The Effect of Parent Technology Use on Parent-Child Interactions and Child Outcomes

Prepared for the Alabama Women's Commission

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Executive Summary

<u>Background</u>

In the FY 2018-2019, the Alabama Women's Commission requested proposals for a study of mother's technology use and its potential effects on her child's early development. Our proposal was to observe 100 mother-child dyads interact during a brief play period and then to follow-up that observation with a survey of mother's technology use and assessments of the child's cognitive, social, and behavioral development. This study began in the Fall of 2019 and was completed in the Fall of 2021. This timeframe included a mandatory pause on research activities imposed by our University during 2020 in response to the COVID-19 pandemic.

<u>Purpose</u>

The purpose of this report is to review study findings related to mother's technology use and its relationship with mother-child interactions and child development outcomes.

<u>Key Findings</u>

Overall, the data from this study showed that mothers spend a significant amount of time each day engaged with technological devices, especially smartphones. Mothers indicated that resisting the urge to check their smartphone was difficult, that they were prone to overusing their smartphone, and that the smartphone regularly interrupted interactions they had with their young child. Notably, these were true across various demographic subgroups within the sample (e.g., low- vs. high-income households, female vs. male child, etc.) Interestingly, mother's beliefs about their smartphone use did not always match their actual use, as when those who agreed that they used the smartphone "too much" logged fewer minutes than those who disagreed. The data also showed that higher levels of smartphone use by mothers corresponded to lower levels of some social, cognitive, and behavioral characteristics in their children and to lesser interactions during free play.

<u>Recommendations</u>

Study findings should be shared with mothers across the state through public messaging that can be delivered across a variety of media platforms. In addition, resources should be created to provide mothers with practical suggestions on how to manage smartphone use. These will motivate and support mothers interested in reducing smartphone use.

Background Literature

Mother-Child Interaction

High quality, one-on-one interactions between a mother and a child support the child's learning and development across a variety of domains.[1] One way to create such interactions is for mothers to synchronize their behaviors with the child's.[2] When a mother matches her child on things like attention, vocalizations, gestures, facial expressions, and emotions she signals to the child that she is engaged and interested in what the child is doing. Increased responsiveness, greater turn-taking, and more socially contingent behaviors can all be found in synchronous interactions. As a result, these interactions can be longer, more positive[3], and more likely to reoccur. Higher quality interactions are related to more positive parental behaviors and more positive developmental outcomes[4] (and lower quality interactions are related to more negative developmental outcomes).[5] For example, parent-child interactions that are more fluent and connected in toddlerhood, support greater expressive language when those children enter preschool.[6] Likewise, parents who are responsive (i.e., engaged, intentional, and mindful) exhibit more positive parenting behaviors overall and have children with a lower risk for negative behaviors.[7] Further, parents who are more attentive and encouraging during sports have children who perform better (e.g., run faster and fall less).[8] These results support the conclusion that parents who engage and stay "in the moment" are more attentive and responsive which promotes an increase in positive and/or a decrease in negative outcomes in their child.

Children are sensitive to their mother's responsiveness as well as to its absence. For instance, children often initiate bids to show their mother something or engage their mother in an activity, such as play. When mothers respond to these bids by joining in the activity they create healthier, long term bonds with their child.[9] Mothers who provide timely verbal and non-verbal cues, like looking or pointing at objects or events during a conversation with their child, support the development of the child's language skills.[10] In fact, young children will frequently reference their mothers for a variety of reasons to

[1] https://doi.org/10.1016/S0273-2297(02)00500-2
[2] https://doi.org/10.1371/journal.pone.0113571
[3] https://doi.org/10.1097/00006199-198707000-00015
[4] https://doi.org/10.2307/1131204
[5] https://doi.org/10.1177/1359104501006002005
[6] https://doi.org/10.1177/0956797615581493
[7] http://doi.org/10.1007/s10802-015-9978-x
[8] https://doi.org/10.1080/14616734.2016.1170052
[9] https://doi.org/10.1542/peds.2006-2697
[10] https://doi.org/10.1111/cdev.12166

better understand the world around them.[11] However, when bids are rejected or interactions are interrupted, by a discrete event (e.g., like a text notification or another child), an abrupt departure (e.g., leaving the room to answer a phone call), or even simply by a still-face from the mother, children will show more negative emotions, they will escalate their bids for the mother's attention,[12] and they will try to reengage the parent.[13] In this way, young children want their parents to be engaged, cooperative, and collaborative and they display unease when parental actions contradict this expectation.[14]

Technology Use

High quality mother-child interactions are clearly important to the child's development, but recent advances in technology have introduced a growing threat to these interactions. Technology is prevalent in the lives of families - the average American family has five internet-connected devices in their home.[15] Further, 95% of US adults between the ages of 18 and 49 own smartphones.[16] Technology is also pervasive – we spend 8 hours a day using digital media[17] and we touch our smartphones more than 2600 times per day, on average.[18] Adults, on average, spend more than 4 hours each day on their phones. This not only represents an increase from previous years, but it leads to the expectation that this trend will grow in the coming years.[19] Rather than occurring all at once or in a few extended episodes, smartphone use tends to be spread out across the day with most episodes (70%) lasting less than 2 minutes and only a small percentage (5%) lasting more than 10 minutes.[20] This pattern is also reflected in the sheer number of times that adults pickup their smartphones (nearly 100 times/day, with adults aged 18 to 24 approaching twice that number).[21] In fact, research suggests that we interact with our phones about once every 5 minutes.[22] Notifications can be one cause for adults picking up or unlocking their smartphones, we receive between 45 and 80 notifications per day.[23] However, research suggests that a majority of pickups are initiated by the user (89%) and not by

[11] https://doi.org/10.1016/B978-0-08-097086-8.23169-3

[12] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3289403/

[13] https://doi.org/10.1037/a0016122

[14] https://doi.org/10.1111/j.1467-7687.2011.01107.x

[15] https://www.pewresearch.org/fact-tank/2017/05/25/a-third-of-americans-live-in-a-household-with-three-or-more-smartphones/

[16] https://www.pewresearch.org/internet/fact-sheet/mobile/

[17] https://www.emarketer.com/content/us-adults-added-1-hour-of-digital-time-2020?ecid=NL1001

[18] https://blog.dscout.com/mobile-touches

[19] https://www.statista.com/statistics/1045353/mobile-device-daily-usage-time-in-the-us/

[20] https://elitecontentmarketer.com/screen-time-statistics/

[21] https://www.asurion.com/press-releases/americans-check-their-phones-96-times-a-day

[22] https://doi.org/10.1016/j.chb.2020.106637

[23] https://doi.org/10.1016/j.chb.2019.07.016

receiving a notification (11%).[24] Together these data suggest that we spend significant amounts of time on our smartphones and that they can be an ongoing source of distraction or interruption throughout the day.[25, 26]

<u>Parental Technology Use and Child Development Outcomes</u>

Distractions and disruptions caused by technology use can reduce the frequency, duration, and quality of mother-child interactions.[27] Parents who use technology more (e.g., streaming a video, checking social media, etc.), have fewer interactions with their child and experience more interference when they do interact (e.g., during playtime, mealtime, trips to the park, visits to the children's science museum, etc.) – something researchers have dubbed "technoference".[28] The accessibility of smartphones, nearly always in our hands, pockets, or bags, can make phone interruptions particularly problematic because the interruptions can happen anywhere at any time and they can be initiated by either the parent or the device. This can pose an almost a constant threat to parent-child interactions. For example, parents report spending about ½ of their time at family dinners on their smartphones.[29] Of course, not all parents use their phones during an interaction with their child, but those that do disengage and become less responsive to their child. Children may respond by raising their efforts to attract the parent's attention, sometimes through more overt or risky behaviors. This can lead to more negative responses from parents and even increased injury to the child. A naturalistic study at fast food restaurants found that adults were often "absorbed" in their devices, to the extent that the phone, and not the child, was their primary focus. When children tried to reconnect, the most absorbed parents would often react harshly to the child.[30] A child's learning can be also negatively affected by interruptions in their parent-child interactions. For example, 2-year-olds failed to learn a new word when their mothers were interrupted by a smartphone call during a teaching episode.[31] Further, children playing with a novel toy ask fewer questions when their mothers were using a smartphone during play.[32]

These negative occurrences are not lost on the parents or the children. Parents who perceived their phone use as too much or who reported higher incidence of interruptions

[24] https://doi.org/10.1016/j.chb.2020.106637

[25] https://doi.org/10.1145/2702123.2702199

[26] https://www.pewresearch.org/internet/2020/07/28/parents-attitudes-and-experiences-related-to-digital-technology/

[27] https://doi.org/10.1016/j.acap.2014.10.001

[28] https://doi.org/10.1038/s41390-018-0052-6

[29] https://doi.org/10.1037/fam0000519

[30] https://doi.org/10.1542/peds.2013-3703

[31] https://doi.org/10.1037/dev0000292

[32] https://doi.org/10.1037/dev0001268

from their smartphone use also reported more problem behaviors (e.g., tantrums) from their 3-year-olds.[33] Likewise, children report feeling unimportant when parental smartphone use interferes with attention or activities and wish parents would use their smartphones less and model good behavior. This is not always easy however, even when they attempt to be more present, parents can be easily distracted by their smartphones and continue to exhibit the same pattern of disengagement. Perhaps this incongruity is one contributor to parents reporting of higher levels of depression[34] and stress[35], something also found with increased social media use (e.g., Facebook, Instagram, etc.),[36] when they exhibit higher levels of smartphone use.

Current Research Questions

The purpose of the current research was to further explore how mother's use of technology might affect important areas of young children's development, including social, behavioral, and cognitive development more broadly. Further, a special focus of this proposal was to investigate how the language and behavior exhibited by mothers during a free play interaction with their child might relate to their own technology use.

Methodology

Participants

96 mother-child dyads participated in this study. 80 (83%) completed both the in-person session and the online questionnaires and 16 (17%) completed only the online questionnaires (Figure 1). Children ranged in age from 2- to 4-year-olds (Figure 2) and approximately half were girls (Figure 3). Most mothers identified their race as white (70%), whereas 19% identified as black, and 11% as something other than black or white (Figure 4). Mother-child dyads were recruited from the Tuscaloosa and Birmingham, AL. Testing in Tuscaloosa occurred on the UA campus at the Child Development Research Center. Testing in Birmingham occurred at the downtown YWCA.

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[33] https://doi.org/10.1111/cdev.12822
[34] https://doi.org/10.1016/j.pmedr.2017.08.005
[35] https://doi.org/10.1016/j.chb.2014.11.006
[36] https://doi.org/10.1001/jamanetworkopen.2021.36113
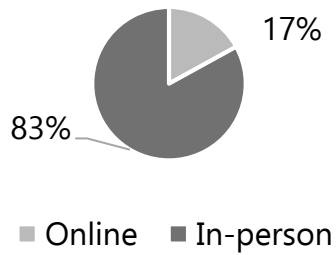
Figure 1: Number of Dyads

Figure 1: 96 mother-child dyads participated in the study, 80 of them (83%) completed both the in-person session and the online questionnaires and 16 (17%) completed only the online questionnaires. Of the 80 in-person, 61 (76%) completed the study under COVID-19 protocols.
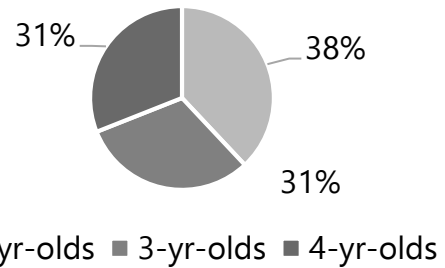
Figure 2: Child's Age

Figure 2: Of the 96 participating children, 36 were 2-year-olds (38%), 30 were 3-year-olds (31%), and 30 were 4-year-olds (31%). Of the 80 that completed the in-person session, 30 were 2-year-olds (38%), 27 were 3-year-olds (34%), and 23 were 4-year-olds (29%).
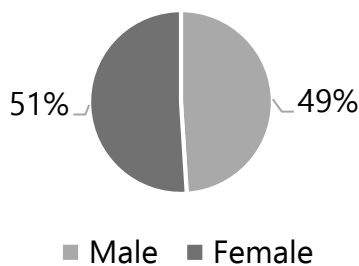
Figure 3: Child Gender

Figure 3: Of the 96 participating children, 49 were female (51%) and 47 (49%) were male. Of the 80 that completed the in-person session, 40 were female (50%) and 40 were male (50%).
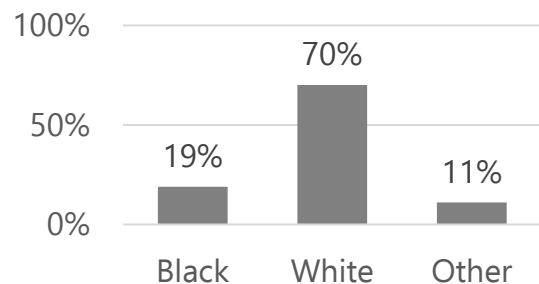
Figure 4: Mother's Race

Figure 4: Of the 96 participating mothers, 18 identified as black (19%), 65 as white (70%), and 11 (11%) as something other than black or white. Of the 80 that completed the in-person session, 15 identified as black (19%), 55 as white (69%), and 10 (12%) as something other than black or white.

Overall, mothers reported a median annual household income of between $60-70,000, with 14% reporting incomes at or below poverty levels (i.e., less than $25,000/year for a family[37]) (Figure 5). Additionally, the highest degree earned for 62% of mothers was either

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[37] https://alabamapossible.org/2020/05/21/4480/

a college or graduate degree whereas the highest degree for 35% of mothers was a high school degree (Figure 6). Roughly 2% of mothers did not earn a degree.
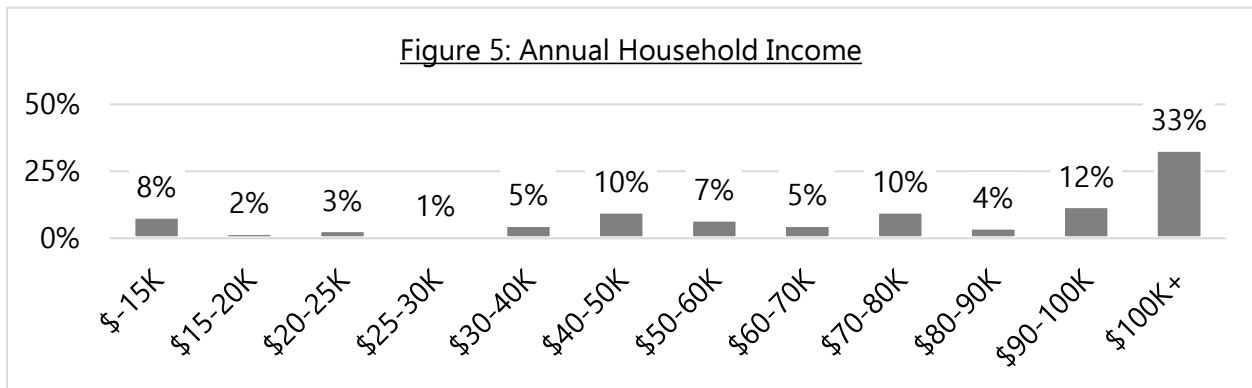
Figure 5: Annual Household Income

Figure 5: Of the 96 participating mothers, 32 (33%) reported household incomes over $100,000 per year, 36 (38%) reported between $50,000 and $100,000 per year, and 28 (29%) reported less than $50,000 in annual household income. A total of 13 (14%) reported less than $25,000 per year which placed them at or below the poverty line. Of the 80 that completed the in-person session, 27 (34%) reported household incomes over $100,000 per year, 30 (38%) reported between $50,000 and $100,000 per year, and 23 (29%) reported less than $50,000 in annual household income. 11 (14%) reported under $25,000.

