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### Does Caregiver Use of Portable Technology Impact Attachment for Infants and Young Children?

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Does Caregiver Use of Portable Technology Impact Attachment for Infants and Young Children?

03/29/2023

This evidence project, submitted by

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has been approved and accepted  
in partial fulfillment of the requirements for the degree(s) of  
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Key words: Caregiver , Technology , Attachment

## Abstract

Ellie Olson, OTR/L, the primary collaborator for this project, is the owner of Fall City Children's Therapy. In collaboration with occupational therapy (OT) students and faculty advisors, Renee Watling, Maggie Hayes, and Yvonne Swinth, the research question, "Does caregiver use of portable technology impact attachment for infants and young children?" was developed. This systematic review resulted in 12 articles meeting inclusion and exclusion criteria. The articles reported mixed results: (1) association between parent technology use and child attachment, (2) no association between parent technology use and child attachment, and (3) other associations besides parent technology use and child attachment, including quality of interactions during and after parent cell phone use, parent responsiveness to child, and increased negative child behaviors. After reviewing the research/literature, it was recommended that parents be cautious about their technology use around their children and take into consideration potential impacts portable technology use may have.

Knowledge translation for this project consisted of compiling and synthesizing research into an informational brochure distributed to caregivers at Fall City Children's Therapy and University of Puget Sound occupational therapy teaching clinic. A post-brochure survey assessed knowledge gained by consumers and change in attitude toward technology use from after reading the informational brochure. Seven surveys were completed and all respondents reported caregiver technology use had an impact on parent child attachment including, quality of attachment, caregiver-child interaction, and increased child protest behavior. Of the respondents, a majority indicated that they were planning on changing their technology use around their children. In the future, it was recommended for further exploration of the impact of caregiver's technology usage specifically on children's emotional regulation.

## Critically Appraised Topic (CAT)

### Contextual Information

What started as a small farm setting in Fall City, WA in 2013, has developed into a growing pediatric clinic. The staff is made up of three registered occupational therapists (OTRs) and two certified occupational therapy assistants (COTA). These professionals have experience ranging from 1 to 10 years. The clinic is owned and operated by Ellie Olson, who posed our clinical research question. She receives patients mainly through referrals from neurologists and clients, as well as website inquiries. There is a waitlist to get into her clinic and are on a first come first serve basis. Most of her clients have insurance, however pre-pandemic she saw several children free of charge through a scholarship program which has not yet been resumed.

While operating as a “boutique” OT clinic, the priority is client centered services and not profitability, so productivity operates around fifty percent. Clients are typically seen for 53-60 minutes or 4 units of billable time. Clients are given the Sensory Profile 2 (Dunn, 2014) assessment which monitors the social and emotional components necessary for emotional regulation. To address the deficit with self regulation, the clinic primarily administers the Safe and Sound Protocol, where clients are given 5 hours of sound therapy split up across 5 times a week as the therapist deems necessary (Unyte, n.d.). This is to help them move out of the fight or flight mentality and more towards social engagement.

Fall City has 2,187 residents with 59% of the population between 18-64 years of age. 75% of Fall City residents are white, followed by 8% Hispanic, and 5% Asian. The median age is 36.6 and 54% of the population is male. The median household income is \$128,224 (Census Reporter, n.d.). This all reveals that the majority of clients who attend Ellie’s clinic mainly fit into a specific demographic of white clients with two parents. The clients treated at the clinic range from three to 16 years old and are mainly white and Asian American. Ellie mentioned that

there are some African American clients, but they are adopted. The caretakers of the clients are primarily married heterosexual couples. There is not an average parent age, but Ellie noted that none of the parents are under the age of twenty years old. This research question emerged from an affluent and non-diverse population, this specific culture and access to technology may differ from global portable technology use.

Ellie collaborates and networks with clinicians in school settings. Several professional conversations took place before COVID-19 that focused on kindergarten classrooms being full of students, with no comorbidities, that presented with emotional dysregulation. Ellie and her colleagues hypothesized that the use of smart phones during critical attachment activities may contribute to the lack of emotional regulation skills for neurotypical children entering kindergarten

### **PICO/Focused Question**

Does Caregiver Use of Portable Technology Impact Attachment for Infants and Young Children?

### **Method**

<b>Categories</b>	<b>Key Search Terms</b>
Patient/Client Population	Caregiver, Parent, guardian, caretaker, father, mother, grandparent Birth to 5, Children, child, infants, toddlers, early development age, kids, preschool age, early childhood
Intervention (Assessment)	Portable technology use, technofence, smart phone, technology, electronic device, phubbing, cell phone, laptop, tablet, iPad, iPhone, MacBook, personal device, mobile device, smart device
Comparison	N/A
Outcomes	Attachment, attachment styles, attachment theory, avoidant, secure, disorganized, anxious, bonding, parent-child interaction, parent-child relationship, sensitivity

<b>Databases, Sites, and Sources Searched</b>
<i>Education Resource Info Center (ERIC)</i>
<i>PubMed</i>
<i>Google Scholar</i>
<i>PsychInfo</i>
<i>CINAHL</i>

## **Procedures for the Selection and Appraisal of Articles**

### ***Inclusion Criteria***

In order to accurately address our research question, we decided upon several areas deemed relevant to be a part of the inclusion and exclusion criteria. Peer reviewed articles from 2012–present were included in our study because research involving portable technology devices subsequently followed the widespread use of smartphones, such as iPhones, in 2007 (Jackson, 2018). Our inclusion criteria required articles to have two or more of our key terms and/or synonyms in the title. Additionally, the articles needed to discuss the topic of caregivers’ use of technology and its impact on children’s development.

### ***Exclusion Criteria***

Since our research question involves preschool-aged children, articles regarding children over the age of 5 were excluded from our study. To account for potential confounding variables, articles that involved children with comorbidities were also excluded. We did not include articles that focused solely on children’s use of technology, since our study’s focus is on caregivers’ use. To avoid potential misinterpretations of a study’s findings, articles that were not published in English were excluded. Lastly, we did not include vignettes, as they may not be rigorous enough to accurately generalize to a group/population.

## **Search Outcomes/Quality Control/Review Process**

In completing our search we used the key terms on the databases listed above to search for peer-reviewed articles. In order to find more research articles, we scanned the reference list of the articles that fit our inclusion criteria for titles containing two or more of our key

