy. ____

11. Misbehaves to get attention from adults. ____

12. Is disobedient or defiant (for example, refuses to do as I ask). ____

13. Is sneaky / hides misbehaviors. ____

14. Is stubborn. ____

15. Has temper tantrums. ____

16. Swears. ____

17. Hurts animals on purpose. ____

Peer Aggression (6 items)

18. Hits, shoves, kicks or bites children (not including siblings). ____

19. Tests other children to see if they will get angry. ____

20. Picks on or bullies other children. ____

21. Teases other children. ____

22. Won't let other children play with his or her group. ____

23. Hurts other children on purpose. ____

Dysregulation Domain (34 items)

Eating Subscale (9 items)

24. Gags or chokes on food. ____

25. Refuses to eat. ____

26. Refuses to eat foods that require chewing. ____

27. Spits out food. ____

28. Accepts new foods right away. ____

29. Good eater. ____

30. Picky eater.____

31. Refuses to eat certain foods for 2 days or more. ____

32. Holds food in cheeks. ____

Negative Emotionality Subscale (13 items)

33. Cries or has tantrums until he or she is exhausted. ____

34. Has trouble adjusting to changes. _____

35. Often gets very upset. _____

36. Cries if he or she doesn't get own way. _____

37. Hard to soothe when upset. _____

38. Wakes up grouchy or in a bad mood. _____

39. Has trouble calming down when upset. _____

40. Impatient or easily frustrated. _____

41. Is able to wait for things he or she wants. _____

42. Cries a lot. _____

43. Irritable or grouchy. _____

44. Is whiny or fussy when he or she is not tired. _____

45. Gets angry or pouts. _____

Sensory Sensitivity Subscale (7 items)

46. Won't touch some objects because of how they feel. _____

47. Bothered by loud noises or bright lights. _____

48. Dislikes some foods because of how they feel. _____

49. Bothered by certain odors (smells). _____

50. Bothered by how some things feel on his or her skin (for example, clothing seems, certain fabrics, etc.). _____

51. Easily startled. _____

52. Bothered by being in motion (for example, swinging, spinning, being tossed in the air, or bouncing). _____

Sleep Subscale (5 items)

53. Wakes up at night and needs help to fall asleep again. _____

54. Has trouble falling asleep or staying asleep. _____

55. Sleeps through the night. _____

56. Must be held to go to sleep. _____

57. Wants to sleep in someone else's room or bed. _____

(*Note.* All 57 items were randomized for the participant online survey)

APPENDIX D:

PARENTING PRACTICES QUESTIONNAIRE (PPQ)

(ROBINSON ET AL., 1995)

Instructions:

Rate how often you exhibit this behavior with your child. Please do your best to respond to every item. Please choose ONE response for each item based on the following scale: (1 = Never, 2 = Once in a While, 3 = About Half of the Time, 4 = Very Often, 5 = Always).

Authoritative Dimension (27 items)

Warmth and Involvement (11 items)

1. I encourage my child to talk about the child's troubles. _____

2. I know the names of my child's friends. _____

3. I give praise when my child is good. _____

4. I show sympathy when my child is hurt or frustrated. _____

5. I give comfort and understanding when my child is upset. _____

6. I am responsive to my child's feelings or needs. _____

7. I tell my child that I appreciate what the child tries or accomplishes. _____

8. I am aware of problems or concerns about my child in school. _____

9. I express affection by hugging, kissing, and holding my child. _____

10. I apologize to my child when making a mistake in parenting. _____

11. I have warm and intimate times together with my child. _____

Reasoning/Induction (7 items)

12. I tell my child expectations of behavior before the child engages in an activity. _____

13. I give my child reasons why rules should be obeyed. _____

14. I help my child to understand the impact of behavior by encouraging my child to talk about the consequences of the child's own actions. _____

15. I talk it over and reason with my child when the child misbehaves. _____

16. I explain to my child how I feel about the child's good and bad behavior. _____

17. I explain the consequences of my child's behavior. _____

18. I emphasize the reasons for rules. _____

Democratic Participation (5 items)

19. I allow my child to give input into family rules. _____

20. I take my child's desires into account before asking the child to do something.

_____

21. I encourage my child to freely express himself/herself even when disagreeing with

parents. _____

22. I take into account my child's preferences in making plans for the family. _____

23. I channel my child's misbehavior into a more acceptable activity. _____

Good Nature/ Easy Going (4 items)

24. I joke and play with my child. _____

25. I am easy going and relaxed with my child. _____

26. I show patience with my child. _____

27. I show respect for my child's opinions by encouraging my child to express them.

_____

Authoritarian Dimension (20 items)

Verbal Hostility (4 items)

28. I yell or shout when my child misbehaves. _____

29. I argue with my child. _____

30. I explode in anger towards my child. _____

31. I disagree with my child. _____

<u>Corporal Punishment (6 items)</u>

32. I guide my child by punishment more than by reason. _____

33. I spank when my child is disobedient. _____

34. I grab my child when the child is being disobedient. _____

35. I use physical punishment as a way of disciplining my child. _____

36. I slap my child when the child misbehaves. _____

37. I shove my child when the child is disobedient. _____

<u>Non-Reasoning, Punitive Strategies (6 items)</u>

38. I punish by taking privileges away from our child with little explanation. _____

39. I appear to be more concerned with my own feelings than my child's feelings.

_____

40. I punish by putting my child off somewhere alone with little if any explanations.

_____

41. When two children are fighting, I discipline children first and ask questions later.

_____

42. I use threats as punishment with little or no justification. _____

43. When my child asks why he/she has to conform, I state: because I said so, or I am

your parent, and I want you to. _____

<u>Directiveness (4 items)</u>

44. I scold and criticize to make my child improve. _____

45. I tell my child what to do. _____

46. I scold or criticize when my child's behavior doesn't meet my expectations. _____

47. I demand that my child does things. _____

Permissive Dimension (15 items)

<u>Lack of Follow Through (6 items)</u>

48. I spoil my child. _____

49. I state punishments to my child and do not actually do them. _____

50. I threaten my child with punishment more often than actually giving it. _____

51. I carry out discipline after my child misbehaves. _____

52. I give into my child when the child causes a commotion about something. _____

53. I bribe my child with rewards to bring about compliance. _____

<u>Ignoring Misbehavior (4 items)</u>

54. I withhold scolding and/or criticism when my child acts contrary to my wishes.

_____

55. I allow my child to annoy someone else. _____

56. I ignore my child's misbehavior. _____

57. I allow my child to interrupt others. _____

<u>Self Confidence (5 items)</u>

58. I find it difficult to discipline my child. _____

59. I appear confident about parenting abilities. _____

60. I am afraid that disciplining my child for misbehavior will cause the child to not like

his/her parents. _____

61. I set strict well-established rules for my child. _____

62. I appear unsure about how to solve my child's misbehavior. _____

(*Note.* All 62 items were randomized for the participant online survey.)

APPENDIX E:

CSUSB INSTITUTIONAL REVIEW BOARD

LETTER OF APPROVAL

IRB #: IRB-FY2022-235
Title: The impact of infant-toddler screen time on self-regulation and behavior problems: The role of parenting style and socio-economic status
Creation Date: 2-10-2022
End Date:
Status: Approved
Principal Investigator: Eugene Wong
Review Board: CSUSB Main IRB
Sponsor:

Study History

Submission Type	Initial	Review Type	Exempt	Decision	Exempt

Key Study Contacts

Member	Tara O'Malley	Role	Co-Principal Investigator	Contact	Tara.OMalley@csusb.edu
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