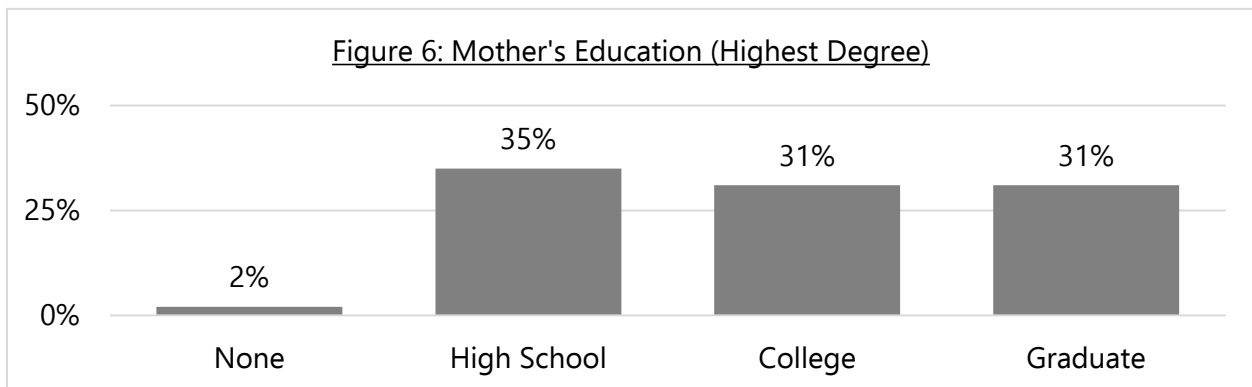## Figure 6: Mother's Education (Highest Degree)

Figure 6: Of the 96 participating mothers, 2 (2%) did not earn a high school degree or equivalency, 34 (35%) earned a high school but not a college degree, 30 (31%) earned a college degree, and 30 (31%) earned a graduate degree (e.g., masters). Of the 80 that completed the in-person session, 2 (3%) did not earn a high school degree or equivalency, 26 (27%) earned a high school but not a college degree, 26 (27%) earned a college degree, and 26 (27%) earned a graduate degree.

Assessments and Activities

Mothers completed several assessments about their child and children completed multiple tasks. Assessments and tasks are listed and described below.

Demographic Survey. Mothers answered questions about the child, including about the child's age, gender, and siblings. Mothers also answered questions about themselves and their household including their marital status, family structure, education level, and household income, as summarized above in Figures 1-6.

Technology Questionnaire. Mothers answered questions about their technology use, with an emphasis on smartphone use. Questions focused on mother's perception of their smartphone use and actual usage statistics. A screen time app was used for these usage statistics (e.g., pickups, notifications, etc.) Finally, mothers also estimated how much time their child spent on technology devices (e.g., computer, TV, phone, tablet, and gaming).

Social and Behavioral Assessments. Mothers completed multiple assessments regarding their child's social and behavioral skills. The <u>Strengths and Difficulties Questionnaire (SDQ)</u> detects potential behavioral, emotional, and social problems in the child. It has 25 questions organized around 5 scales: emotional symptoms, conduct problems, hyperactivity and inattention, peer relationship problems, prosocial behavior. The <u>Devereux Early Childhood Assessment (DECA)</u> assesses the child's social and emotional health and resilience (e.g., does the child show patience, cry easily, cooperate, etc. with others). It has 35 questions that reflect two basic constructs: one is *total protective factors* which reflects children's positive behaviors of initiative, self-regulation and attachment/relationships, and the other is *behavioral concerns* which reflects children's social and emotional problems. See Figure 7 for an example.

<u>Figure 7: Sample Table Showing DECA Outcomes for Protective Factors and Behavioral Concerns</u>

DECA Protective Factors	Strength	Typical	Area of Need
Initiative		X	
Attachment/Relationships		X	
Self Regulation			X
Behavioral Concerns		Typical	Area of Need
Behavioral Concerns			X

Language and Cognitive Assessments. Mothers and children completed multiple assessments regarding the child's language and cognitive skills. The MacArthur-Bates Communicative Development Inventories (MCDI) measures a child's language development. Mothers reviewed a long list of words, phrases, and questions and indicate what the child knows, says, or does regarding language. The Picture Vocabulary Task measures a child's receptive vocabulary. Child are shown a card with four pictures on it and asked to "touch the picture" that corresponds to a given word. The words get progressively harder and children continue with the task until they miss several pictures in a row. The Ratings of Everyday Executive Functioning (REEF) measures a child's self-control. Mothers answer 75 questions about their child's self-control in various everyday settings or activities (e.g., storytelling, secret keeping, and tidying up). The Card Sort Task measures a child's ability to sort cards featuring different shapes, colors, and numbers and to switch between different rules. The Flanker Task measures a child's inhibition by asking children to suppress their first response and instead produce another. These final two tasks along with the PVT were administered by the experimenter. Finally, the Flanker Task was replaced with the Day/Night Stroop after several participants early in the study had trouble completing the opening trials.

Free Play Period. Mother-child dyads completed a brief play period (avg. 10 minutes, 26 seconds) in a small, private room. The room contained two iPads for recording, each mounted on a "robot" (i.e., Swivl). The robots sat on the floor on opposite sides of the room. The mother and child each wore a "marker" around their neck which could be located remotely by one of the robots. As the mother and child moved around the room, the robots rotated to follow the markers and the iPads recorded what the dyads said and did. There was also a laptop in the room. During the pandemic, this was used to support a follow-up task administered after the play period. Finally, there was a small box of 12 objects in the room. The box included three different object types: 4 familiar objects whose names were known to both the mother and the child (e.g., a ball), 4 unknown objects whose names were known to the mother but not the child (e.g., spatula), and 4 novel objects whose names were not known to the mother or the child (e.g., spile). Mothers were instructed to play with the child naturally for about 10 minutes, as they would at home, and try to use each of the 12 objects during their play. No other instructions were given.

Word Learning Task. After the play session, children completed a word learning task involving the 4 play objects that were known to the mother but unknown to the child. For the task, children were shown each object, one at a time, and asked to say its name (e.g., "what is this called")? Then children were shown sets of 4 objects and asked to pick the one that corresponded to a name (e.g., "show me the coaster").

<u>Coding</u>

Videos of the mother-child play period were transcribed and coded by separate individuals. Both mother and child behaviors were coded, those most relevant to the child's language development are listed below. For the mother, we coded how many times she talked and the total amount of time she talked (in seconds) during the period. We also counted how many times she used a label for an object (e.g., ball), how many times she described its function (e.g., bouncing), and what action she performed on the object (if any) (e.g., bouncing the ball). Finally, we coded the number of times the mother initiated joint attention with the child (i.e., when the mother identifies an object or activity that the child attends too) and how much time the mother and child spent engaged in joint attention. For the child, we coded how many times she/he talked and the total amount of time she/he talked (in seconds) during the period. We also coded the number of times the child initiated joint attention with the mother.

<u>Procedures</u>

Each study session included three different activities. First, the mother used an iPad or laptop to complete the assessments listed in the previous section. Next, the mother and child completed the 10-minute free play period. Finally, the child completed the assessments listed in the previous section. When the full session was finished, mothers were given a $25 gift card in appreciation for their participation. Because data collection occurred during the COVID pandemic, experimenters and participants wore masks when in proximity to each other. Additionally, all study spaces and materials (i.e., objects, iPads, etc.) were sterilized upon session completion. Finally, for some children (n=19), an experimenter administered the child measures (e.g., PVT, Card Sort, Flanker, and Word Learning Task). These children completed the study before COVID-19 protocols were in place. For the remaining children (n=80), those tested under COVID-19 protocols, mothers administered the measures in order to limit close contact between the mother and child and the experimenter. For these dyads, an experimenter was live via Zoom during the administration of the measures guiding mothers through the procedures.

Findings

<u>Mother's Technology Use</u>

Mothers reported on several aspects of their technology use, with a focus on smartphone use. On average, mothers spent more than 4 hours a day on their phones. Their 4 most

frequently used apps totaled an average of 223 minutes a day, about 3 hours and 45 minutes. The most common app, Facebook, accounted for 90 minutes per day. To put this amount in perspective, mothers spend the same amount of time on Facebook as they do with their children, according to research[38]. On average, mothers picked up their phones 82 times per day (once every 12 minutes while their awake) and they received 107 notifications per day (or one every 13 minutes throughout the day) - which is more often than they hear someone say "Mom!"

Mothers seem to be aware of, and concerned about, their smartphone use. When asked whether they were able to resist checking a new message on their phone, 71% of mothers agreed that they could not – 3.5 times more than agreed that they could (Figure 8). Half of mothers (50%) also said they thought about calls or messages that they *might* receive (Figure 9). Perhaps most significant for mother-child interactions, 82% of mothers said they used their phone too much (Figure 11) and 98% said that conversations or activities with their child are interrupted at least twice a day by their devices and 95% are interrupted every day by their smartphones (Figure 10). In fact, 1 in 4 mothers said their devices interrupt conversations or activities with their child over 10 times per day.
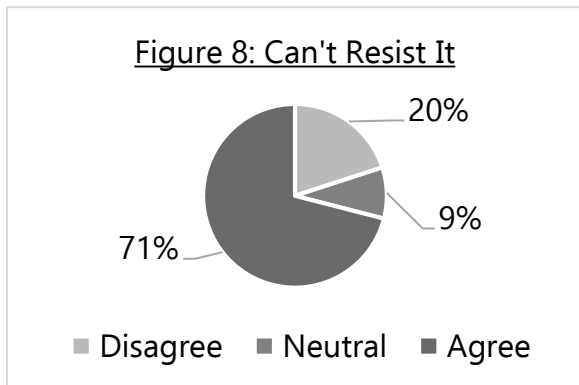

Figure 8: 71% of 96 mothers agreed that "When my mobile phone alerts me to indicate new messages, I cannot resist checking them."
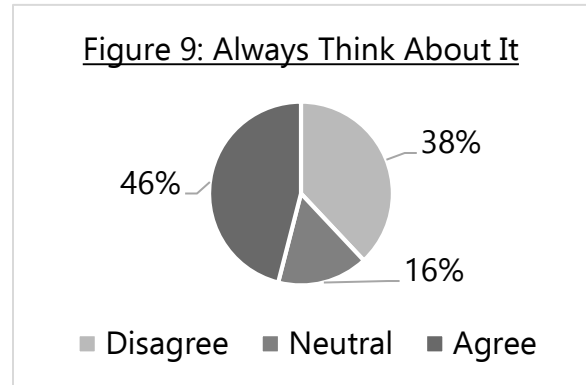

Figure 9: 50% of 96 mothers agreed that ""I often think about calls or messages I might receive on my mobile phone."

[38] https://doi.org/10.1111/jomf.12305

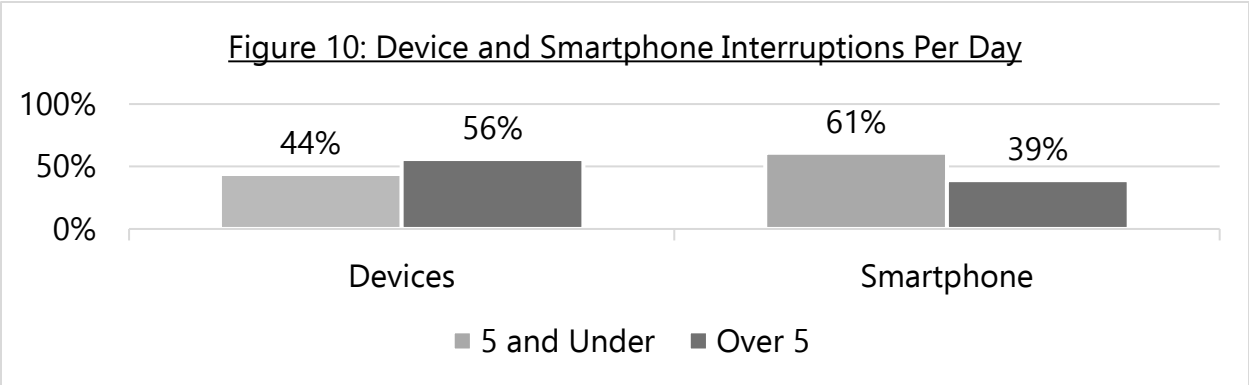**Figure 10: Device and Smartphone Interruptions Per Day**

Figure 10: When asked "On a typical day, about how many times do [Devices or Smartphone] interfere with a conversation or activity you are engaged in with your child?", 98% of 96 mothers indicated that device interruptions happen at least twice a day and 56% indicated more than 5 times a day. 95% of 96 mothers indicated that they are interrupted by their smartphone every day with nearly 40% saying that this happens more than 5 times per day.
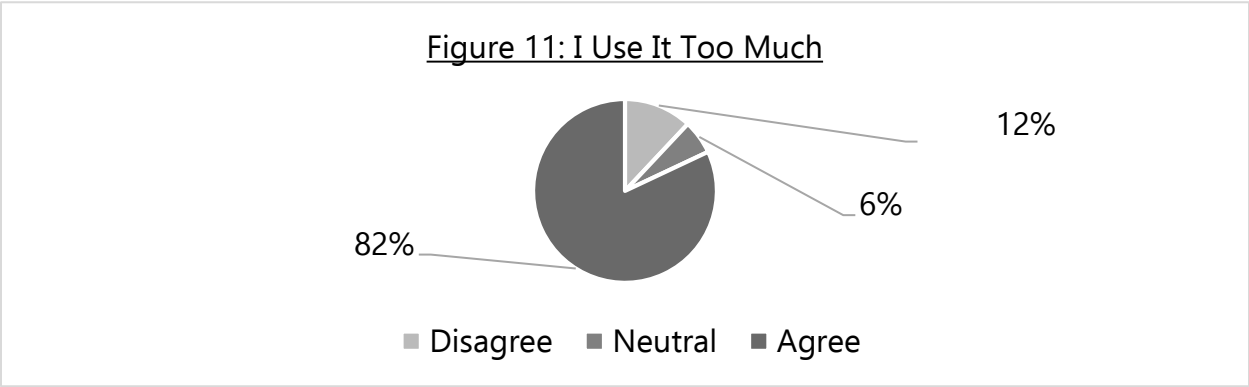
Figure 11: I Use It Too Much

Figure 11: 82% of 96 mothers agreed that "I feel like I use my mobile phone too much."

