UNIVERSITY OF CALIFORNIA,
IRVINE

Mobile Screen Technologies and Parents of Young Children: Investigating Diverse Parents' Attitudes, Beliefs, and their Interactions with Children

DISSERTATION

submitted in partial satisfaction of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

in Education

by

Wendy Ochoa

Dissertation Committee:
Associate Professor Stephanie M. Reich, Chair
Distinguished Professor George Farkas
Associate Professor Rossella Santagata

2019

DEDICATION

To

my Mexican-American parents,

for instilling the value of education, hard work, and creativity in me.

To

my siblings,

for your unwavering encouragement and support.

To

The Latino community,

your values and work ethic have inspired me to become an advocate of our community.

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ACKNOWLEDGMENTS

I would like to thank my parents for their support throughout this difficult process, especially for helping me find parents to interview for the completion of this dissertation. Although you often apologized for not having a higher formal education and financial resources to provide us with the life you wanted for me and my siblings, your work ethic and creativity for dealing with financial hardships inspired me every day since a young age. In fact, my passion for working with Latino families and finding ways to build on their strengths was inspired by you. I would not have the confidence I do today to reject the deficit perspective that currently characterizes most of the research done among our community if it weren't for the experiences you exposed me to.

Thank you Dr. Stephanie Reich for being my adviser and always providing me with prompt feedback for every milestone, even when you were out on vacation. I truly appreciate the high standards you had for me throughout the years because they helped me become a better writer and critical thinker. Your investment in my success in the program and growth as a researcher also helped me persevere and overcome some of the most difficult obstacles. Above all, thank you for the confidence you often expressed in my ability to become a strong contributor to the field. I also want to thank Dr. George Farkas for taking the time to meet with me for weeks while we figured out the best analytic strategy for Study 1. What I thought was going to be a very painful analytical process turned out to be a great learning experience that increased my confidence as a researcher. To Dr. Rossella Santagata, thank you for your feedback and encouragement throughout my time in the program. Every time I saw you, you always had something nice to say, and those words truly made a difference when I was doubting my place in this program.

In addition to the support of my family and UCI faculty, I also want to thank my close friends. Dr. Guadalupe Diaz, thank you for being my first Latina mentor and always findings the right words to encourage me to keep going. Dr. Tarana Khan, thank you for being such an awesome roommate and friend. Your friendship truly made the transition to UCI bearable. Finally, Elham Zargar, Kristel Dupaya, Ashely Harlow, Amy Gaona, and Maritza Morales-Gracía, thank you for being there for me during good and the bad times. Thank you all for providing me with your unconditional support and for believing in me. This experience would not have been the same without all of you. Additionally, I want to thank my lab mates, Dr. Joanna Yau, Jennifer Cabrera, Juan Gaytan, Melissa Dahlin, and Jennifer Renick for providing me with feedback and encouragement during our lab meetings.

Lastly, I would like to thank all of the parents who agreed to be interviewed for this project. Thank you for letting me come into your homes and entrusting me with your opinions. I hope to one day be able to give back to our community in a truly meaningful way.

CURRICULUM VITAE

Wendy Ochoa

Education

2014- 2019	PhD in Education Specialization: Human Development in Context University of California, Irvine
Dissertation Title:	Mobile Screen Technologies and Parents of Young Children: Investigating Diverse Parents' Attitudes, Beliefs, and their Interactions with Children
2014-2016	Master of Arts in Education University of California, Irvine
2008 – 2013	Bachelor of Arts in Psychology (*Cum Laude*) California State University, Los Angeles

Research Interests

My research interests are broadly focused on understanding how factors such as socioeconomic status, race/ethnicity, language, media, and the home environment influence parenting and child development among families with young children from ethnic minorities, particularly Latino parents. I further aim to utilize this research to provide socioeconomically and linguistically diverse parents with a set of culturally sensitive tools that empowers and supports them in fostering their children's bilingual language development and academic success.

Peer-Reviewed Publications

Reich, S., Hoeft., Díaz, G., **Ochoa, W**., & Gaona, A. (January, 2019). Disparities in the quality of pediatric dental care: New research and needed changes. *Society for Research in Child Development Social Policy Brief, 31,* 1-27.