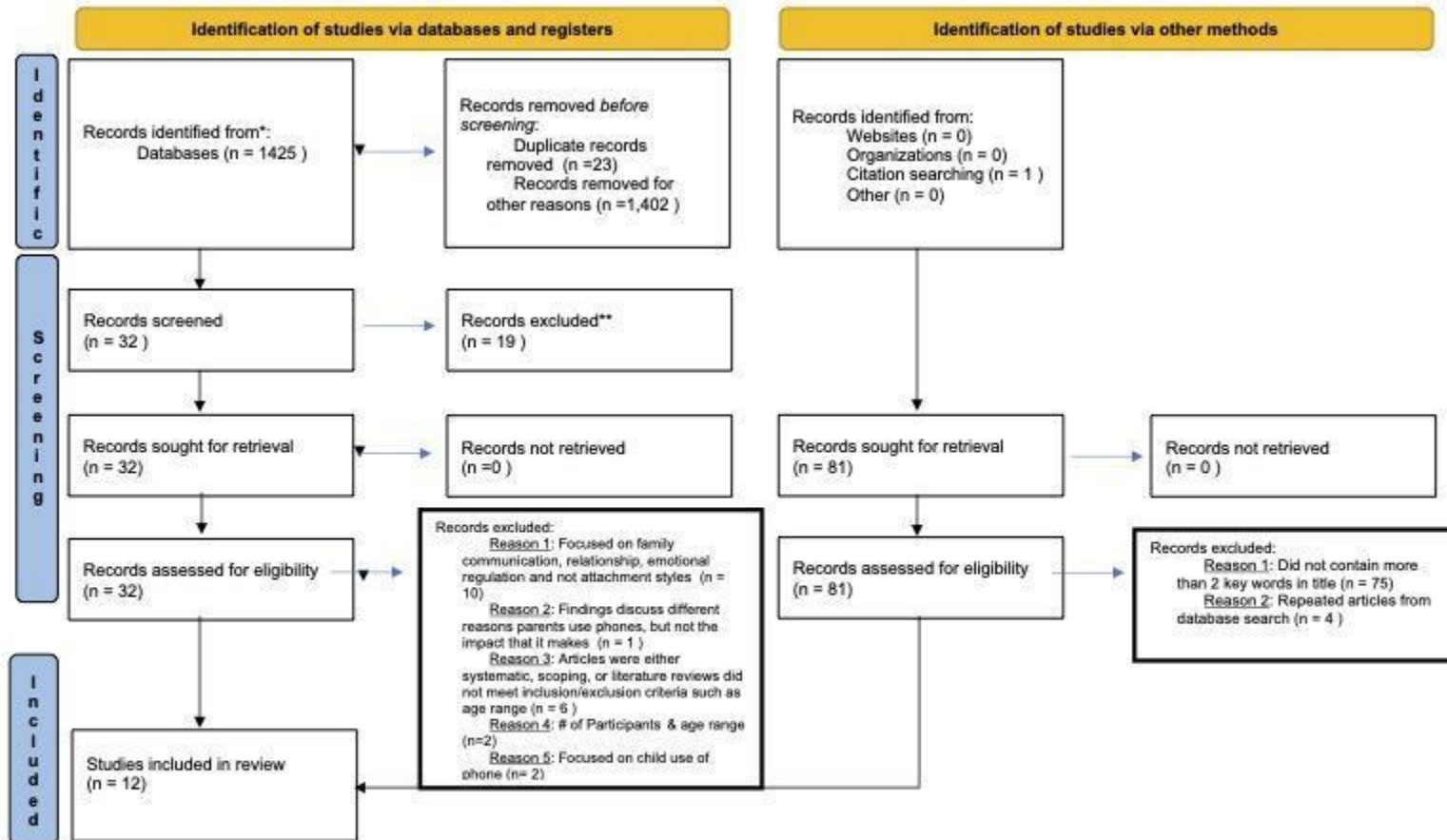
terms/phrases. Another strategy we used is meeting with the OT library liaison, Eli. Eli helped us if we needed access to a reference, or if we had difficulties finding specific topics.

We kept track of all of the articles we used in a shared google drive. We continually checked the shared drive to ensure the articles meet our criteria and there are no duplicate articles. For accessibility, we documented the articles we are planning to use in our master citation table.

To begin dividing up the literature that met inclusion criteria we assigned each group member one database to search. Depending on the search results of the databases, we adjusted everyone's assignments to ensure exhaustion of all relevant databases within reason and that the work was evenly divided between the group members. Lastly, we hand searched through references of systematic reviews and literature reviews that were found in the searching progress.

## Graphic Representation of the Research Process

Adapted PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and other sources



\*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).

\*\*If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71. For more information, visit: <http://www.prisma-statement.org/>

Adapted by University of Puget Sound School of Occupational Therapy



## **Results**

### ***Literature Searching and Article Inclusion***

To begin our search we split up the relevant major databases, using our keywords there were a total of 1425 hits. From those 1425 hits, 1369 of them did not meet our inclusion criteria, 23 of them were duplicates and thus were also excluded before screening. This left our group 33 articles to screen for our CAT table. Out of the 33 articles 5 were able to be accepted based on their abstracts. The other 28 articles were marked as maybes from their abstracts and were looked at in more detail. Upon examination, 12 of the articles were excluded because they focused on either family communication or emotional regulation, which did not fit the specific research question dealing with attachment. One of the articles focused on why caregivers may use phones, instead of the impacts of that phone use, so it was excluded. Six of the articles were systematic reviews or literature reviews and did not meet our inclusion criteria, such as the age range for the children studied. Three of the articles being screened did not have the correct age ranges. The last articles excluded during our screening process focused on child phone use, instead of parent phone use. After our initial screening, our group used the references from the literature reviews/scooping reviews for hand searching. From this searching, there was one dissertation found that was extremely relevant to our research question. This dissertation brought our total number of included articles to 12.

## Evidence

Table Summarizing the *QUANTITATIVE* Evidence

<u>Author</u> <u>Year</u> <u>Journal</u> Country	Study Objectives	Study Design/ Level of Evidence/	Participants: Sample Size, Description Inclusion and Exclusion Criteria	Interventions & Outcome Measures	Summary of Results	Study Limitations
Alvarez Gutierrez & Ventera  2021  <i>Early Human Development</i>  USA	Examine assoc. b/t maternal tech use during mother-infant feedings/care interactions and mother-infant attachment	Cross sectional survey  AOTA: III  Pyramid: D2	N= 332 Age of mothers m= 31.2. 74.7%= Non-Hispanic White.  Incl= mothers, over 18, infant b/t 2 to 6 m.o, infant born full term, signed consent.  Excl= Feeding disorders, developmental delays	I= Maternal tech use measured w/ MDQ  O= Mother-to-infant attachment quality measured w/ IBQ-RVS & MPAS	Maternal tech use had a small but statistically significant assoc. w/ decrease in mother-to-infant attachment quality ( $\beta = -0.20, p < .0001$ ).	Cross-sectional which limits causality/directional ly.  Uses surveys which depend on self reporting.  Recruited from an online platform, which may have attracted more technologically inclined mothers.  Mainly a Non-Hispanic White sample which limits generalizability.  Only included mothers, not other caregivers.
Ali et al.  2019	Prevalence of mothers that use tech excessively. Determine any assoc. b/t maternal	Descriptive Correlation Cross-Sectional  AOTA: IV	N=114 mothers age <40 99% married 86% 1-3 children	I: face-to-face survey conducted by 1 researcher; web-based survey	There is no significant assoc. b/t maternal tech use and	Convenience sampling  Self-administered questionnaire