One additional point about smartphone use is that mothers of all demographic subgroups agreed that they use it too much and "can't resist" checking it for notifications like new messages. Figures 12a-12l show the various items (i.e., can't resist, too much, and interruptions) split by child gender, mother's highest degree, household income, and mother's race. For each level of each of these variables more than 50% of mothers agree that they use the smartphone too much and have trouble resisting it. Also, all report daily interference by the smartphone on activities with their child. Paradoxically, mother's perceptions about their smartphone use do not always match their actual use. For example, mothers who agree that they use the phone too much actually spend *less time* on their smartphones (208 minutes compared to 318) than mothers who disagree with this statement.
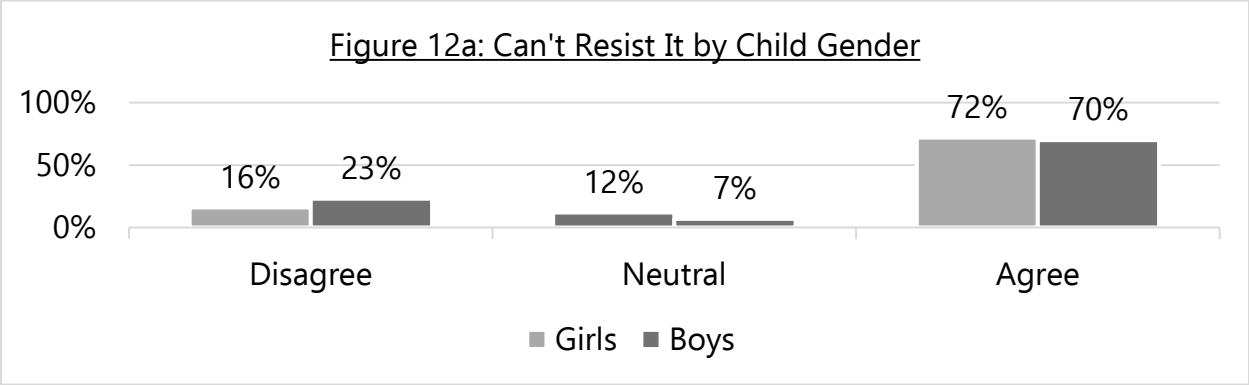
Figure 12a: Can't Resist It by Child Gender

Figure 12a: Mothers of girls and boys agreed that "When my mobile phone alerts me to indicate new messages, I cannot resist checking them."

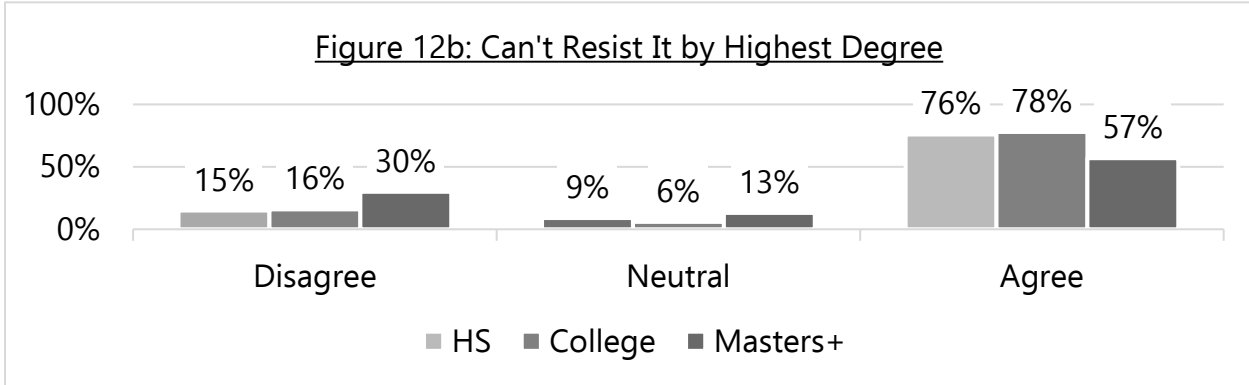
Figure 12b: Can't Resist It by Highest Degree

Figure 12b: Mothers with high school, college, and advanced degrees agreed that "When my mobile phone alerts me to indicate new messages, I cannot resist checking them."
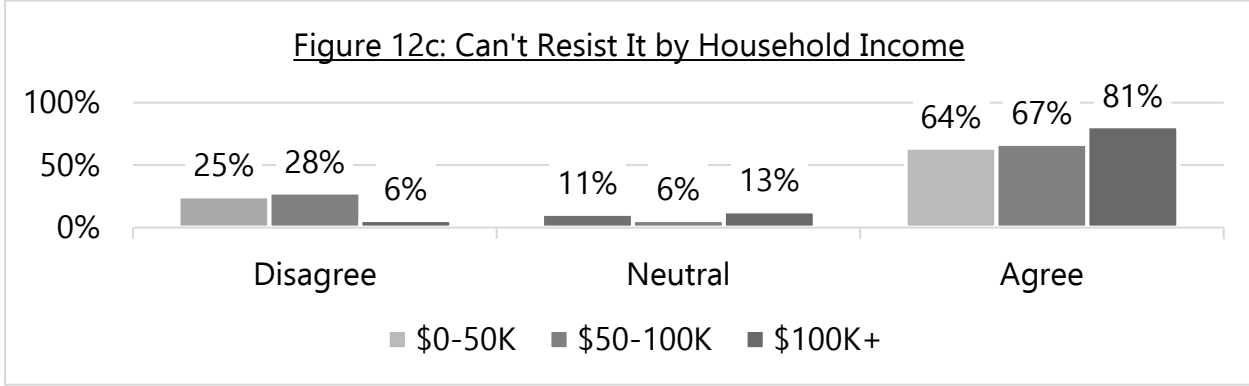

Figure 12c: Can't Resist It by Household Income

Figure 12c: Household income levels and mothers agreeing that "When my mobile phone alerts me to indicate new messages, I cannot resist checking them."

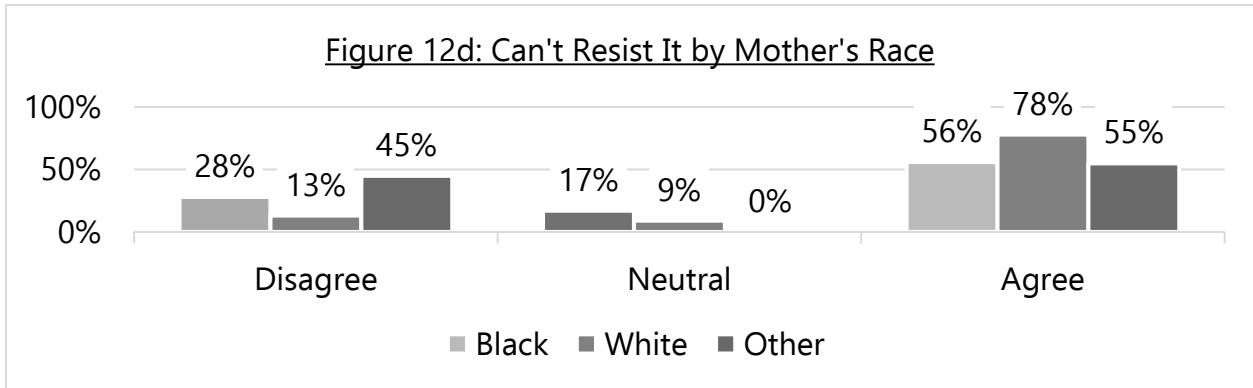## Figure 12d: Can't Resist It by Mother's Race

Figure 12d: Mother's race and the percentage who agree that "When my mobile phone alerts me to indicate new messages, I cannot resist checking them."
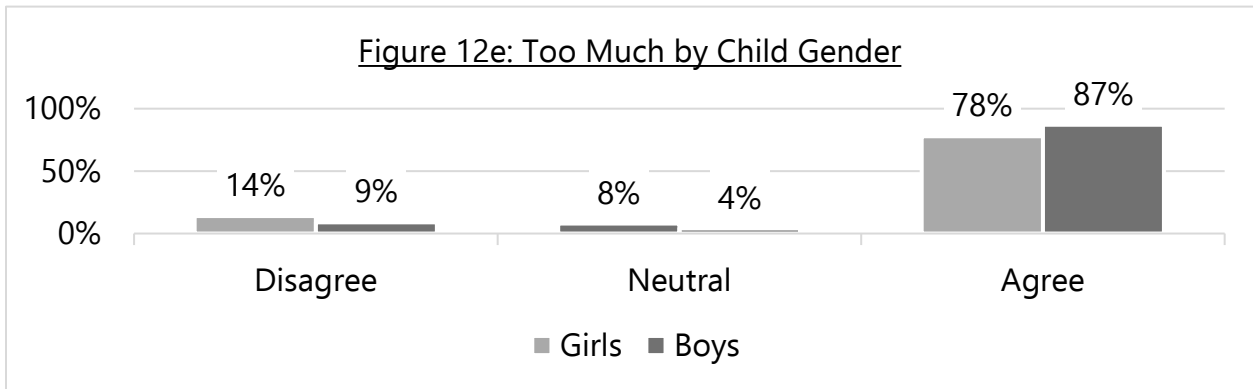
Figure 12e: Too Much by Child Gender

Figure 12e: Mothers of girls and boys agreed that "I feel like I use my mobile phone too much."

Figure 12f: Too Much by Highest Degree
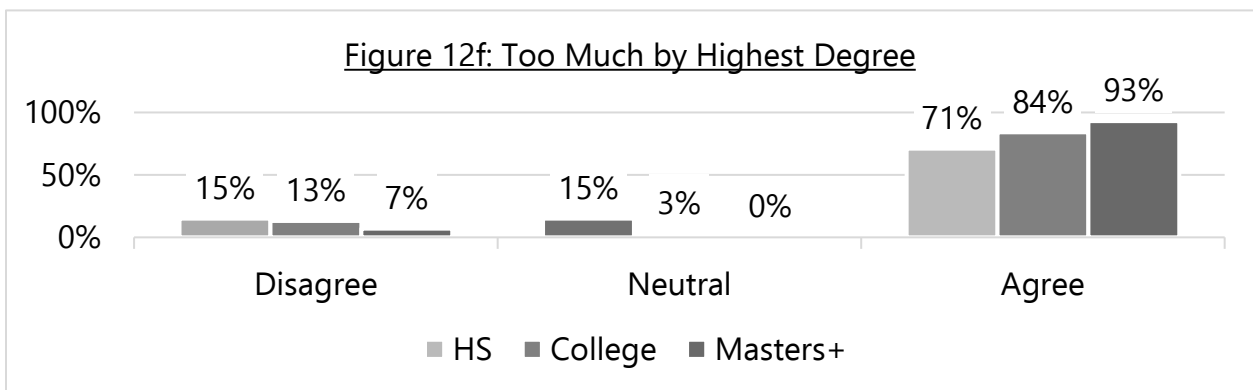
Figure 12f: Mothers with high school, college, and advanced degrees agreed that "I feel like I use my mobile phone too much."
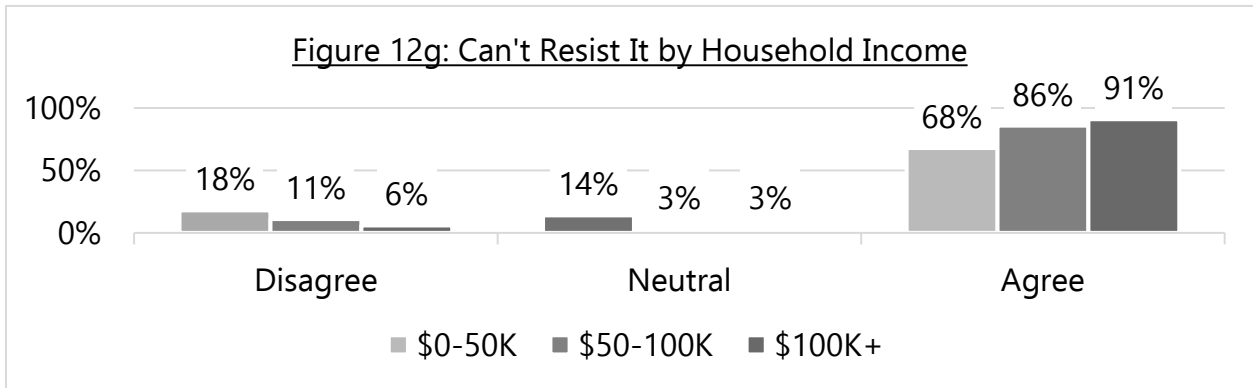
Figure 12g: Household income levels and mothers agreeing that "I feel like I use my mobile phone too much."
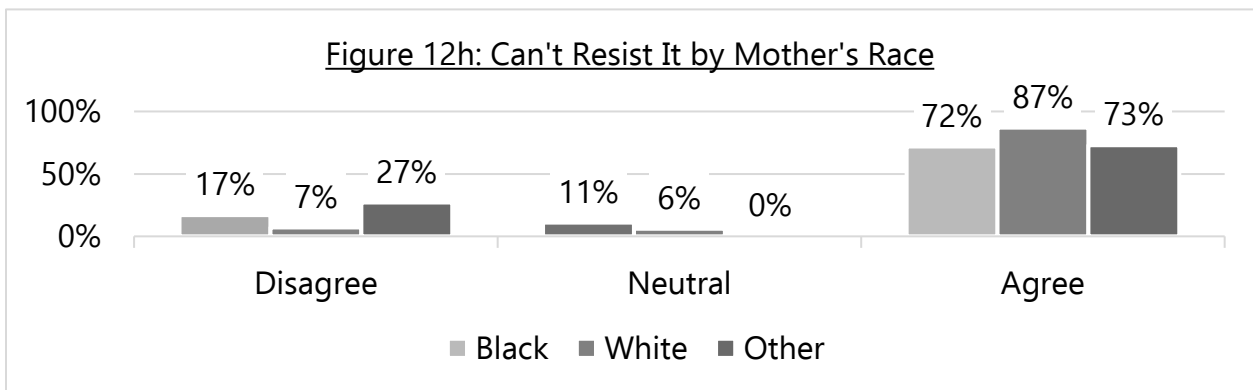

Figure 12h: Mother's race and the percentage who agree that "I feel like I use my mobile phone too much."
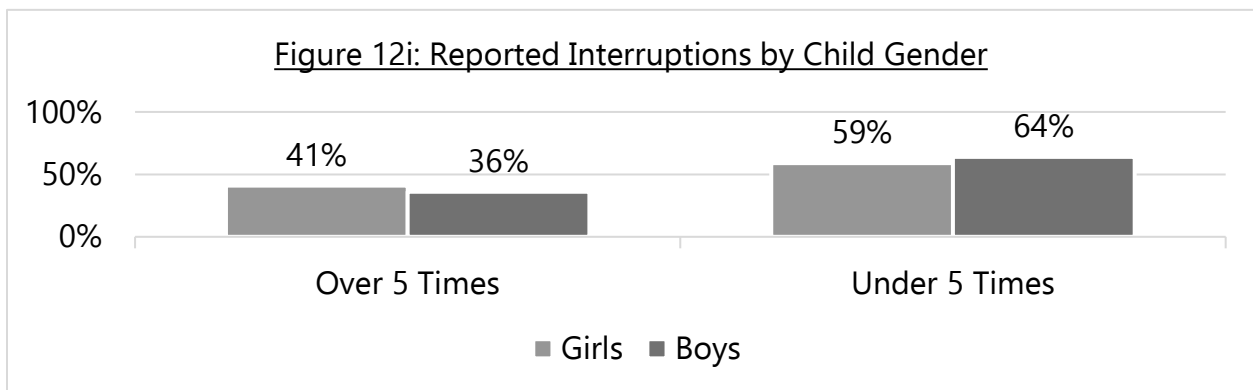

Figure 12i: Mothers of girls and boys reported "On a typical day, about how many times does your smartphone interfere with a conversation or activity you are engaged in with your child?"