Reich, S., **Ochoa, W**., Gaona, A., Salcedo, Y., Bardales, G.E., Newhart, V., Lin, J., & Díaz, G. (In press). Disparities in caregivers' experiences at the dentist with their young child. *Academic Pediatrics.*

Mancilla-Martinez, J., Greenfader, C., & **Ochoa, W**. (2019) Spanish- speaking preschoolers' conceptual vocabulary knowledge: Towards more comprehensive assessment. *NHSA Dialog, The Research-to-Practice Journal for the Early Education Field.*

Montanari, S., **Ochoa, W**., Subrahmanyam, K. (In press). A longitudinal of language mixing in Spanish-English dual language learners: The role of language proficiency, variability, and socio-linguistic factors. *Journal of Child Language.*

Ochoa, W., Reich, S., Cabrera, N., Gaona, A., & Salcedo, Y. (under review). Assessing knowledge of child development among predominantly low-SES Latino mothers and fathers.

Ochoa, W., Reich, S.M., Díaz, G. (under review). Using baby books to decrease the depressive symptoms and stress of first-time, low-income mothers.

Research Presentations

Ochoa, W., Díaz, G., Reich, S., Gaona, A., & Morales-Gracia, M. (June, 2019). Don't worry honey, I got this: Examining the relation between mothers and fathers' stress and self-efficacy. Paper presented at the Society for Community Research and Action (SCRA), Chicago Illinois.

Ochoa, W., Reich, S., & Mosley, A.H. (March, 2019). Socioeconomically Diverse Latino Mothers and Fathers' Attitudes, Beliefs, and Use of Mobile Technology with Children. Paper presented at the Society for Research in Child Development (SRCD), Baltimore Maryland.

Reich, S., **Ochoa, W**., & Díaz, G. (March, 2019). Infant Media Use, Alone and with Parents, and their Social-Emotional and Language Development. Paper presented at Society for Research in Child Development, Baltimore Maryland.

Martin, E., **Ochoa, W**., & Reich, S. (March, 2019). Comparing Latino Moms and Dads: Use of Mobile Screen Technologies for Managing Child Behaviors. Poster presented at Society for Research in Child Development, Baltimore Maryland.

Reich, S., Díaz, G., **Ochoa, W**., Gaona, A., & Gaytan, J. (October, 2018). Language as a Gatekeeper to Community Research. Poster presented at the International Conference of Community Psychology, Santiago Chile.

Ochoa, W., & Reich, S. (June, 2017). Decreasing the Depressive Symptoms and Parenting Stress of First-Mothers through Educational Baby Books. Poster presented at Society for Community Research and Action, Ottawa Canada.

Ochoa, W., Reich, S., Cabrera, N., Garrard, W., & Kuhns, C. (April, 2017). Does Mother Know Best? Investigating What an Ethnically Diverse Sample of Parents Know About Child Development and Parenting. Paper presented at Society for Research in Child Development, Austin Texas.

Khan, T., & **Ochoa, W**. (April, 2017). Moms Mindset Matters: Mindsets and Help Attributions and Adolescent Achievement and Motivation. Poster presented at Society for Research in Child Development, Austin Texas.

Salcedo, Y., Gaona, A., Espino, G., **Ochoa, W**., Garrard, W., & Reich, S. (April, 2017). Don't Complain if it's Free: Latino Parents' Experiences at their Children's Dentist in the United States and Mexico. Poster presented at Society for Research in Child Development, Austin Texas.

Ochoa, W., Reich, S., Cabrera, N., & Kuhns, C. (October, 2016). Comparing Mothers and Fathers' Knowledge of Child Development in Latino and African American Families. Poster presented at Society for Research in Child Development, Tampa Florida.

Ochoa, W. & Reich, S. (September, 2015). Decreasing the Depressive Symptoms and Parenting Stress of First-Mothers through Educational Baby Books. Poster presented at the UC Irvine PhD in Education First Year Student Research Poster Presentation, California.

Aguilar, G., **Ochoa.W**., Subrahmanyam, K. (March, 2015). The Oral Narrative Skills of Spanish-Speaking Preschoolers. Poster presented at Society for Research in Child Development, Philadelphia Pennsylvania.

Ochoa, W. & Subrahmanyam, K. (July, 2014). Analyzing Language-Mixing Among Preschool Dual Language Learners. Poster presented at the Head Start Research Conference, Washington DC.

Aguilar, G., **Ochoa, W.,** & Subrahmanyam, K. (April, 2014). The Narrative Skills of Bilingual Spanish-Speaking Children. Poster presented at the Western Psychological Association (WPA), Oregon.

Ochoa, W. & Mancilla-Martinez, J. (August, 2013). Latino, Spanish-Speaking Parents of Preschoolers: What Drives their Enrollment Decisions? Paper presented at the UC Irvine Summer Undergraduate Research Program (SURP) Research Symposium, California.

Ochoa, W., Parrales, A., & Subrahmanyam, K. (May, 2013). Analyzing Language-Mixing Among Preschool Dual Language Learners. Paper presented at the Psi Chi Whittier Undergraduate Research Conference, California.