<p><i>Nursing &amp; Health Sciences</i></p> <p>Jordan</p>	<p>tech use and bonding, mental health, and family functioning.</p>	<p>PYRAMID: D2</p>	<p>54% college education</p> <p>Incl=owns personal SPHN; access to internet</p> <p>Excl=incomplete web-based survey; unable to comprehend and speak Arabic</p>	<p>monitored by 1 researcher</p> <p>O: face-to-face survey (SAS; demographics) web-based survey (MIBS; DASS-21; GF of FAD)</p>	<p>mother/infant bonding.</p>	<p>Small study sample size</p> <p>No observation data or SPHN logger software to track SPHN use</p>
<p>Ante-Contreras</p> <p>2016</p> <p><i>Electronic Theses, Projects, and Dissertations</i></p> <p>USA</p>	<p>Examine parental use of social media and parent-child attachment.</p>	<p>Survey</p> <p>AOTA: V</p> <p>Pyramid: D2</p>	<p>N= 167 (aged 18 to 54), 83%=White/Caucasian. 77% of children= 1 to 2 y.o. 93% had no developmental disabilities.</p> <p>Incl=Mothers or Fathers w/ children &lt; 4 y.o, signed consent form</p> <p>Excl= Children over 4 y.o</p>	<p>I= parental use of social media while caring for their child measured by hour per day. O= Parent-child attachment measured w/ PCAS</p>	<p>No statistically significant correlation b/t social media use and parent-child attachment.</p>	<p>Self-reporting bias.</p> <p>Over-representation of Caucasian and highly educated parents.</p> <p>Dissertation, which means it has not gone through vigorous peer review.</p>
<p>Coyne et al.</p> <p>2021</p> <p><i>Computers in Human Behavior</i></p> <p>USA</p>	<p>Parent tech use while feeding infants and the impact on parent-infant attachment over the infant's first year.</p>	<p>Correlational</p> <p>AOTA: IV</p> <p>PYRAMID: D2</p>	<p>Wave 1 N=249 (244 mothers; 5 fathers)</p> <p>Wave 2: 92% retention rate</p> <p>Caregivers avg age 30.97 y.o.</p> <p>Infants avg. 5.85 m.o.</p>	<p>I: In-home by parent and research assistant</p> <p>O: Wave 1 → Questionnaire: -bottle or breastfeed -estimate b/w 0-100% how often use any tech when feeding infant</p>	<p>Avg. of participants used tech 50% of the time. 97% of participants use tech sometimes during feeding. Breastfeeding mothers are more likely to use tech while feeding.</p>	<p>Only Denver residents and participants in Project M.E.D.I.A.</p> <p>Self-administered survey.</p>

			Incl= Participants in Project M.E.D.I.A.; Denver metro area Excl= children over 12 m.o.	Wave 2 (1 year later) → AQS IGDI-IPCI coding schema: unstructured 4 min. video-recording of free-play (3 undergraduate coders) PSI (Likert Scale)	No evidence of relationship b/w tech use during feeding and attachment security	
Inoue et al.  2021  <i>Nursing &amp; Health Sciences</i>  Japan	Determine if mother SPHN use while breastfeeding negatively impacts mother-infant interactions.	Subject Experimental Design  AOTA: IV  PYRAMID: D2	N= 13 mother/infant dyads mother age: $\mu=35.9$ y.o. infant age: $\mu=13$ wks  Incl= full term pregnancy; mother and infant healthy after birth; mother reports no depressive symptoms; infant b/t 2-6 m.o.; mother breastfed during the day; mother habitual use of SPHN during breast-feeding; own and afford SPHN  Excl= N/A	I: video recording w/ gaze tracking camera to record child's bid for mother attention and mother visual response; 2 observations in lab w/in 2wks control: SPHN use restricted experimental: direction to use SPHN as mothers would at home  O: AMIS scale and MIBS-J scale compared w/ Mann-Whitney <i>U</i> test using SPSS	SPHN use ↑ distracted feeding time. No assoc. b/t maternal SPHN use during breastfeeding and mother-infant interaction quality	Not randomized  Positions of SPHN made it difficult to record/ interpret gaze data  Breastfeeding in laboratory is not the same as participant homes  Participants aware of being observed which could affect behavior
Lederer et al.  2021  <i>Child Development</i>	Examine the effects of maternal SPHN use on mother-child interaction	Controlled clinical trial  AOTA: II	N=33 mother-child dyads	I= maternal SPHN use, maternal magazine reading, and uninterrupted dyadic play	Mothers produced significantly fewer responses to child in both SPHN and print magazine	Generalizability may be restricted to particular SPHN features (i.e., reading & video

Israel		Pyramid: E2	<p>Mothers: ages 25-45 y.o. (<math>M=35</math>, <math>S=4.5</math>);</p> <p>Infants (16 m; 17 f): ages 24-36 m.o. (<math>M=28.8</math>, <math>S=3.6</math>)</p> <p>Incl: Mothers owned a SPHN &amp; Facebook account, fluent Hebrew speakers, married</p> <p>Excl: Mothers had no known dx of ADHD</p>	O= frequency and quality of maternal responses during mother-child interaction	<p>conditions compared to uninterrupted free-play. No significant differences b/t media conditions (<math>p &gt; .05</math>)</p> <p>Mothers non-responsiveness was significantly greater and more frequent in SPHN condition (<math>p &lt; .001</math>) compared to print magazine and free-play conditions</p> <p>Mothers produced significantly less expansions &amp; affirmations while absorbed w/ both media conditions than during free-play (<math>p &lt; .001</math>)</p>	<p>watching) &amp; maternal-child dyads from middle/high SES.</p> <p>Sample only included mothers, limiting generalizability towards fathers &amp; other caregivers.</p> <p>Mother-child interaction may be biased due to fabricated situations, rather than observed in natural environment.</p> <p>Study took place in Israel, potentially limiting generalizability to USA due to cultural differences.</p>
Linder et al 2021 <i>International Congress of infant studies</i> USA	Assess the role that parent and child media use at home has on the development of early attachment	Correlational AOTA: IV PYRAMID: D2	N=269 dyads of caregiver-infants (130f and 132m, 7 unknown) 3%=Asian, 9%=Black, 21%=Hispanic, 59%=White, 1%=Mixed Race, 6%=Other. Caregiver=97.2% F	I= Parent media use and absorption  O= attachment security measured w/ the Attachment Q-Sort (AQS)	Greater parent media use in general did not predict attachment security ( $\beta = .03-.04$ , $ps = .61-.71$ ). Greater parental media absorption is associated w/lower attachment security ( $\beta = -.15$ , $p < .05$ )	Potential bias from parent-reports on surveys and AQS.  Majority of participants were White, suggesting findings may not be generalizable for other ethnic populations.