Figure 12j: Reported Interruptions by Highest Degree

Figure 12j: Mothers with high school, college, and advanced degrees reported "On a typical day, about how many times does your smartphone interfere with a conversation or activity you are engaged in with your child?"
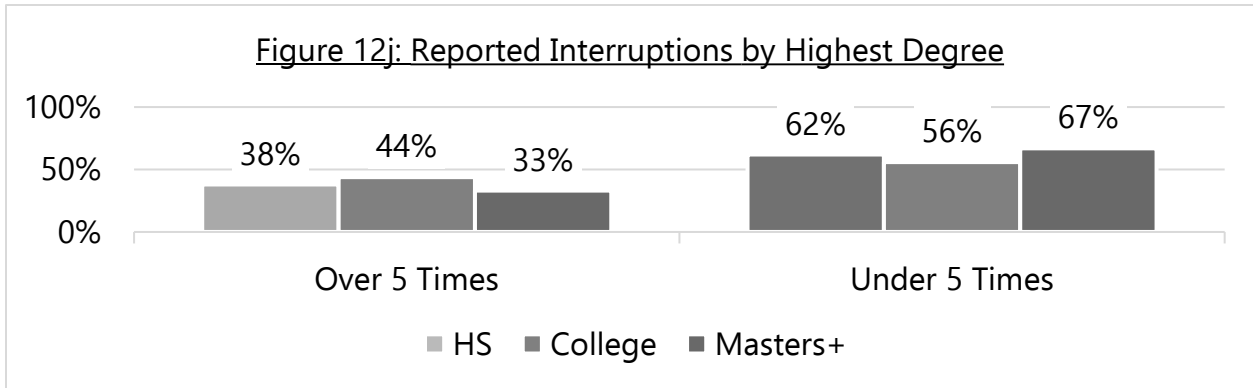
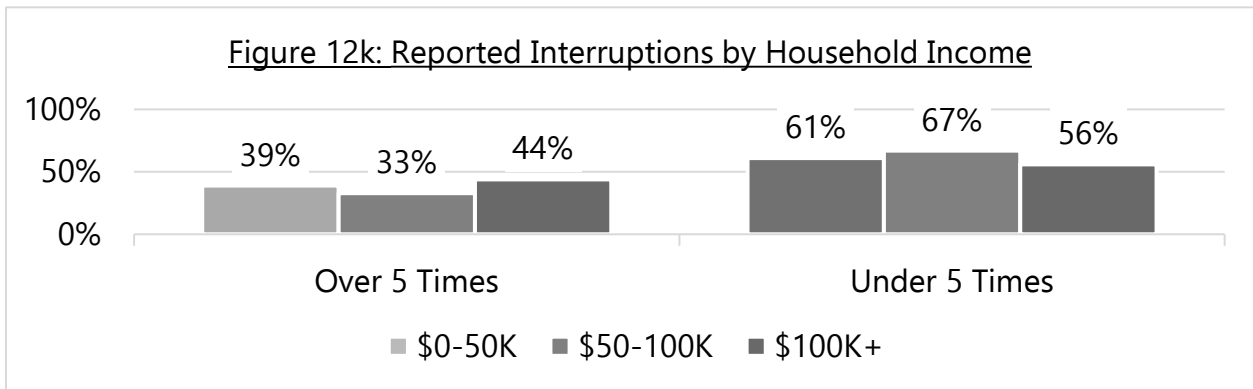## Figure 12k: Reported Interruptions by Household Income

Figure 12k: Household income levels and mothers reported "On a typical day, about how many times does your smartphone interfere with a conversation or activity you are engaged in with your child?"
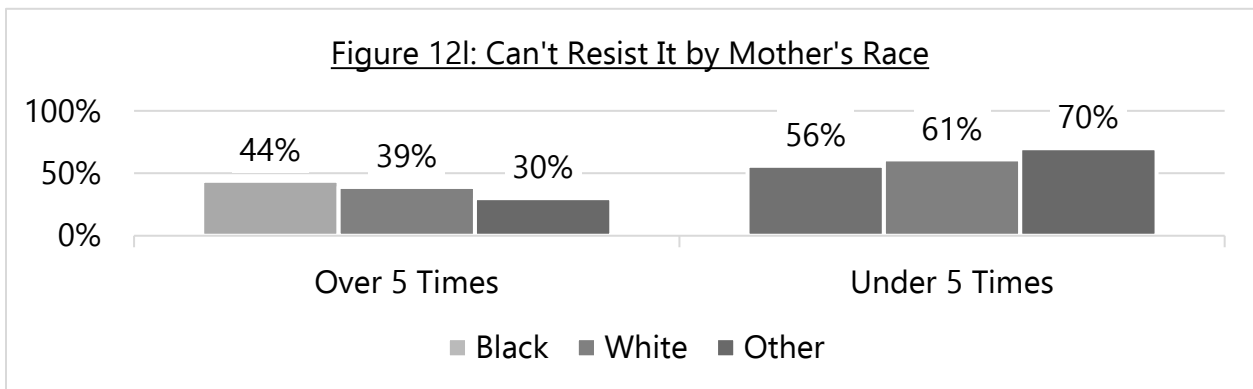
Figure 12l: Can't Resist It by Mother's Race

Figure 12l: Mother's race and the percentage who reported "On a typical day, about how many times does your smartphone interfere with a conversation or activity you are engaged in with your child?"

Finally, mothers also reported that their child was on a screen an average of 3.5 hours per day across all devices. This is notable since The American Academy of Pediatrics recommends that children between the ages of 2- and 5-years limit screen use to 1 hour a day of quality programming.[39] In this study, only 25 mothers (26%) reported that their child met that recommendation. In contrast, 48% of children watched more than double the recommended amount of screen time (Figure 12).

Child Development Outcomes: Social Development

We included two primary assessments of children's social and behavioral development. The DECA provides assessments for protective factors and behavioral concerns. Regarding protective factors, most children (72%) scored in the "typical" range, but for 16% protective factors were considered a strength and for 12% they were considered an area of need (Figure 13). Regarding behavioral concerns, most children (81%) again scored in the "typical" range, but for 19% behavioral concerns were considered an area of need (Figure 14). Note that behavioral concerns were never considered a strength and the DECA does not assess these in 2-year-olds.
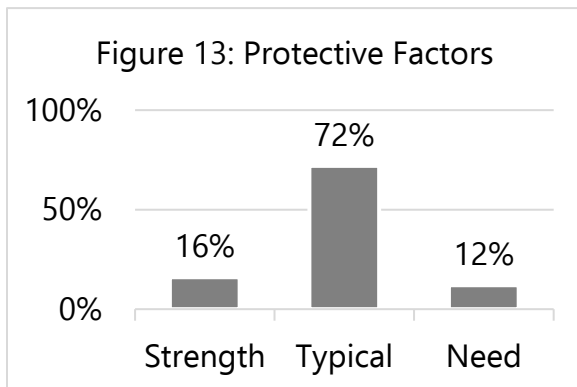

Figure 13: Protective Factors

Figure 13: 72% of 96 mothers rated their child as being in the typical range for positive behaviors like initiative, self-regulation and attachment/relationships. For 12% of children these were marked as areas of need.
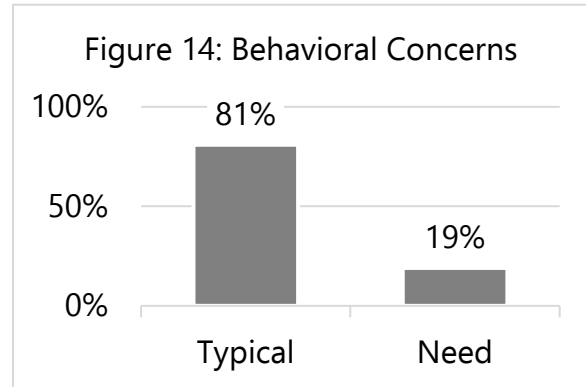

Figure 14: Behavioral Concerns

Figure 14: 81% of 96 mothers rated their child as being in the typical range for behavioral concerns, namely social and emotional problems. However, 19% of children had this identified as an area of need.

The SDQ provides a total difficulties score which reflects the combination of emotional symptoms, conduct problems, hyperactivity and inattention, and peer relationship problems. Separately it also assesses positive or prosocial behavior. Regarding total

[39] https://www.aap.org/en/news-room/news-releases/aap/2016/aap-announces-new-recommendations-for-media-use/

difficulties, most children (84%) scored in the "average" range, but 8% were scored as "slightly raised", 3% were scored as high, and 4% were scored as very high, meaning that 16% of children had higher-than-average total difficulties (Figure 15). Regarding prosocial behavior, 72% were "average", 17% had slightly lowered levels, 3% were "low" and 8% were very low, meaning that 28% of children had lower-than-average prosocial behavior (Figure 16).
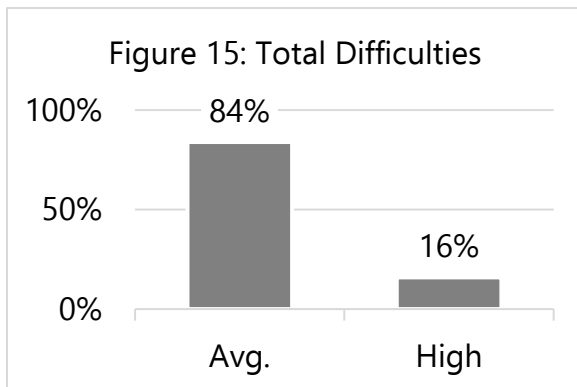
Figure 15: Total Difficulties

Figure 15: 84% of 96 mothers rated their child as having average difficulties with emotion, conduct problems, hyperactivity, and attention. For 16% of children these were marked as areas of higher than average difficulties.
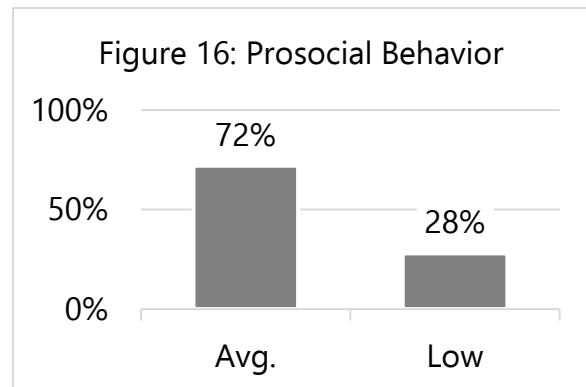
Figure 16: Prosocial Behavior

Figure 16: 72% of 96 mothers rated their child as having average positive of prosocial behaviors. For 28% of children these were marked area of lower than average positive behaviors.

Child Development Outcomes: Cognitive Development

We included five primary assessments of children's cognitive development, two for language and three for executive functioning (i.e., self-control). One of each was a direct measure from the child's performance and the other was an indirect measure based on mother-reported skills. The MCDI and PVT assess children's language development, including their vocabulary. On the MCDI, parents reported that children used, on average, 77 words, far below what would be expected.[40] Similarly, on the PVT children averaged around the 35th percentile, also lower than would normally be expected. Likewise, children's scores on the sorting task (avg. 37th percentile) and the inhibition task (avg. 40th percentile) were lower than would be expected. On the REEF, children were scored between 0 (is not able to) and 3 (always or almost always does) for items related to their executive functions in everyday situations. Overall, the average child scored a 141 across

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[40] https://mdcresearch.net/index.php/ehdi-outcomes/macarthur-bates-communicative-development-inventory/norms-across-all-three-assessments/

all items on the REEF which equates to an average score of 1.86 per item. This corresponds roughly to a response of "sometimes", as in my child *sometimes* "sits still for extended periods of time (e.g., during movies, performances)".

Free Play Period

On average mothers talked 145 times during the play period, about once every 4 seconds, and they talked for a total of about 206 seconds or roughly 1.5 seconds each turn. Mothers provided labels for the objects in the box about 20 times, 12 references to objects whose names were familiar to both the mother and child, 6 for objects known only to the mother, and 3 for completely novel objects. Mothers also referenced the function of the objects, 7 for familiar objects, 2 for unknown objects, and very few for novel objects (.29). Table 1 shows that mothers provided labels and functions for unknown object more for 2-year-olds (Ms=7.4 & 2.1, resp) than for 3- and 4-year-olds (Ms=4.5 & 1.7, 4.5 & 1.8, resp.) Finally, mothers also demonstrated actions with the objects, 6 for familiar, 4 for unknown, and 7 for novel. Mothers initiated joint attention 11 times during the play period. On average, children talked 72 times for 102 seconds, roughly half as much as mothers did. Children initiated joint attention 10 times during the play period.

Table 1: Frequency of Mothers Labeling and Describing the Function for the Unknown Object by Child's Age

	2-year-olds	3-year-olds	4-year-olds
Labeling the Unknown Objects	7.4	4.5	4.5
Describing the Unknown Object's Function	2.1	1.7	1.8

Word Learning Task

For the word learning task, the crucial objects were those known to the mother but unknown to the child (i.e., the "unknown" objects). We reasoned that mothers might recognize the gap between the child's knowledge and their own and make greater efforts to help the child learn about the object, by labeling it or describing its function more often. In turn, we expected children to show significant learning of these objects (there were a total of 4 of these "unknown" objects). Instead, we found that mothers devoted more time and attention to the objects that were known to both themselves and the child (i.e., the "familiar" objects). Mothers used the names of familiar objects more often, interacted with them for longer durations, and were more likely to describe the functions for these familiar objects. With regards to the unknown objects, there were two measures of learning: 1) could the child say the object's name when prompted and 2) could the child point to the object out of a lineup when given its name? Children rarely said the

word correctly. Of 320 trials (80 children, 4 objects each), the correct word was said spontaneously only 20 times (roughly 6% of trials). Pointing to the correct object was more common. Of 320 trials, the correct object was identified 103 times (roughly 32% of trials). However, because there were always 4 choices in the lineup, children could have chosen correctly just by guessing 25% of the time. Also, children described the function on 94 trials (29%). One note, mothers who labeled the unknown objects also spent more time interacting with those objects (correlation = .927) and were more likely to provide their functions (correlation = .375).

Mother's Technology Use and Child Development Outcomes

An important goal of this research was to examine the influence of mother's technology use on the social and cognitive development outcomes reviewed above. Here we focused primarily on two sets of variables: mother's smartphone use (e.g., avg. minutes per day, pickups, and notifications) and mother's perception of their smartphone use (e.g., resisting checking their smartphone, agreement that they use the smartphone too much, and number of interruptions). We assessed the influence of these factors on each of the developmental outcomes.

Mother's Technology Use and the Child's Social Development

DECA - Social and Emotional Health, Resilience. Figure 17 shows that children who scored in the typical range for protective factors on the DECA had mothers who logged more minutes on their smartphones than mothers whose children had this as an area of need or as a strength. Related, Figure 18 shows that these same children had mothers with more smartphone pickups and who received more notifications throughout the day.

Figure 17: Mother's Smartphone Use (in Minutes) and Child's Protective Factors
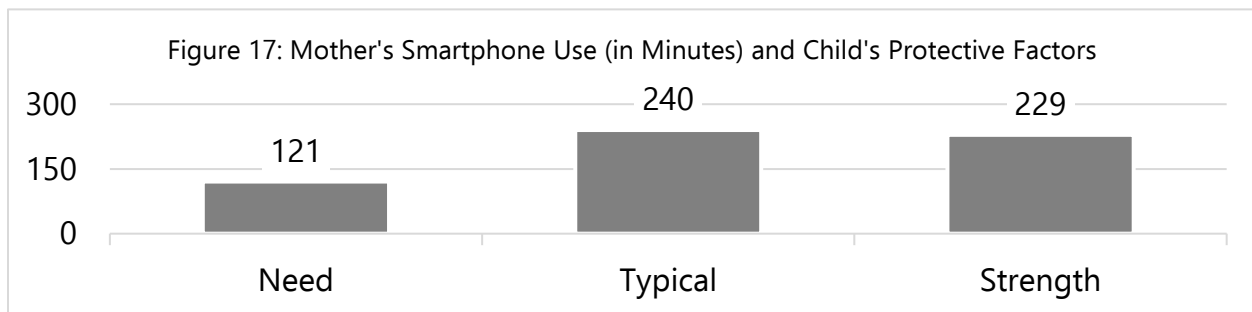
Figure 17: Mothers average daily smartphone use (in minutes) and whether their children had initiative, self-regulation and attachment/ relationships (i.e., protective factors) as strengths, areas of need, or as being typical, according to the DECA.
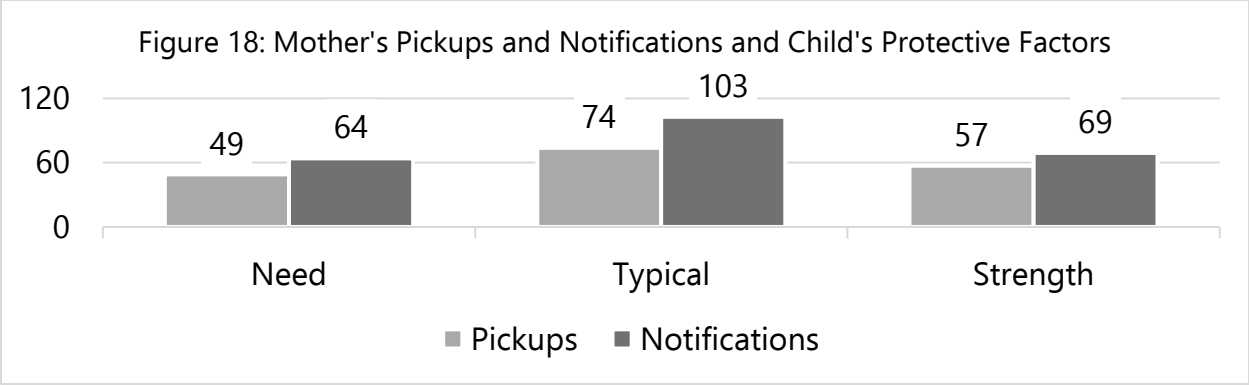
Figure 18: Mothers average daily pickups and notifications and whether their children had initiative, self-regulation and attachment/ relationships (i.e., protective factors) as strengths, areas of need, or as being typical, according to the DECA.

Figure 19 shows that children who scored in the typical range for protective factors on the DECA had mothers who reported having more trouble resisting checking their smartphone and Figure 20 shows that these mothers reported having more interactions with their child interrupted by their smartphone. Ironically, mothers whose children had this as an area of strength more often agreed that they used their smartphone "too much" (86%) while also having the fewest number of interruptions (21%) (Figure 21).
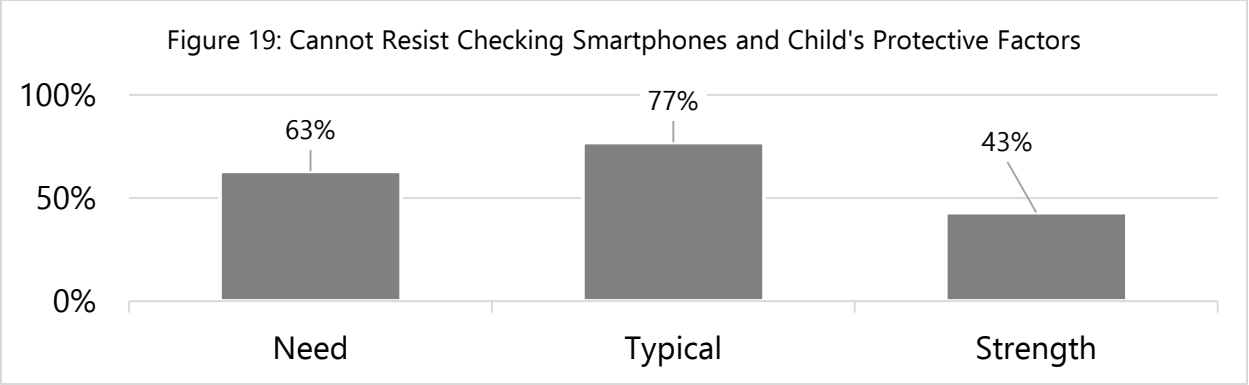

Figure 19: Percentage of mothers agreeing that they cannot resist checking their smartphones and whether their children had initiative, self-regulation and attachment/ relationships (i.e., protective factors) as strengths, areas of need, or as being typical, according to the DECA.

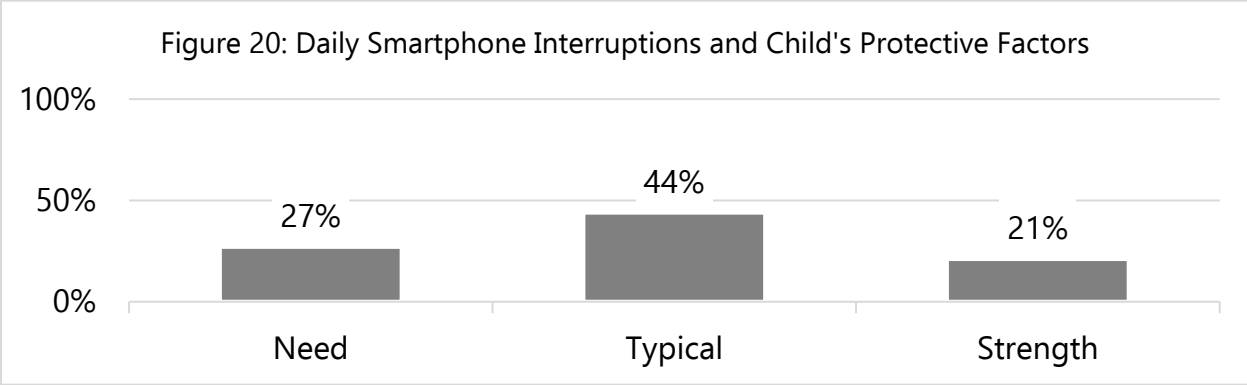Figure 20: Daily Smartphone Interruptions and Child's Protective Factors

Figure 20: Percentage of mothers reporting that they are interrupted by their smartphone more than 5 times per day and whether their children had initiative, self-regulation and attachment/ relationships (i.e., protective factors) as strengths, areas of need, or as being typical, according to the DECA.

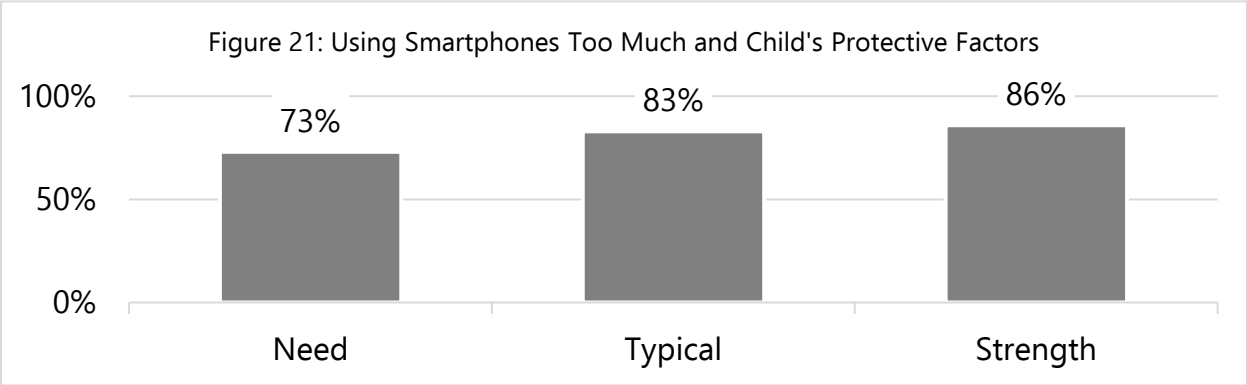Figure 21: Using Smartphones Too Much and Child's Protective Factors

Figure 21: Percentage of mothers agreeing that they feel that they use their smartphones too much and whether their children had initiative, self-regulation and attachment/ relationships (i.e., protective factors) as strengths, areas of need, or as being typical, according to the DECA.

The patterns depicted in Figures 17-21 did not appear when assessing behavioral concerns according to the DECA.

SDQ - Strengths and Difficulties. Figure 22 shows that children who scored high on total difficulties on the SDQ had mothers who logged more minutes on their smartphones than mothers whose children scored average in this area. Related, Figure 23 shows that mothers with children in both the high and average groups tended to have similar numbers of daily pickups and notifications, on average.

Figure 22: Mother's Smartphone Use (in Minutes) and Child's Total Difficulties

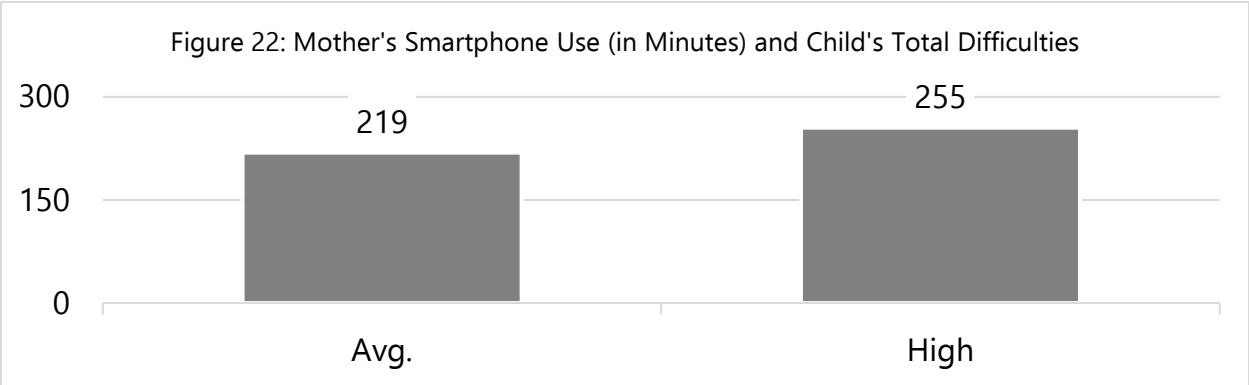|	Avg.	High
	219	255

Figure 22: Mothers average daily smartphone use (in minutes) and whether their children had average or high total difficulties, according to the SDQ.

Figure 23: Mother's Pickups and Notifications and Child's Total Difficulties
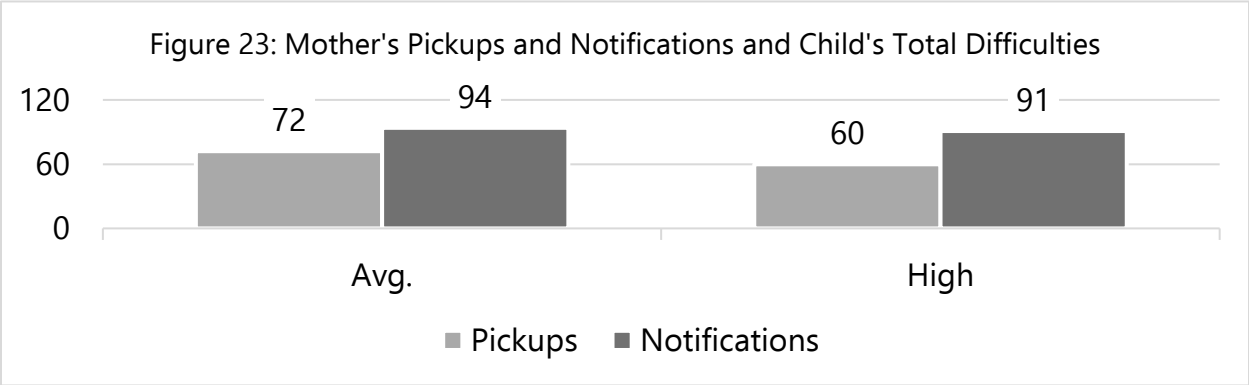
■ Pickups ■ Notifications

Figure 23: Mothers average daily pickups and notifications and whether their children had average or high total difficulties, according to the SDQ.

Figure 24 shows that children who scored low on prosocial behaviors on the SDQ had mothers who logged slightly more minutes on their smartphones per day than mothers whose children scored average in this area. In contrast, Figure 25 shows that these same children had mothers with fewer smartphone pickups and who received fewer notifications throughout the day, on average.
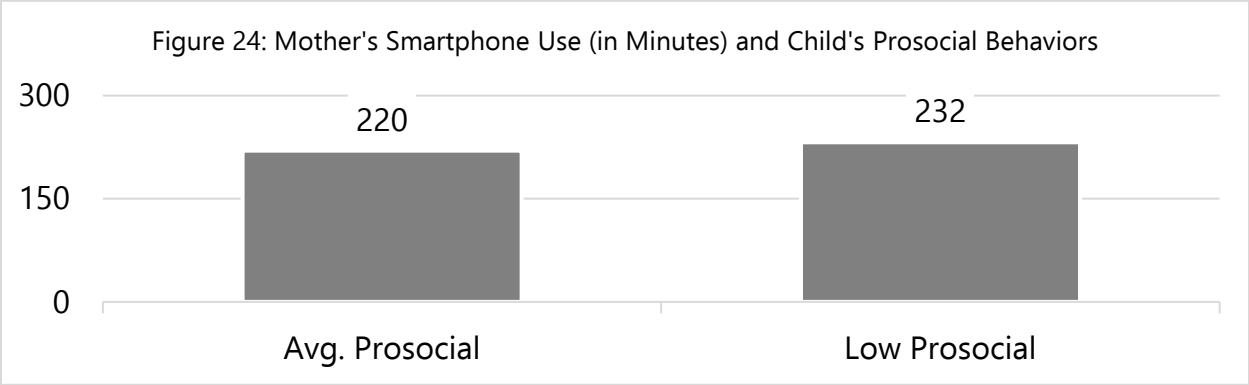
Figure 24: Mothers average daily smartphone use (in minutes) and whether their children had average or low in prosocial behaviors, according to the SDQ.
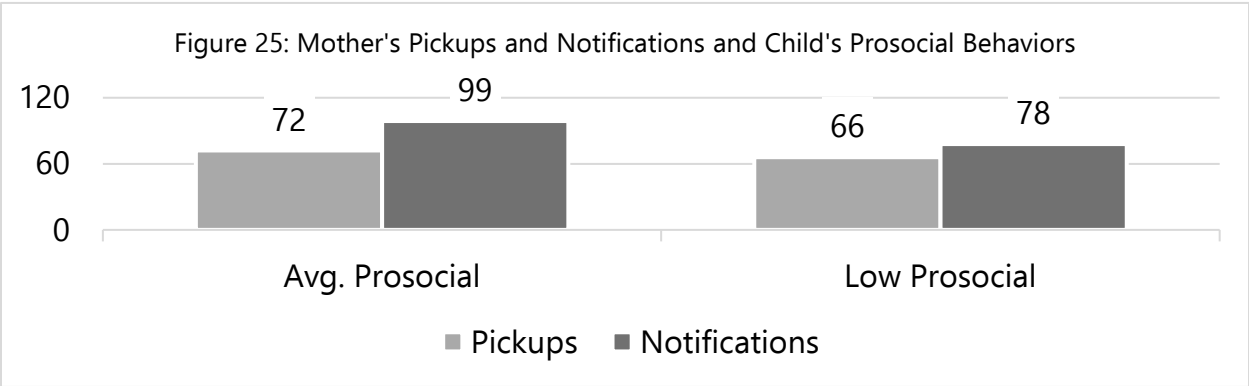

Figure 25: Mothers average daily pickups and notifications and whether their children had average or low in prosocial behaviors, according to the SDQ.