			Incl=infants all <1 y.o. at start of study  Excl= parental failure to follow instructions			Caregivers in the study were mostly mothers and f; cannot be generalized to other caregivers (i.e., fathers, grandparents, etc.).
Myruski et al.  2017  <i>Developmental science</i>  USA	To examine impacts of maternal mobile device use on child socioemotional behavior using modified SFP & to examine differences in infant behavior resulting from maternal device use habits	Controlled clinical trial  AOTA: II  Pyramid: E2	N=50 infants (25 f, 25 m; ages 7.20-23.60 m.o.) & their mothers  Ethnicity: White/Non-Hispanic (90%), Hispanic (6%), Asian/Pacific Islander (6%), African-American (2%), Native American (2%)  Incl & Excl not provided	I= maternal mobile device use during free play, maternal habitual use of mobile device  O= infants' temperament using the IBQ-R or TBAQ; frequency of observed behavior during reunion phase	Maternal device use did not predict infant behavior during SFP ( $p > .01$ )  Greater habitual device use ( $\beta = -.36$ ), more use in front of family ( $\beta = -.25$ ), and more use in front of infant ( $\beta = -.28$ ) was associated w/ less engagement w/ mother during reunion (Still face phase)	Process of recruiting participants not addressed.  Lacked a comparison group.  Maternal self-reported frequency of mobile device use, possibility for bias/inaccuracy.
Tidemann et al.  2022  <i>The British Psychological Society</i>  Norway	To examine infant sensitivity to interrupted parent-child interactions using smart phones to simulate the SFP.	Cross-sectional study  AOTA: III  Pyramid: D2	N(total) = 51 parent/child dyads N(6mo) = 21 N(9mo) = 17 infants N(12mo) = 13 infants  Incl = 6, 9, or 12 month infants born w/in 2 wks of due date; no comorbidities	I = SPHN Procedure Phase 1: 2min; baseline parent/child interaction Phase 2: 1 min; unresponsive parent (Still Face Simulation) Phase 3: 2 min; parent/child interaction re-established	Infants showed more protest behavior and less positive object and social engagement during Still Face Simulation. Infants never resumed their phase 1 baseline behavior in phase 3. Infants demonstrated increased protest behavior when	Experimental context represents a less secure environment.  Skewed sample of m and f parents.  Small variability of parent SES.

			Excl = drowsiness; too high levels of frustration early in procedure	O = ANOVA ( $\alpha = .05$ ) protest, object/environment, engagement, social monitoring, social positive engagement  parent interview to determine SPHN use	interactions are interrupted by parent SPHN use.	
Vanden et al. 2020 <i>Cyberpsychology, Behavior and Social Networking</i> Netherlands	To examine if parents are less responsive to children when using a phone.	Systematic observation  AOTA: III  Pyramid: O2	N= 23 parent-child dyads  Incl= Children aged 0-5 y.o  Excl = N.A.	I= Intensity of SPHN use. Coded by trained coders into 4 codes (0= no involvement, 1= passive involvement, 3= exclusive involvement) in 10 second intervals & a child's bid for attention.  O=Parent's quality of response to a bid for attention categorized by time, strength, positive or negative and prioritization.	Parents were less likely to show a response to a bid for attention when using a phone. Parent's responding timely, strongly, w/ positive affect and prioritizing the child are decreased when parents are using a phone. Passive and fully absorbed phone use appeared more disruptive than occasional use, suggesting occasional use may allow parents to divide attention b/t phone and child.	Parents were only observed for a short time (10 min).  Small sample size.  Setting of consultation bureau may not be representative of naturalistic parent behavior.  Did not record time of day.  Social desirability bias, parents may have used their phone less since they knew they were being observed.
Wolfers et al. 2019	To understand how mothers' SPHN use is related to maternal sensitivity	Correlational  AOTA: IV	N= 89 mother child dyads (52 m, 37 f) Post survey n=79	I= Parents frequency of use, duration of use, and mother's	The effect of frequency of SPHN use was not	Cannot address the question of causality, differentiate b/t

<i>Elsevier</i> Germany		Pyramid: D2	Incl= Mothers b/t 20-45, child b/t 7-36 mo  Excl= non-mothers (e.g. nannies), non post-survey participants, Non English/German speaking status	sensitivity toward child  O= Researchers observed parent's sensitivity to child during 10 min of playground play	significant ( $\beta = 0.15$ , $p = .270$ ) Mothers who used SPHN longer had lower sensitivity ratings ( $\beta = -0.51$ , $p < .001$ ).	situation-based and trait sensitivity.  Data limited to context and external influence on playgrounds.  Sample was self-selective.
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**Table Summarizing the *QUALITATIVE* Evidence**

<u>Author</u> <u>Year</u> <u>Journal</u> <u>Country</u>	<u>Study Objectives</u>	<u>Study Design/ Level of Evidence/</u>	<u>Participants: Sample Size, Description Inclusion and Exclusion Criteria</u>	<u>Methods for Enhancing Rigor</u>	<u>Themes and Conclusions</u>	<u>Study Limitations</u>
Ewin et al. 2021 <i>Journal of Child and Family Studies</i> Australia	Explores the relationship b/t I and joint caregiver device use and a wide range of attachment behaviors	Observational  AOTA: N/A  PYRAMID: Q3	N=66 parent child dyad (57%f 43% caregivers) Children age=26% 0-2yo, 24% 3-4 yo, 38% 5-8 yo, 12% 9-12 yo  Incl= Mall needs play/food area, 1 caregiver min. w/1 child. Children 12 and under. Caregiver visible throughout observation, & observation window of at least 10 min  Excl= failure to meet inclusion	Participants observed during play, one dyad at a time. Detailed notes were refined following observations (code/recode). Mobile devices use timed w/digital clocks. Observations were 10 mins or longer	Over half the children tried to engage w/caregiver while the caregiver used a mobile device. Caregiver using mobile devices had reduced shared play and conversation w/higher # of negative interactions.	Small sample size.  Layout of playgrounds varied.  No standardized tool to measure caregiver-child interaction



			criteria length, primary caregiver not visible throughout observation			
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**Key:**

↑ = increase

&lt; = less than

&gt; = greater than

#=number

ADHD=Attention deficit hyperactivity disorder

AMIS= Assessment of Mother Infant Sensitivity

assoc. = association

ATQ= Attachment Q Sort,

avg= average

AQS=Waters and Deane Attachment Q-Sort

b/t= between

DASS-21=Depression Anxiety and Stress Scale

dx=diagnosis

excl= exclusion,

f=female,

GF of FAD = General Functioning subscale of McMaster Family Assessment Device

IBQ-RVSF= Infant Behavior Questionnaire-Revised Very Short Form

I=intervention

IGDI-IPCI: Early Growth and Development Indicator-Indicator of Parent Child Interaction,

incl= inclusion;

ind.=independent

 $\mu$  = mean

MDQ= Mother Distraction Questionnaire

MIBS=Mother to infant bonding scale

MIBS-J=mother to infant bonding scale-Japanese version

MPAS=Maternal Postnatal Attachment Scale

N/A= not available/ not applicable

PCAS=Parent Child Attachment Survey

PSI=Parenting Stress Index-short form

SAS=smartphone addiction scale

SES=socioeconomic status

SPHN= smartphone

SPSS=Statistical Package for the Social Sciences

SFP=Still Face Paradigm

TBAQ=Toddler Behavior Assessment Questionnaire

tech=technology,

m=male,

min=minutes,

m.o.=months old,

O=outcome

w/=with,

wk(s)=week(s)

y.o.=years old

## **Summary of Key Findings**

### ***Association Between Technology Use and Attachment***

Two studies found a direct association with caregiver technology use and a decrease in attachment (Alvarez Guterrez & Ventera, 2021; Linder et al., 2021). Both of these studies utilized self reporting in order to gather their data. Self reporting always comes with the risk of biases and should be kept in mind while evaluating the strength of the studies. One of the studies found an association of lower attachment, specifically dependant on why parents are using technology (parents' need to be connected via technology and using technology as an escape and other similar measures) (Linder et al., 2021).