Figure 26 shows that children who scored low on prosocial behaviors on the SDQ had mothers who reported having more trouble resisting checking their smartphone and Figure 27 shows that these mothers reported having more interactions with their child interrupted by their smartphone. Figure 28 shows no difference in the child's prosocial behavior based on mother's smartphone use.
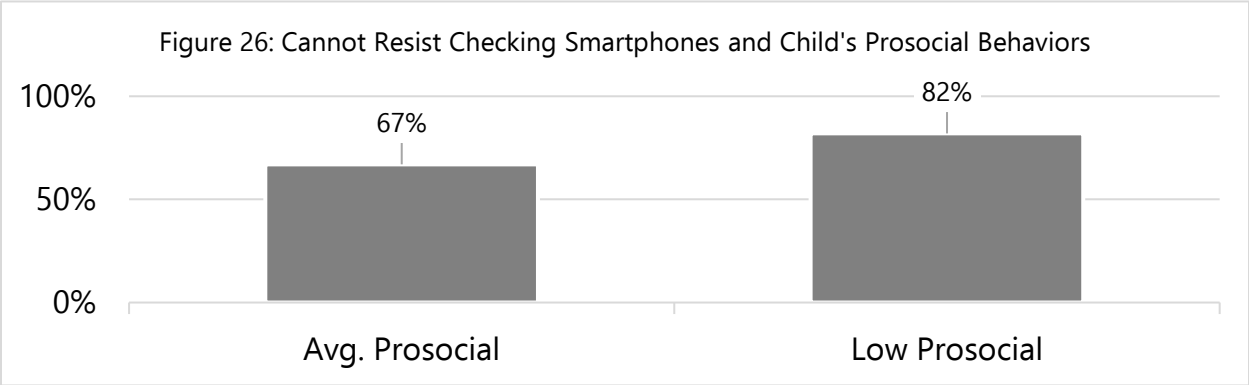
Figure 26: Percentage of mothers agreeing that they cannot resist checking their smartphones and whether their children had average or low prosocial behavior, according to the SDQ.
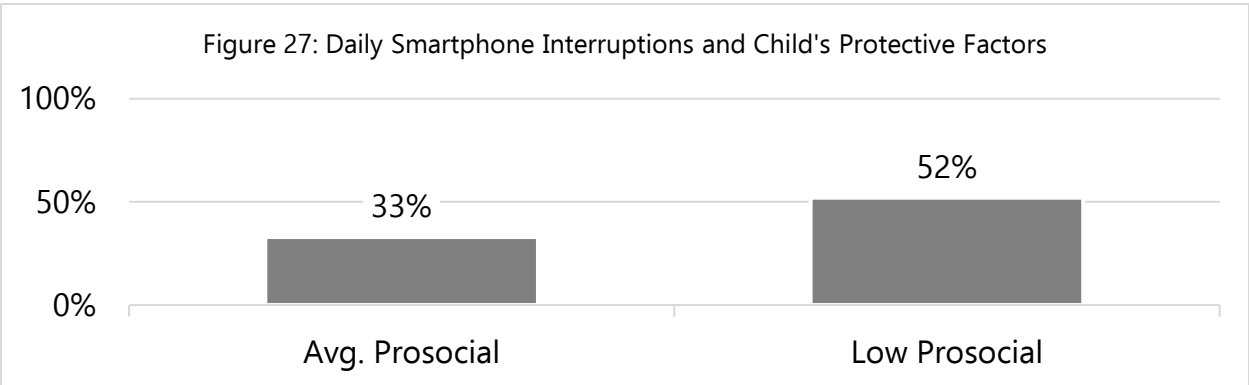

Figure 27: Percentage of mothers reporting that they are interrupted by their smartphone more than 5 times per day and whether their children had average or low prosocial behavior, according to the SDQ.
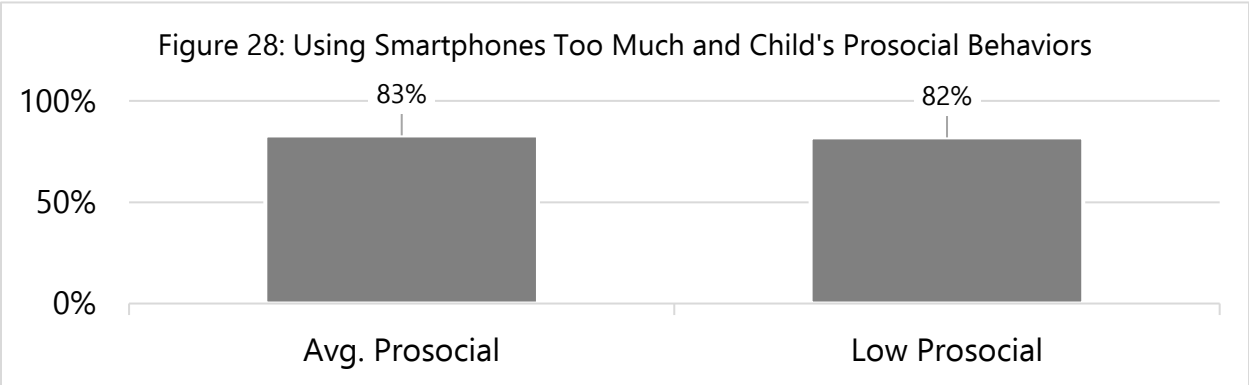

Figure 28: Percentage of mothers saying they feel that they use their smartphone too much and whether their children had average or low prosocial behavior, according to the SDQ.

The patterns depicted in Figures 26-28 did not appear when assessing total difficulties according to the SDQ.

Mother's Technology Use and the Child's Cognitive Development

Expressive and Receptive Language. Figures 29-34 depict data from the two language measures. Figures 34-39 depict data from the three executive function measures.

Figures 29-34 do not show a consistent pattern across the two language measures. With regards to receptive language (PVT), less smartphone use corresponds to better vocabulary as indicated by fewer pickups, fewer notifications, and fewer average daily minutes of use. With regards to expressive (or productive) vocabulary (MCDI), the opposite pattern emerged - more smartphone use corresponded to better vocabulary.
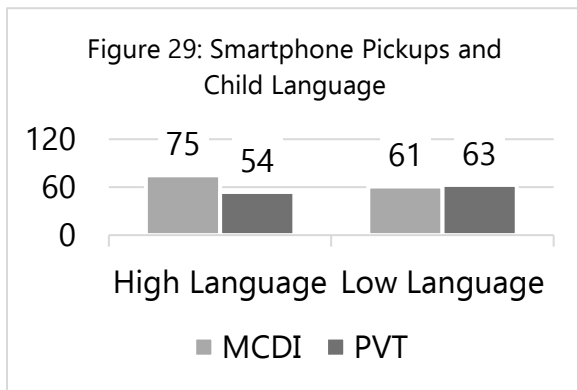
Figure 29: Mothers average daily pickups and whether their children scored higher or lower on expressive language (MCDI) and receptive language (PVT).
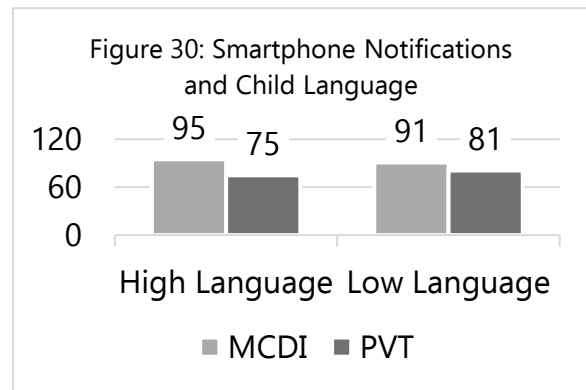
Figure 30: Mothers average daily notifications and whether their children scored higher or lower on expressive language (MCDI) and receptive language (PVT).

Figure 31: Smartphone Use (in Minutes) and Child Language
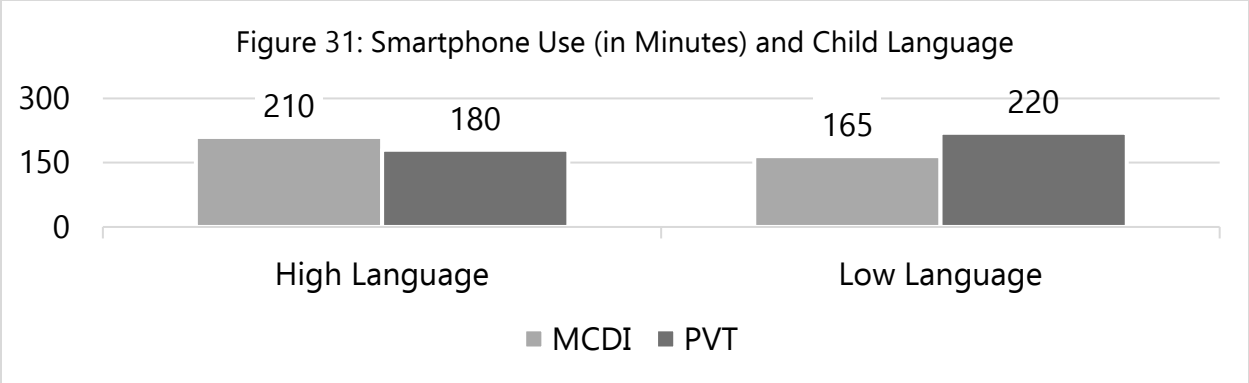
Figure 31: Mothers average daily smartphone use (in minutes) and whether their children scored higher or lower on expressive language (MCDI) and receptive language (PVT).

Figure 32 shows that higher scores on the MCDI (i.e., expressive vocabulary) and PVT (i.e., receptive vocabulary) were not differentiated very strongly by whether mothers had trouble resisting checking their smartphone. This was also true for using the smartphone too much (Figure 33) and interruptions (Figure 34).

Figure 32: Cannot Resist Checking Smartphones and Child Language
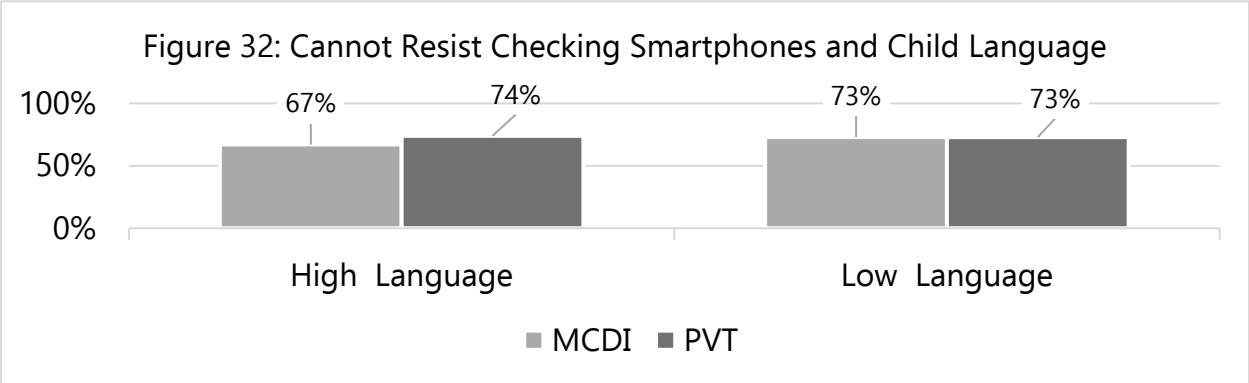
Figure 32: Percentage of mothers agreeing that they cannot resist checking their smartphones and whether their children scored higher or lower on expressive language (MCDI) and receptive language (PVT).

Figure 33: Percentage of mothers agreeing that they use their smartphones too much and whether their children scored higher or lower on expressive language (MCDI) and receptive language (PVT).

Figure 34: Percentage of mothers reporting that they are interrupted by their smartphone more than 5 times per day and whether their children scored higher or lower on expressive language (MCDI) and receptive language (PVT).

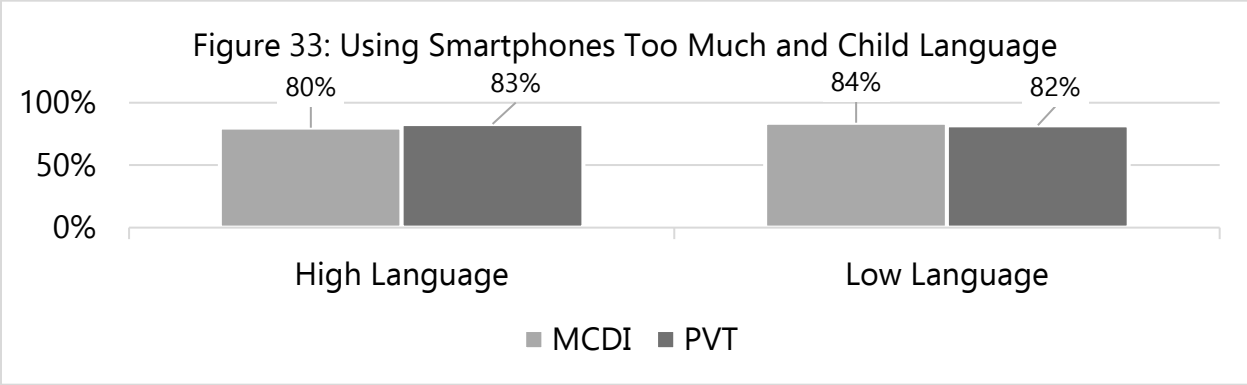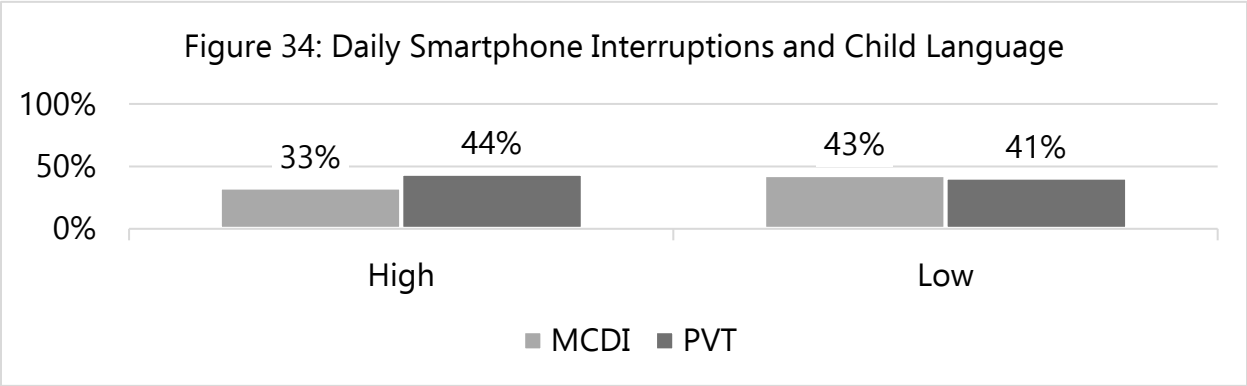Executive Function – Self-control, Flexibility, Inhibition. Figures 35-37 do not show a consistent pattern across the three measures of executive function. According to the REEF, which is based on the mother's report, more pickups, more notifications, and more minutes of smartphone use correspond to higher executive functions scores and better task performance. A similar pattern emerged for the card sort task when assessing pickups and notifications, but the opposite pattern emerged for minutes of daily smartphone use. Here higher smartphone use corresponded to worse task performance. The flanker task depicted an even different pattern. Better performance on this executive function task corresponded to less smartphone use in terms of pickups, notifications, and amount of daily use. Two notes on this task, however. First, this task had the fewest number of participants so this pattern should be interpreted cautiously. Second, both the flanker and card sort were completed by the child so perhaps they provide different sensitivities to mother's smartphone behaviors compared to the REEF. Third, the flanker task is thought

to measure inhibition, one aspect self-control. Perhaps it is natural for mothers who are skilled at ignoring notifications, not picking up their phones compulsively or impulsively, and limiting their overall use to have children who also show this type of trait in their own behaviors.
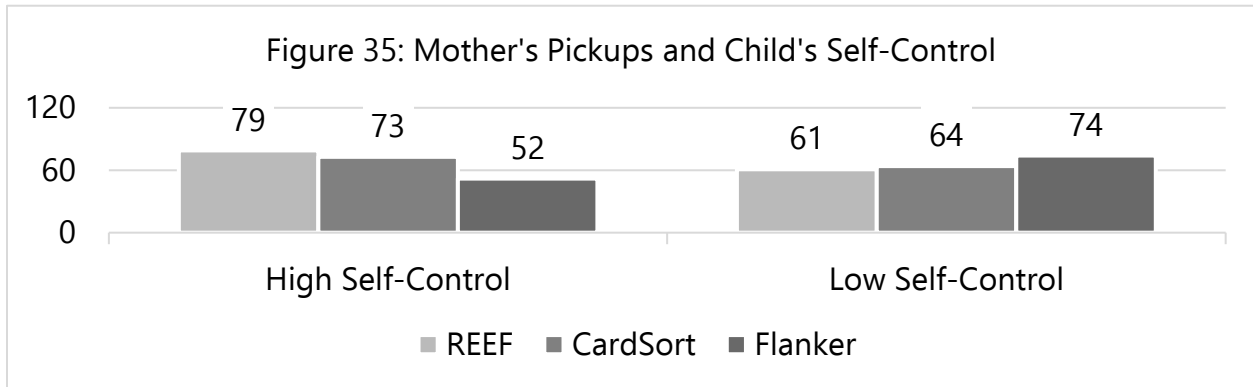

Figure 35: Mothers average daily pickups and whether their children scored higher or lower on measures of executive function (i.e., self-control).
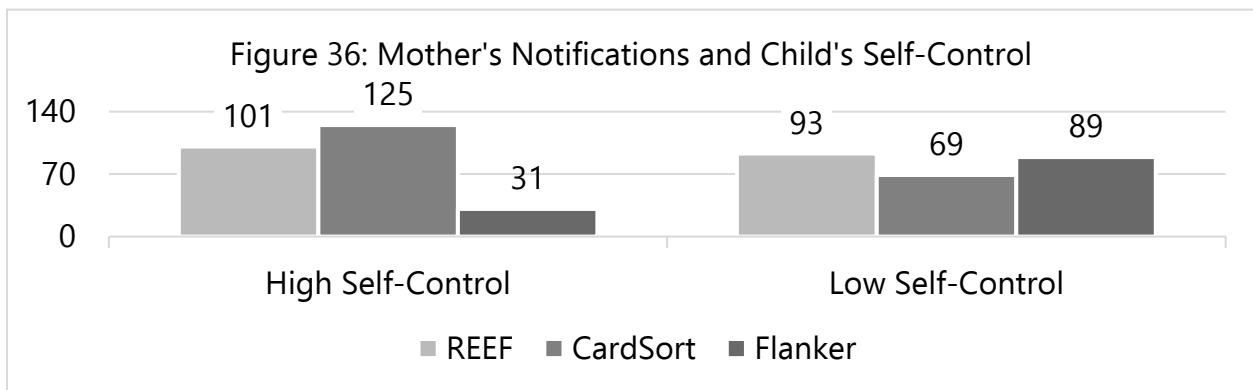
Figure 36: Mothers average daily notifications and whether their children scored higher or lower on measures of executive function (i.e., self-control).

Figure 37: Smartphone Use (in Minutes) and Child's Self-Control
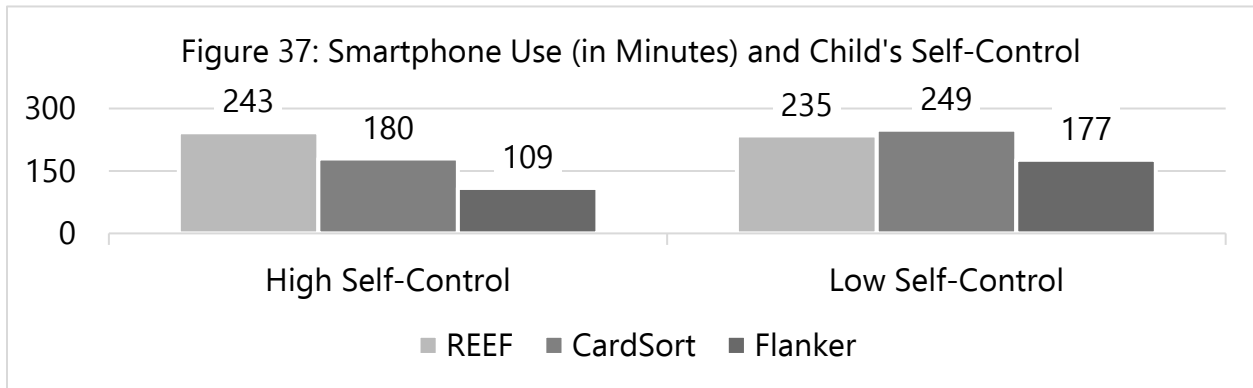
Figure 37: Mothers average daily smartphone use (in minutes) and whether their children scored higher or lower on measures of executive function (i.e., self-control).

Figures 38-40 also do not show a consistent pattern across the three measures of executive function. According to the REEF, better resistance, not thinking you use your smartphone too much, and fewer interruptions correspond to higher executive functions scores. The same pattern emerged for the flanker task. Although, it should be noted that the difference in these cases were often small (i.e., just a few percentage points). The card sort task depicted a different pattern. Better performance on this executive function task corresponded to worse resistance, too much use, and the same likelihood for interruptions.

Figure 38: Cannot Resist Checking Smartphones and Child's Self-Control
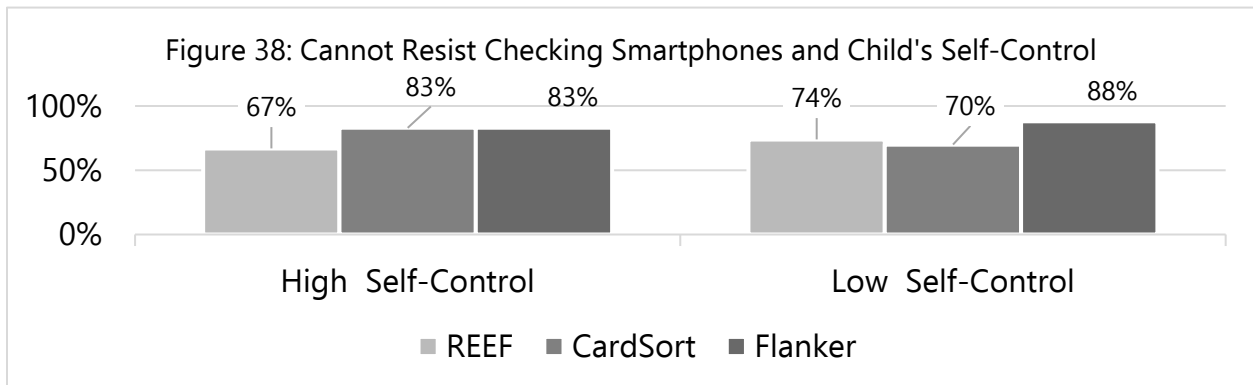
Figure 38: Percentage of mothers agreeing that they cannot resist checking their smartphones and whether their children scored higher or lower on measures of executive function (i.e., self-control).

Figure 39: Using Smartphones Too Much and Child's Self-Control Language

100%
50%
0%

High Self-Control   Low Self-Control

80%   92%   83%   83%   85%   88%

REEF   CardSort   Flanker

Figure 39: Percentage of mothers agreeing that they use their smartphones too much and whether their children scored higher or lower on measures of executive function (i.e., self-control).

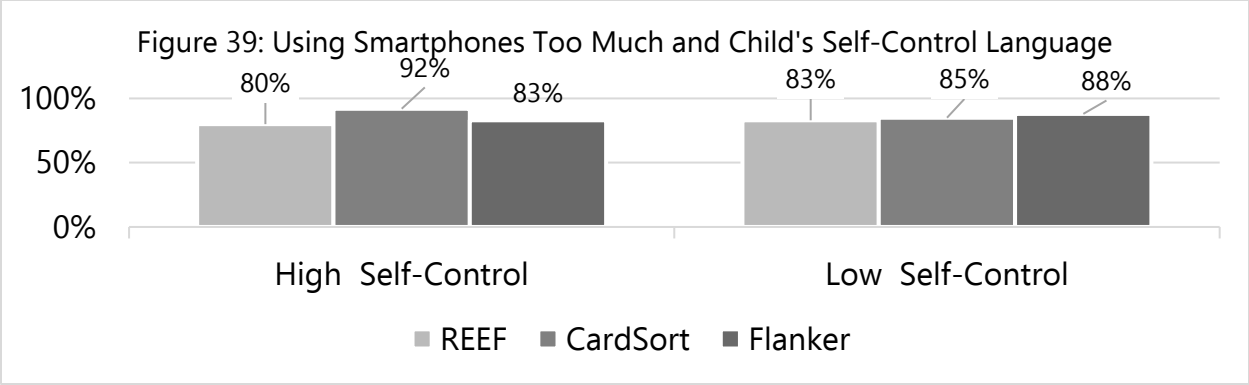Figure 40: Daily Smartphone Interruptions and Child's Self-Control

100%
50%
0%

High Self-Control   Low Self-Control

36%   33%   50%   46%   33%   63%

REEF   CardSort   Flanker
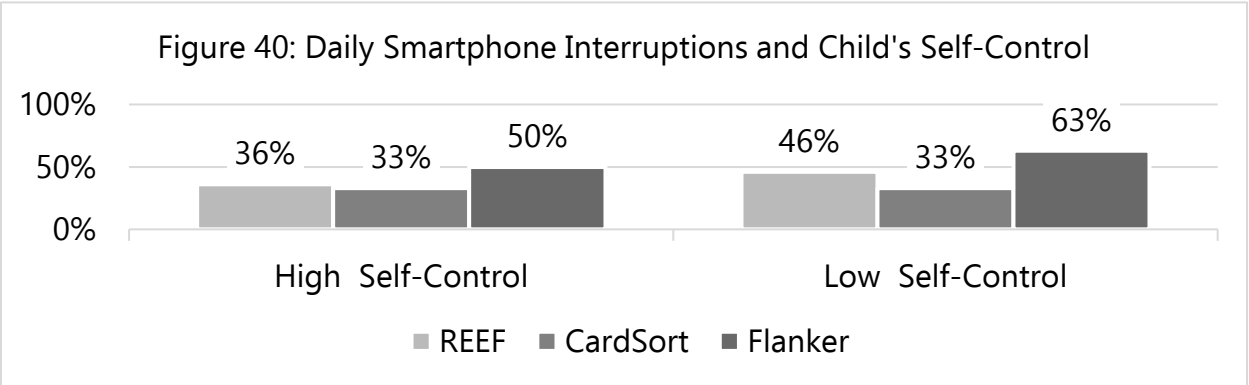
Figure 40: Percentage of mothers reporting that they are interrupted by their smartphone more than 5 times per day and whether their children scored higher or lower on measures of executive function (i.e., self-control).

Mothers varied widely by how much they used their smartphones and what they used it for. For example, although mothers averaged 223 minutes of smartphone use per day, the full range included mothers who averaged less than one hour a day and mothers who averaged more than 10 hours a day. Also, some mothers spent less than 20 minutes each day using social media, whereas others spent more than 5 hours. These differences were used to create 3 categories of use. Mothers (n=15) were placed in the "high" use category if they averaged more than 4 hours of overall use and more than 2 hours of social media use per day. The average daily screen time use for this group was roughly 8 hours and the average social media use was about 4 hours. Mothers (n=14) were placed in the "low" use category if they averaged under 2 hours of overall use and under 1 hour of social media use per day. The average daily screen time use for this group was just 79 minutes and the average social media use was about 30 minutes. Mothers (n=49) were placed in the

moderate or "normal" use category if their use pattern fell between the other two groups. The average daily screen time use for this group was 3 hours and the average social media use was about 1 hour and 20 minutes.

Figures 41-42 show how children's language and executive functions are potentially affected by the category of use mothers fall into. For language, the children of high use mothers had slightly lower reported vocabulary scores compared to those of low use mothers. For executive functions, the children of high use mothers had slightly lower reported everyday self-control scores compared to those of low use mothers.

Figure 41: High/Low Use and Vocabulary

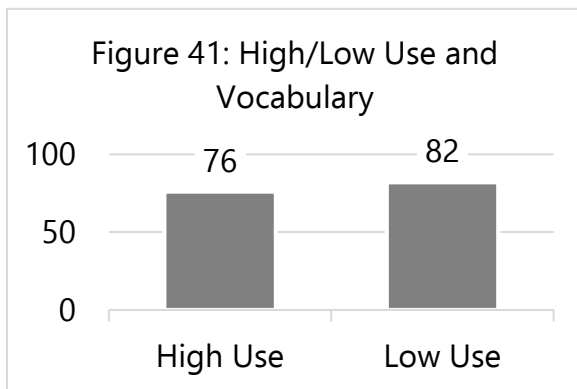|	High Use	Low Use
	76	82

Figure 41: Child vocabulary scores as indicated on the MCDI and whether mothers were categorized as high or low smartphone use. Low use corresponded to better scores.

Figure 42: High/Low Use and Self-control

	High Use	Low Use
	139	158
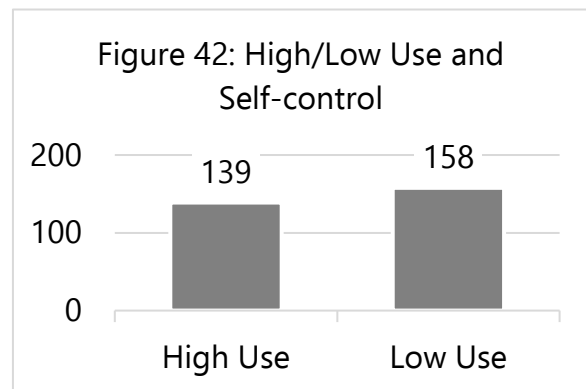
Figure 42: Child executive function (i.e., self-control) as indicated on the REEF and whether mothers were categorized as high or low smartphone use. Low use corresponded to better scores.

Mother's Technology Use and Free Play

We assessed several aspects of the 10-minute free play interaction between the mother and child, including how much mothers talked to their children and how much they engaged in joint attention with their children. Figure 43 shows a negative relationship between how much mothers talk during the free play period (in seconds) and how often they pick up their smartphones per day (correlation = -.24). This indicates that the more mothers pick up their smartphones the less they talked during the play period. Similarly, Figure 44 shows a negative relationship between how much mothers talk during the free play period (in seconds) and how much they use their smartphones per day (correlation = -.22). Mothers who use their smartphones more talk less during free play. These have negative implications for children's language development since early mother-child

interactions have been shown to support, and even be crucial for, later language growth.[41] Figure 45 shows that mothers who experience more interruptions due to their smartphone spend less time in joint attention episodes, both those they initiate and those the child initiates. Interestingly, mothers with more interruptions did not engage in fewer instances of joint attention, just shorter ones.