### ***Other Associations***

Seven articles found other associations besides attachment quality. Associations found between caregiver technology use and child interactions include quality of interactions during and after cell phone use, parent responsiveness, and increased negative child behaviors. Several studies found that greater levels of parental smartphone use negatively impacted parent-child interactions, such as an increase in parental non-responsiveness (Inoue et al., 2021; Lederer et al., 2021; Vanden et al., 2020) and lower parental sensitivity (Wolfers et al., 2019). Research suggested that negative interactions (Ewin et al., 2021) and child protest behavior (Tidemann et al., 2022) increased after caregiver cell phone use interrupted caregiver-child interactions. Furthermore, after smartphone interruption, infant behavior never returned to baseline (Tidemann et al. 2022) and researchers observed less engagement between the caregiver and child (Myruski et al., 2017).

### ***No Associations***

Four articles found no significant association between maternal technology use and mother/infant attachment (Ali et al., 2019; Ante-Conteras, 2016; Coyne et al., 2021, Inoue et al., 2022 ). Two of the studies (Ante-Conteras et al., 2016 & Coyne et al., 2021) utilized self reporting surveys to identify the amount of hours in a day parents used technology while with the infant, followed by a subsequent survey to score the child's level of attachment. Both reported no correlation among the groups. Similarly, a third article also utilized a self reporting survey (Ali et al., 2019) to report frequency of technology use during maternal bonding activities, finding no association. The fourth article specifically explored smartphone use during breastfeeding, also finding no association (Inoue et al., 2022). Due to the three articles utilizing caregiver self reports, this method of data collection is at risk for a response bias thus results should be interpreted with caution.

### **Implications for Practice**

#### ***Implications for Consumers***

Since there is some support that caregiver technology can impact attachment, caregivers should be cautious of their level of technology use while in the role of a caregiver. Research supports that caregiver technology is especially impactful when parents are using technology as a means to escape or are using technology to feel connected. There are other associations that caregivers should be aware of such as decreased parent responsiveness and increased negative interactions. Lastly, it is important to note that there were multiple studies that found no correlations between caregiver technology use and attachment levels. This can help comfort caregivers that feel they may have used too much technology in the past, as this does not mean that a child will or can not have healthy attachment/development.

### ***Implications for Practitioners***

Practitioners should be educated on the potential impacts that caregiver technology use can have on children. Because the findings were mixed about the impact of caregiver's technology use on children's attachment, practitioners can use these findings to check in with their own bias regarding technology use. It is important to be aware of these possible biases a practitioner may have as their decision making can change based on how they think or feel. This could influence their interventions for clients. Lastly, consider the client as a whole including, SES and availability for support when weighing feasibility of limiting technology. It may be helpful to include caregiver technology in evaluations and potentially be addressed in therapy plans for certain clients.

### ***Implications for Researchers***

It is evident that more research needs to be conducted, especially experimental or experiments that use controls to account for self biases. As researchers continue to conduct studies they should explore the other associations further to see how these findings impact children later on in life. As further research is conducted, researchers should also look at what are potential confounding factors that could contribute to the mixed findings. A similar topic that is important to study is how child use of technology impacts their attachment and behavior. Additionally, through our research we noticed that many of the studies focus specifically on mothers, it is important to determine if the findings that focus on mothers are generalizable for other caregivers. Lastly, as research continues, researchers should keep in mind cultural differences and explore how cultural differences impact views on technology use while parenting.

### **Bottom Line for Occupational Therapy Practice/ Recommendations for Best Practice**

OT treats an individual in a holistic manner accounting for environmental and client factors, which caregiver technology is categorized within. As practitioners, we want to be knowledgeable of how caregiver technology use may influence children, so we are able to not only treat the effects but also spread awareness for prevention. The research done for this project has found that caregiver technology use does not always result in a decrease or change of attachment in children, but that does not mean caregiver technology use does not have consequences. Some of the associations found with caregiver technology use were lower sensitivity and less responsiveness. OTs want to provide education and training to caregivers of the potential effects that technology use may have on children.

### **Involvement Plan**

The group had a meeting with the collaborator, Ellie Olson, which covered the progress of the research question and some options for the next steps. Ellie stated that her ideal end product would be some sort of program to establish or re-establish secure attachment between a caregiver and a child. However, more research needs to be published to create and support this type of program. We came to the decision, with Ellie, to create an informational brochure to bring awareness to caregivers about their technology use and its impact on parent/child attachment.

### **Needs Assessment**

The needs assessment first takes into account what is already known about the needs of the target population. As the research group took on this question, our project chair shared that there is already a known connection between emotional regulation and attachment style. We also know that in recent years technology use has increased especially with the advances of

smartphones and tablets. With this information in mind, we altered the research question to focus on caregiver technology use and attachment style.

As we progress societally post COVID-19, through group discussion, we found it was important to acknowledge overwhelming observable practices post pandemic between children and caregivers. During the pandemic which limited our ability to interact with others physically, we adopted a culture where we heavily relied on technology for unlimited access to each other. It seems as though habits formed during this period have exacerbated the amount of time caregivers use their technological devices, whether for personal or professional use, creating an opportunity for unintentional “phubbing” (a new term used to describe snubbing another individual by paying more attention to their smartphone than the person engaging in a conversation or activity). As children return to the classroom, we seek to relay meaningful information to the clinic to address concerns about attachment.

The next aspect of the needs assessment identifies what should be or what is the desired outcome of the whole research project. As a group, with the help of the collaborator and project chair, we identified the desired outcome of this involvement plan to be that caretakers are educated on the potential impacts that their technology use may have on children. The education that we, as a student research group, provided is comprehensive, based on all the varying potential outcomes that were highlighted by the research. The overall desired outcome was for caregivers to be informed on how technology use may impact their attachment to their child. We also hoped that more attention and thoughtfulness is created around technology use in general.

We anticipate that if parents are mindful of their usage of devices during periods of interaction with their children, poor interactions during critical windows of attachment opportunities will lessen. Messages we seeked to convey include evidence based information on the overall increase in use of technology, and how the formation of unregulated technology usage

habits can negatively affect parent/child interactions. Possible barriers anticipated included biases on the impact of technological usage while caregiving and the cost and time required to convey the information in a beneficial way.

The last section of the needs assessment is the proposed solution. Through collaboration with our project chair, Yvonne Swinth, and community collaborator, Ellie Olson, we decided that the best solution that we were able to provide is spreading the knowledge that we have gained through the research. We decided to do this by providing an easy to read brochure presenting current research outcomes. Though currently the research details mixed findings regarding the influence of technology use and attachment, the information is still relevant to determine possible impacts going forward.

### **Knowledge Translation**

The knowledge translation activity for this research question involved creating a brochure that synthesizes our findings regarding the potential outcomes for caregivers' technology use on parent/child attachment. The brochure discusses the correlations between caregiver/parent technology use on attachment, as well as other associations that were found in the current literature. Research in this area is still emerging, therefore words such as "can" or "may" were used to show that the findings are not conclusive. As a group, we identified several goals which we aimed to fulfill through the completion of the brochure. We sought to bring general awareness to caregivers on the impact of using technology during critical attachment periods for their children. To do this we laid out the information gathered around the association between parent technology use and child attachment. We discussed findings that show no association between parent technology use and parent/child attachment, but highlighted why it is still important to consider during periods of interaction. Finally, we addressed other associations that may contribute to poor attachment including duration, frequency, and reasons for technology use.