Figure 43: Mother Talking during Free Play and Pickups
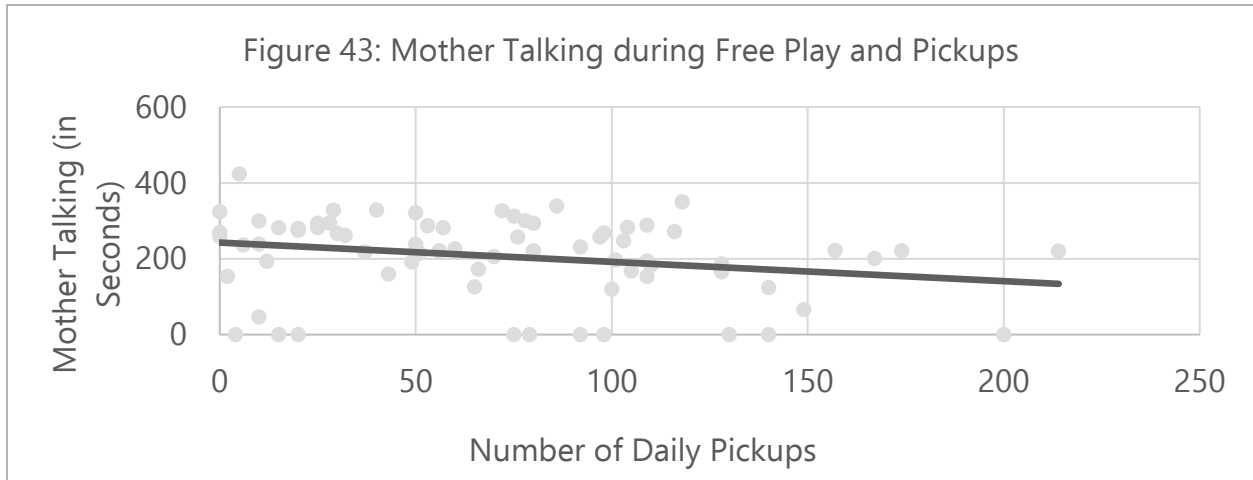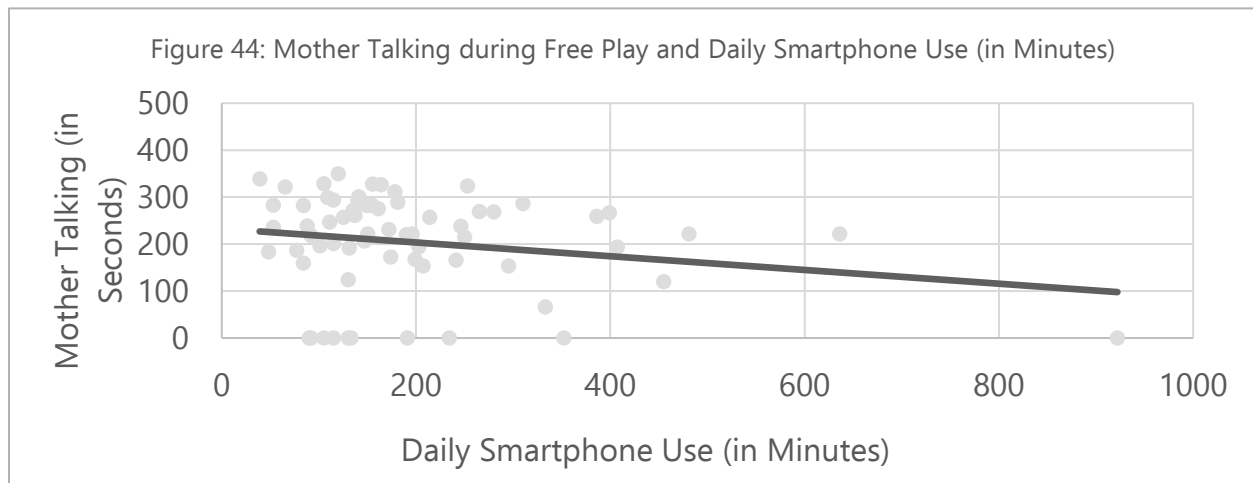

Figure 43: Mothers who talked less during the free play period (in minutes) averaged more daily smartphone pickups.

Figure 44: Mother Talking during Free Play and Daily Smartphone Use (in Minutes)

Figure 44: Mothers who talked less during the free play period (in minutes) averaged more daily smartphone use.

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[41] https://doi.org/10.1177/0956797613488145

Figure 45: Time Spent in Joint Attention (in Seconds) and Smartphone Interruptions
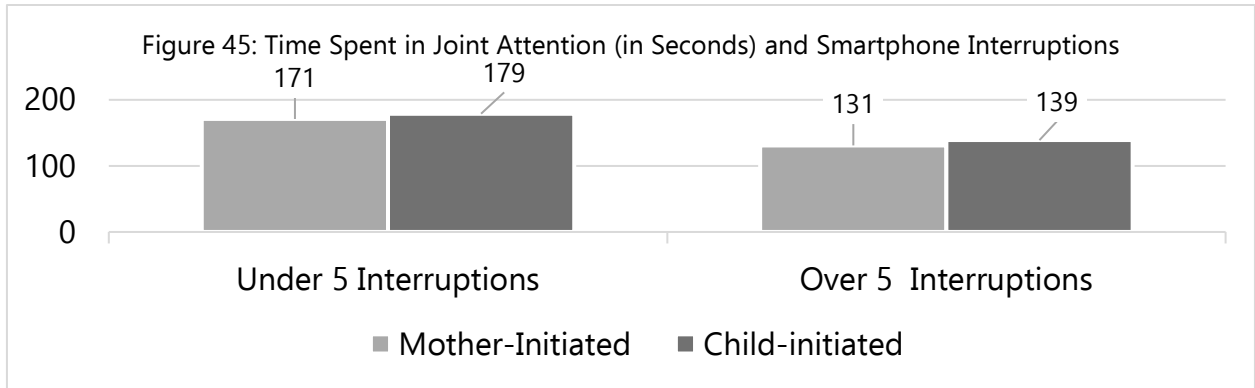
Figure 45: The number of seconds mothers spend in mother-initiated episodes of joint attention and whether they are interrupted more or less than 5 times per day by their smartphones (i.e., text, call).

High and low use mothers (as described previously) were compared on free play behaviors. Low use mothers talked more often (169 times vs. 134 times) and for a longer total duration (233 seconds vs. 184) than high use mothers during the free play period. Low use mothers had children who initiated more joint attention episodes (12 times vs. 10 times) compared to high use mothers. Low use mothers also initiated more joint attention episodes (11 times vs. 9 times) than high use mothers, and these episodes lasted for longer durations in low use mothers (161 seconds vs. 128 seconds). Low use mothers also provided more object names during the play period compared to high use mothers (20 vs. 13), including more references to unknown and novel objects (9 vs. 6). Finally, the children of low use mothers learned more object names (1.64 vs. 1.50) and functions (1.58 vs. 1.44) compared to high use mothers.

Conclusions

Mother's Technology Use

Most US adults spend significant parts of every day using technology, especially their smartphones, and the AL mothers in this study are no different. Our mothers used their smartphones approximately 4 hours per day, with over half of this time accounted for with social media apps like Facebook, they picked up their phones 82 times per day, and they received more than 100 notifications per day. Each of these data points is either at or above the corresponding national average. This level of use, by itself, is not necessarily problematic. It can become so, however, if it starts to erode the frequency or quality of the interactions that the mothers have with their young children. We saw some evidence in this study that it might: 73% of mothers reported having trouble resisting the urge to check their smartphones, 83% agreed that they use their smartphone too much, and,

perhaps most telling, every mother in the study said that their smartphone interrupts interactions with their child multiple times a day. Indeed, nearly 60% said they are interrupted more than 5 times per day. There is also some evidence that mothers increased smartphone use could negatively affect the child's social and cognitive development, as summarized below, although these appeared to be small or subtle effects. However, independent of whether there are more negative effects or few positive effects on the child as a result of mother's smartphone use, mothers in this study communicated clearly that they are susceptible to overusing their smartphones and doing so compulsively or impulsively (i.e., "I can't resist"). It might be these data which make the most compelling case to assist mothers in reducing their smartphone use or at least in showing them how to be more intentional about when and where they use it. This has potential benefits for the child, both socially and cognitively, but also for the mother's own well-being.

Conclusions Regarding Social Development

For social development, the clearest patterns suggest that a mother's increased smartphone use corresponds to their child having fewer or lower positive outcomes. This was especially clear on the DECA. For example, the difference between children who were typical on initiative, self-regulation, and attachment/relationships and those who were high on these factors high (i.e., it was an area of strength) was often evident in the differences between their mother's smartphone use. Mothers of children in the typical range logged more daily minutes, had more pickups and notifications, had more trouble resisting checking their smartphone, had higher agreement that they used their smartphones too much, and experienced more interruptions due to their smartphones than other mothers. However, their increased smartphone use did not create a parallel increase in the risk for their child to show these as areas of need. In fact, the difference between children scored low on initiative, self-regulation, and attachment/relationships (i.e., as an area of need) and those who scored high (i.e., as an area of strength) was often not evident in their mother's smartphone use. Perhaps these groups differ in other meaningful ways (e.g., SES). The pattern was less clear, although still present, on the SDQ. Smartphone use was lower for mothers whose children exhibited more positive characteristics. For example, higher prosocial behaviors were exhibited by children whose mothers logged fewer daily minutes on their smartphones, who had less trouble resisting checking their smartphones, and who experience fewer interruptions from their smartphones while interacting with their child. Likewise, fewer problems were exhibited by children whose mothers logged fewer daily minutes on their smartphones. However, children whose mothers had more pickups and notifications were reported to have lower prosocial behavior and more difficulties regarding emotionality, conduct problems,

hyperactivity and inattention, and peer relationship problems. Overall, these findings suggest that mother's heightened smartphone use may have less to do with avoiding negative social outcomes and more about limiting positive social outcomes.

Conclusions Regarding Cognitive Development

For cognitive development, the patterns suggest more complexity in the relationships. Regarding language, the data suggest that mother's smartphone use might be more strongly related to young children's ability to understand and comprehend words (i.e., their receptive vocabulary) than to their ability to produce them (i.e., expressive vocabulary). However, this was true mainly for the measures of smartphone use that captured actual use (i.e., pickups, notifications, average daily minutes). Neither assessment differentiated children based on mother's perception of her use (i.e., agreeing that it was hard to resist checking her smartphone, agreeing that she used her smartphone too much, and her estimates of how often interactions with her child are interrupted by the her smartphone). Regarding executive function, both actual use and perceived use produced similar patterns of response on two of the measures but not on the third. For actual use, higher levels of smartphone use corresponded to better self-control in everyday situations (e.g., shopping with mom, playing with a friend) and more cognitive flexibility in the child (e.g., able to switch rules quickly with less perseveration). For perceived use, lower perceptions of smartphone use by the mother, and few perceived interruptions, corresponded to better inhibition in the child (e.g., resisting their first impulse). Overall, these findings suggest that mother's heightened smartphone use may be related to some aspects of cognitive development in this sample, including the children's receptive language and their inhibition skills.

Conclusions Regarding Mother-Child Interactions

In some cases, there may be direct influences of technology use on child development outcomes. In other cases, those influences may be indirect. In the context of free play, we saw mother's technology use, and in particular how much she used her smartphone and how often she picked up her smartphone throughout the day, was negatively related to how much she talked during the natural mother-child interaction. It is possible that a mother's average number of daily pickups reflect her everyday habits when it comes to interacting with her child and more pickups are characteristic of mothers who engage in shorter, less frequent, or lower quality interactions. This possibility is supported by the finding that mothers who experienced more smartphone interruptions spent less time in joint attention episodes, both those they initiated and those the child initiated. In fact, mothers with more interruptions engaged in shorter,

but not fewer, instances of joint attention. While not representing direct effects, these patterns have negative implications for children's development since early mother-child interactions have been shown to support, and even be crucial for, later growth.

Recommendations for Dissemination, Public Messaging

The findings summarized in this report show that mothers with young children, like many adults, spend a significant amount of time each day on technology devices, especially their smartphones. Mothers in our sample felt that they spent too much time each day on their smartphones and that this use regularly interrupted activities and conversations with their child. Our findings also show that higher amounts of smartphone use can increase the child's likelihood for negative developmental outcomes in some cases and decrease the child's likelihood for positive developmental outcomes in others. One implication of these findings is that mothers should consider limiting their smartphone when possible. This is an important message to broadcast widely to Alabamians. So, what can be done to help mothers limit their device/smartphone use? Below we discuss some ideas for communicating these findings to interested parties and stakeholders across the State by: developing and launching a public messaging campaign targeting less smartphone use, creating a resource listing practical tips for using smartphones less, and providing detailed instructions on how to use tools and apps designed to limit smartphone use.

Public Messaging

One idea for helping mothers limit their device/smartphone use is to develop a public messaging campaign that can be marketed through internet, TV, radio, and print ads, promotional items, etc. throughout the state. The campaign could be built on one or more simple, catchy themes. The goal of any theme would be to help mothers reduce device/phone use by motivating, educating, or reminding them to do so. Below are some potential themes. They are presented individually here but could be combined. Also, the tone could be serious or light, provided the message resonates with mothers and is not aimed at making them feel negatively about their use.

Be a role model. This theme would focus on encouraging mothers to model good technology use behavior (e.g., slogans like "they're watching"). The purpose of this message would be to limit smartphone use by reminding mothers that children learn behaviors and habits from what they observe every day.

Put it down. This theme could focus on encouraging mothers to use the phone less (e.g., "turn it off" or "tech diet"). The purpose of this message would be to limit smartphone use

by reminding mothers to take breaks from their smartphones and that too much use can be unhealthy and even harmful.

It can wait. This theme could focus on the non-urgency of many smartphone activities (e.g., text messages, scrolling through social media, watching YouTube, etc.) – activities that do not require immediate or automatic attention. The purpose of this message would be to limit smartphone use by reminding mothers not to be distracted by their smartphones and to resist the urge to respond quickly.

Don't miss out. This theme could focus on reminding mothers that childhood is finite (e.g., "they grow up fast" or "look up"). The purpose of this message would be to limit smartphone use by reminding mothers that childhood is fleeting, and they do not want to miss anything. Any moment can matter, so stay in the moment.

Did you know. This theme could focus on providing basic phone use or "how to" information to mothers (e.g., "do you know how to…") (see the next paragraph for examples). The purpose of this message would be to limit smartphone use by educating mothers on basic smartphone phone use rates/norms and how to monitor their own.

Practical Tips

Another idea for helping mothers limit their device/smartphone use is to develop a list of practical tips. This would provide give mothers recommendations for "what to do when" by introducing easy solutions or habits that support their efforts to resist and reduce phone use. These could include: silencing the phone, placing the phone screen down, designating a permanent location for the phone like a charging station (rather than carry it around), setting personal/house rules about when/where to use the smartphone (e.g., not in front of children, after children are in bed, during naps, etc.), developing a reward system where phone use is earned through quality time with the child, agreeing that only one parent can be on the phone at a given time, practicing co-watching with the child, put a reminder image on the lock screen, placing a sticker on the back as a reminder, setting the ringtone to be a reminder (e.g., "hi mommy"), choosing activities that make phone use more challenging (e.g., read a book, take a walk), or assigning designated times[42] to check notifications, texts, etc. Tips like these could be printed on information sheets/pamphlets for distribution by doctor's offices or county health departments, made into public service announcements, or posted on websites or social media.

<u>How To</u>

Another idea for helping mothers limit their device/smartphone use is to educate mothers on some of the basic features, functions, or apps available on their smartphones and how to use them. This would help by closing the gap between what smartphones can do and what mothers know. "How to" tips could include: how to track smartphone use with a built-in or downloaded app (e.g., RescueTime, Apple's Screen Time, Google Digital Wellbeing, etc.), how to schedule periods of downtime using something like a *do not disturb* function, how to set screen limits for a maximum amount of use overall or for certain apps, how to turn off notifications on some or all apps, how to set the phones color to grayscale, how to talk to you child about interruptions – informing them when you are about to use the phone or what to do when the phone rings.