Overall, by presenting these findings in the brochure, we hoped to facilitate caregivers' ability to make conscious decisions regarding their technology habits, and therefore prevent further challenges in children's attachment.

Our group anticipated the potential barriers and facilitators for our knowledge translation efforts. We found that current literature does not present a strong correlation between caregivers' technology use and parent/child attachment. We felt that this may present a barrier to our knowledge translation efforts, as readers feel impartial or confused about the mixed results. One way that we aimed to overcome this barrier is by purposely structuring the order of the information presented from the research articles. In the end we decided to acknowledge that some articles found no correlations at the beginning of the findings, we felt that having this at the beginning served as a caveat to keep in mind while reading the rest of the associations found. We felt that if we had put that some articles found no associations at the end of the findings, this would be the lasting impression on readers and thus the main takeaway. We wanted to avoid the articles that had no associations being the main take away, because as a team we noticed the emerging research commonly points toward parents being cautious about their technology use around their children.

Another difficulty that our group encountered was agreeing on the overall structure of the brochure, specifically where to place the QR codes to optimize the visibility to increase the likelihood that consumers would take the survey. As a group we came to the conclusion to put the survey QR code in two locations, one next to the takeaways of the brochure and one on the back of the brochure. We felt that having the QR code on the inside as well as the outside of the brochure would be the best option to increase the likelihood that consumers would take part in the survey.

Another potential barrier that we wanted to address was making the brochure eye catching and engaging. In order to overcome this barrier we decided to add multiple photographs into the brochure. The photographs included images of caretakers on their phone in front of children, a child surrounded by phones and a picture of a parent actively engaging with their child. Additionally, our group hoped that adding pictures that displayed/related to the main topics of the brochure would create supplemental visual examples of the information that was being explained.

Lastly, as an effort to increase the number of caretakers that would see and read the brochure, we decided to distribute the brochures to our onsite campus clinic (University of Puget Sound, located in Tacoma, Washington) as well as Ellie's clinic in Fall City, Washington. Passing out the brochures to the school clinic was suggested by one of our course instructors and we got permission confirmed by one of the clinic coordinators. In the end, we printed 20 copies of the brochure and laid it out on the front desk of the school clinic starting on March 23rd. On March 24th we printed 30 copies of the brochure and one of our group members delivered them to Ellie's clinic to be distributed. On March 28th, in an attempt to get survey responses we shared the survey with some friends and family who are caretakers of children.

## **Workflow**

Timeline:

Goals/Tasks/Products	Due Date
Research and review a variety of brochures to determine an appropriate template for our brochure	February 1
Group discussed the content/sections in brochure	February 6
Started draft of brochure	February 6
Reviewed organization of content in brochure	February 13

Attached graphics for comprehension and maintaining attention/interest	February 13
Finalized draft of brochure and sent draft to our project chair	February 28
Received feedback on brochure from our project chair	March 2
Reviewed feedback from project chair with group and started revisions	March 6
Added references to brochure	March 14
Attached 2 QR codes to brochure 1. link to resources if consumers would like to read research sources 2. Post-brochure survey link	March 15
Sent revised version of brochure to project chair	March 20
Revised reference page	March 22
Edited QR code for reference page	March 22
Finalized brochure before printing	March 23
Distributed brochures to Onsite Clinic	March 23
Distributed brochures to Ellie's clinic	March 24
Shared brochure with friends and family	March 28
Completed Final Report - First Draft	March 29
Data analysis from survey	April 10
Added data from survey analysis to Final Report	April 13

### **Outcomes Monitoring**

In order to monitor the outcomes of our knowledge translation efforts, our group created a survey for caregivers to complete after reviewing the brochure. Caregivers can easily access this survey with their mobile devices through a QR code attached to the back of the brochure

(see Appendix A). The survey was created through Qualtrics and consists of eight multiple choice questions. The questions examine caregivers' perceptions regarding the impact of technology use on their children, as well as caregivers' technology usage habits around their children (see Appendix C). The purpose of the survey is to investigate the potential changes in caregivers' perception and habits involving technology use following their review of the brochure. The outcomes of caregivers' self-reports will suggest the influence of the current content of the brochure and the impact that it may have on their future behavior.

In our group's initial plans for monitoring outcomes of our knowledge translation efforts, we were also going to conduct a final interview with Ellie to discuss her experience with distributing the brochure, as well as to gain insight on whether additional changes needed to be made to the brochure to promote the effectiveness of our knowledge translation efforts. Scheduling an interview with Ellie was not feasible due to the limited timeline of our project. Additionally, when the brochure was emailed to Ellie she expressed satisfaction with our efforts. Due to these factors, we decided to exclude the final interview from our methods of monitoring the outcomes of our knowledge translation efforts.

### **Evaluation of Outcomes**

The results from our caregiver survey suggest the effectiveness of our knowledge translation efforts. In total, we received seven survey results by the time of data analysis. Caregivers' self-reports revealed that 43% of caregivers use their phone often (4-6 hours per day), 43% reported sometimes (2-4 hours per day), and 14% reported seldom (0-2 hours per day). Reports also suggest that 57% of caregivers sometimes (25-50% of the time) use their phone in the presence of a child, 14% said almost always (75-100% of the time), 14% said often (50-75% of the time). Prior to reading the brochure, 86% of respondents believed caregiver's technology use had an impact on their children. They identified that the following areas may be

impacted: caregiver-child interaction level (83%), children's self-regulation and/or behavior (50%), and caregiver-child attachment/connection (17%). These self-reports suggest a baseline for caregivers' technology habits prior to reading the brochure, as well as their initial perceptions of the impact of technology use on their children.

Further data analysis suggests that our knowledge translation efforts influenced caregivers' perceptions of the impact of caregivers' technology habits on their children. Respondents reported that after reading the brochure they thought that the following areas were impacted by caregivers' technology use: quality of attachment (83%), caregiver-child interaction (83%), and increased protest behavior (57%). Of the respondents, 67% indicated that they were planning on changing their technology use around their children. Those that indicated that they were not planning on changing their technology use (43%) identified the following reasons for their decision: not worried of the impact (33%), need to use the phone whenever I have to (33%), and I already don't use my phone around my child (33%). These survey results indicate that there were several changes in respondents' perspectives regarding the impact of caregivers' technology use on their children. Furthermore, the majority of the respondents were influenced to change their technology habits after reading the brochure.

The primary goals for our knowledge translation efforts were to inform caregivers about the potential outcomes for caregivers' technology use on children's attachment and to facilitate their ability to make informed decisions regarding their technology habits. Although our sample size for the study was small ( $N=7$ ), the results of the survey suggest that our knowledge translation efforts were effective in informing readers about the current evidence regarding our topic as changes in perspectives regarding the topic were reported. Additionally, the majority of the respondents reported that they planned on changing their technology use after reading the brochure, which further indicates the effectiveness of our knowledge translation efforts.

## **Recommendations**

The focus of our research question was to determine whether caregiver use of portable technology impacted the attachment for infants and young children. This is considered a niche and relatively new aspect of research, in regard to how external stimuli can affect childhood bonding experiences during critical attachment periods. Currently the available data has mixed findings on the level of significance technology use during critical periods can negatively impact children during these early developmental stages. While the current level of data all suggests the need for continued research, it was still acknowledged that excessive usage of these devices may be detrimental to the child. Though a common consensus of whether extended technology usage during critical periods has not been established, there are still concerns on how it may impact children beyond attachment.

Growing technology usage, as a means to streamline and make tasks easier, has been indoctrinated into the culture of modern society. While this has revolutionized many aspects of human society in a positive manner, it can also have a negative impact. An option for a follow-up project is to continue researching caregiver technology's effects during critical development stages specifically focusing on attachment and emotional regulation. Recent studies have discovered that attachment and emotional dysregulation are positively correlated. It has been suggested that poor attachment leads to challenges with emotional regulation. Currently there is limited data on the impact of technology and emotional regulation, but this future project can make a connection supporting a possible impact. By being able to establish a link from technology use and attachment to attachment and emotional regulation, treatments can be established that can help young children.

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## Appendix A

### Knowledge translation informational brochure.

### Vocabulary


*These terms are used by researchers to describe behaviors. You will find the following vocabulary used in this brochure.*

**Technoference:** Interruption In everyday interactions due to digital and technology devices (Coyne et al., 2022).


**Protest Behavior:** Displays of protest through facial expressions, vocalization, or gestures (Tidemann et al., 2022).

**Attachment security:** When a child uses the primary caregiver as a secure base for safety and comfort when exploring (Linder et al., 2021).

QR Code for Survey




QR Code for References




Prepared by:  
Caitlyn A. Christine C. Kevin A. Tess M.

### Caregiver Technology Use



(N.A., 2021)




(N.A., 2020)

Figure A1: First page of informational brochure.

### Introduction

With the emergence of mobile and digital technologies, increased parental technological usage has been associated with decreased caregiver-child interactions. This guide reflects on the evidence found on whether too much technology use or "technoference" is associated with interruptions during critical attachment building cycles.



(N.A., 2021)

### Evidence Supported by Research


Multiple studies found that caregiver technology use had no significant impact on children (Ali et al., 2020; Ante-Conteras, 2016; Coyne et al., 2022; Inoue et al., 2022).

Another study found that occasional phone use created less of an issue, than when a parent is fully focused on their devices (Vanden et al., 2020).

**But other studies found that higher rates of technology use are related to...**

- Lower mother-infant attachment quality, decreased attachment security, & less parent-child interactions (Alvarez Gutierrez & Ventera, 2021; Lederer et al, 2022; Linder et al., 2021)
- Increase in non-responsiveness to children (Lederer et al, 2022; Tidemann et al. 2022)
- Lower maternal sensitivity (Wolfers et al., 2020)
- Reduced play & conversation between parents (Ewin et al., 2021)
- Higher rates of negative interactions (Ewin et al., 2021)
- Increase in childrens' protest behavior (Tidemann et al., 2022)

### What does this mean for you and your family?



(Grill, 2022)

There are many factors that impact caregiver-child interactions. Although current research presents mixed findings regarding caregiver technology use, many suggest that there may be negative effects. It is important to consider the following:

- When are you using the device?
- Why are you using the device? (E.g., distraction when breastfeeding due to pain)
- Check your phone for time usage

**Be mindful of how your technology use may impact your child.**

Please scan this QR code to fill out a brief survey  
**Thank You!**




Figure A2: Second page of informational brochure.

## Appendix B

The reference page linked in the reference QR code.

### Article References

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Figure B.1: First page of references from QR code.

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Figure B.2: Second page of references from QR code.

## Photo References

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Figure B.3: Third page of references from QR code.

## Appendix C

Survey questions linked to the survey QR code, survey was created on Qualtrics.com.

Caregiver Phone Use ExpertReview score Great

Default Question Block

Skip to

End of Survey if No Is Selected

Do you agree to participate in the following survey and allow the results to be used for research for the University of Puget Sound?

Yes

No

Page Break

Figure C.1: First question on survey, if answered no, survey skips to end.

Q2

On average how often do you use your phone daily?

Never (0 hours)

Seldom (0-2 hours)

Sometimes (2-4 hours)

Often (4-6 hours)

Frequently (6 plus hours)

Page Break

Q3

On average how often are you on your phone in the presence of your child?

Never (0 % of time)

Seldom (0-25% of time)

Sometimes (25-50% of time)


Often (50-75% of time)

Almost Always (75-100% of time)

Page Break

Figure C.2: Question two through three of survey.

Q4 \*

▼  Skip to

End of Block if No Is Selected

Prior to reading this brochure did you consider the impact that your technology use may have on your child?

Yes

No

---

Q5 \*

What did you think the impact of your technology might be on your child?

Nothing (I didn't think my phone use would impact my child or our relationship)

Attachment/connection between the child and myself

Interaction level between the child and myself


Self regulation and/or behavior of child

Other:

Figure C.3: Questions four through five of survey. For question four, if “No” is selected skips to question 6.

▼ Block 2 ...

Q6 \*

▼  Skip to

End of Block if Yes Is Selected

After reading this brochure do you plan to change your technology use around your child?

Yes

No

---

Q7 \*

If not, why?

I'm not worried about the impact

I need to use my phone whenever I have to

I already don't use my phone around my child

Other:

Figure C.4: Questions six through seven of survey. If “Yes” is selected for question 6, survey skips to question 8.

▼ Block 4

Q8 ★

After reading the brochure what ways do you think caregiver technology use could impact children?

- Quality of attachment
- Interaction between caregiver and child
- Increased protest behavior
- I don't think it has an impact
- Other

▲

[Import from library](#) [+ Add new question](#)

[Add Block](#)

End of Survey

We thank you for your time spent taking this survey.

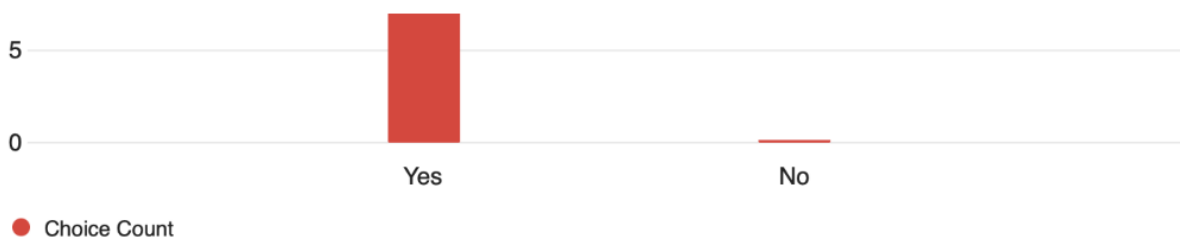
Your response has been recorded.

Figure C.5: Question eight of survey and thank you note for completing survey.

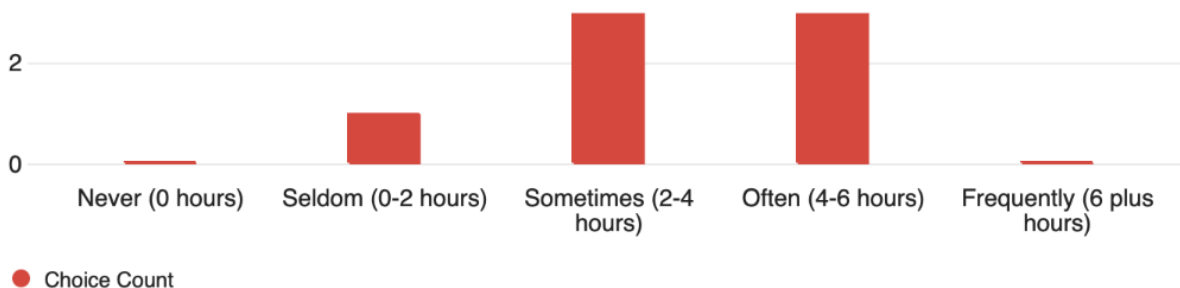
## Appendix D

Results of survey distribution.

- Do you agree to participate in the following survey and allow the results to be used for research for the University of Puget Sound?



Q2 - On average how often do you use your phone daily?



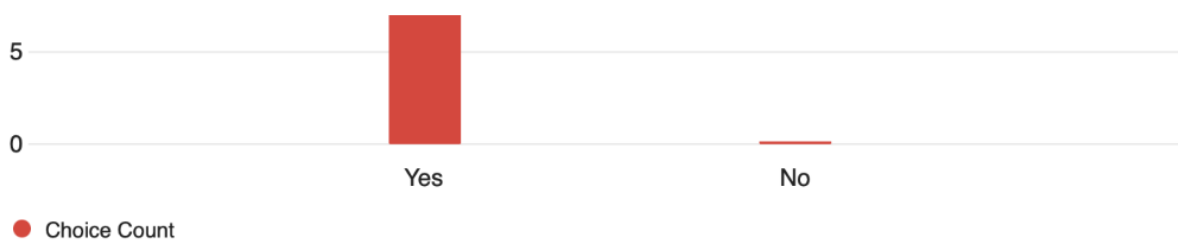
Q3 - On average how often are you on your phone in the presence of your child?



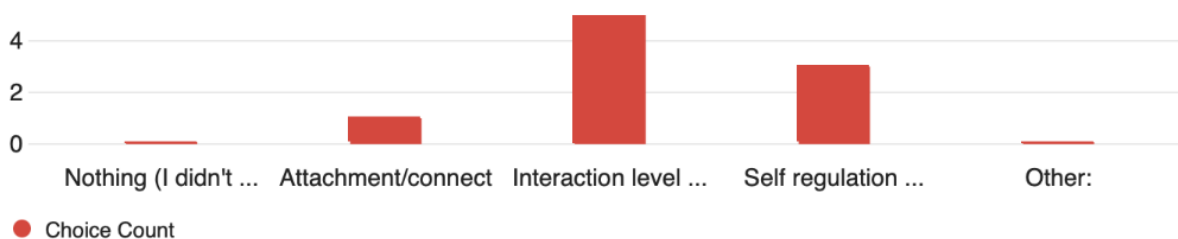
Figure D.1: Results of question 1-3.



Q4 - Prior to reading this brochure did you consider the impact that your technology use may have on your child?



Q5 - What did you think the impact of your technology might be on your child? - Selected Choice



Q5\_5\_TEXT - Other: - Text

No data found - your filters may be too exclusive!

Q6 - After reading this brochure do you plan to change your technology use around your child?

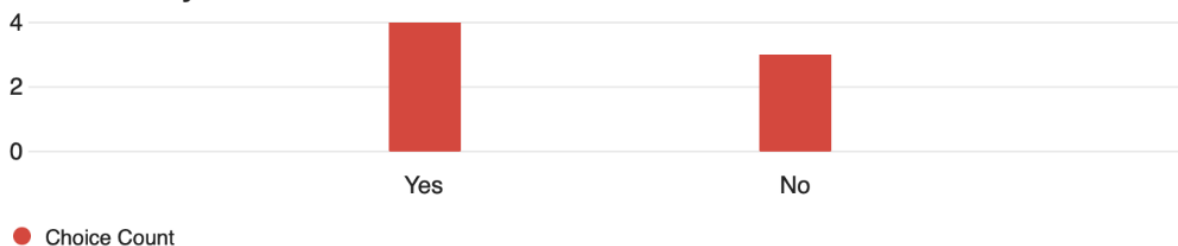
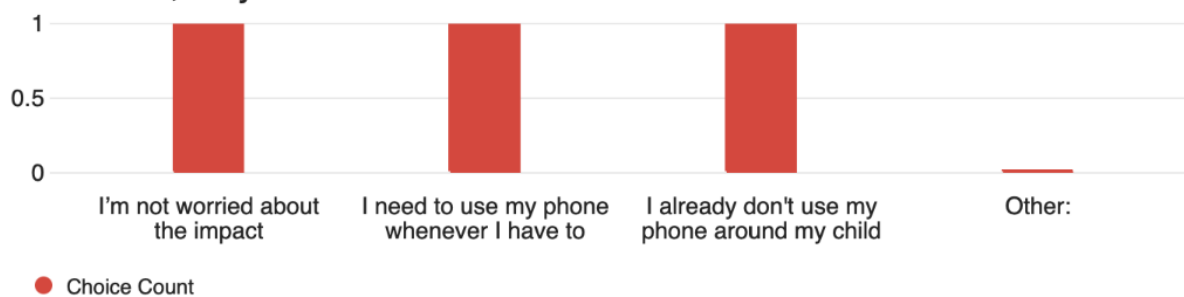
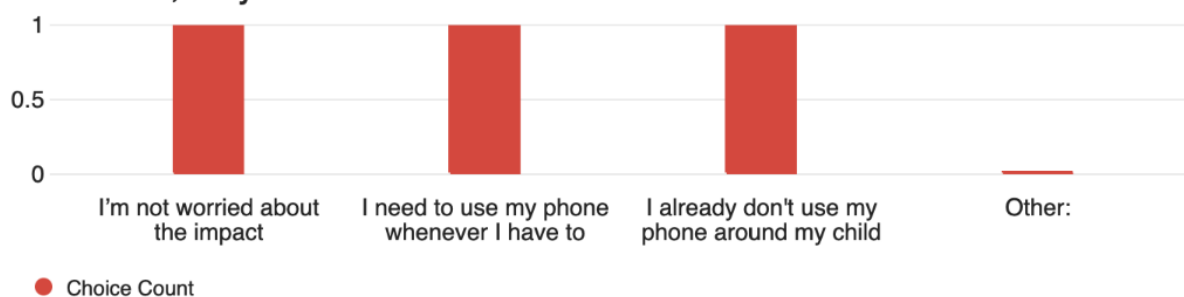


Figure D.2: Results from questions 4-6, (no “other” responses were recorded).

### Q7 - If not, why? - Selected Choice



### Q7 - If not, why? - Selected Choice



### Q7\_4\_TEXT - Other: - Text

No data found - your filters may be too exclusive!

### Q8 - After reading the brochure what ways do you think caregiver technology use could impact children? - Selected Choice



Figure D.3: Results from questions 7-8 (no “other” responses were reported).

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