Ochoa, W., Parrales, A., & Subrahmanyam, K. (April, 2013). Analyzing Language-Mixing Among Preschool Dual Language Learners. Paper presented at WPA, Nevada.

Ochoa, W., Parrales, A., & Subrahmanyam, K. (March, 2013). Language-Mixing Among Preschool Dual Language Learners. Poster presented at the California State University, Los Angeles Symposia of Student Research, Scholarship and Creative Activity, California.

Ochoa, W., Parrales, A., & Subrahmanyam, K. (February, 2013). Language-Mixing Among Preschool Dual Language Learners. Paper presented at the California State University, Los Angeles Symposium, California.

Tran, P., Carrillo, R., **Ochoa, W**., & Subrahmanyam, K. (April, 2012). Is Chatting Helping My Comprehension? Poster presented at WPA, California.

Research Experience

08/2015-2019	**The Baby Books 2 Intervention (Graduate Student Researcher)** University of California, Irvine

Responsibilities: Analyze & manage data, synthesize literature, organize excel files, translate baby books to Spanish, create questionnaires, data collection, attend weekly lab meetings, participant interviews, translations, write baby books content, home visits, develop assessments and questionnaires, and manage undergraduate research assistants.

04/2015-2019 **Development in Social Context (Lab Member)**
University of California, Irvine

Responsibilities: Discuss and critique projects that graduate students are working on. Provide social and academic support for all lab members.

04/2015-2017 **Socio-emotional Development (Lab Member)**
University of California, Irvine

Responsibilities: Discuss and critique current projects that doctoral students are working on, review fellowship submissions, & learn new statistical analysis.

08/2014-07/2015 **Preschool Language Minority Learners Lab (Graduate Student Researcher)**
University of California, Irvine

Responsibilities: Transcribe and analyze data using transcription software, collaborate in conference and manuscript submissions, score child language assessments in English and Spanish, supervise and manage undergraduate research assistants.

06/2013-08/2013 **Preschool Language Minority Learners Lab (Undergraduate Student Researcher for summer internship)**
University of California, Irvine

Responsibilities: Conduct literature reviews on diverse topics related to preschool dual language learners, attend lab meetings, propose and present a research project.

08/2011-08/2014 **Media and Dual Language Learners Language Lab (Undergraduate & Graduate Student Researcher/ Lab Coordinator)**
California State University, Los Angeles

Responsibilities: Leading and organizing lab meetings, mentoring undergraduate students, data collection, data analysis, coding, SPSS knowledge, reviewing manuscripts, transcribing, designing poster presentations, designing power point presentations, literature review

Fellowships, Honors, and Awards

Outstanding Graduate Student Award for the Annual Latino Excellence and Achievement Dinner (LEAD), 2019
University of California, Irvine
Celebrates faculty, staff, and graduate students for research excellence and for providing encouragement and support for the Latino community and their success.

Most Promising Future Faculty Award, 2019 (Nominated)
University of California, Irvine

Graduate Student Travel Grant, 2019
Society for Research in Child Development

Associated Doctoral Students in Education Outstanding Service Award, **2018**
University of California, Irvine
Recognizes a doctoral student for outstanding service to the School and to her/his fellow students. This award is designed to recognize a student whose work often goes unnoticed.

Keith Curry Scholarship Award, 2018
University of California, Irvine
Honors a PhD student who has demonstrated significant growth in academic achievement and unusual perseverance.

Ford Dissertation Fellowship (*Honorable Mention),* 2018
Ford Foundation

Millennium Scholars Program, 2017
Society for Research in Child Development
Program designed to encourage selected scholars from under-represented ethnic/racial groups in pursuing graduate work in developmental science by receiving support from leaders in the field.

Graduate Student Travel Grant, 2017
Society for Research in Child Development

Faculty Mentor Program Fellowship (*Honorable Mention*), 2016
University of California, Irvine

Eugene Cota-Robles Fellowship, 2014
University of California, Irvine
Fellowship is awarded to students who show potential to become excellent faculty or researchers in institutions of higher education.

Summer Undergraduate Research Fellowship, 2013
University of California, Irvine
Provides selected undergraduate students the opportunity to work on a research project with a faculty mentor during the summer.

Dean's List, 2008-2013
California State University, Los Angeles

Minority Access to Research Careers (MARC) Undergraduate Scholar Fellowship, 2012
California State University, Los Angeles
A highly selective 2-year program that supports underrepresented undergraduate students to improve their preparation for graduate training at the PhD level by working closely with a faculty mentor on research projects.

James & Linda Hornbuckle Scholarship, 2012
California State University, Los Angeles
Awarded to students with a high GPA and who are in the Dean's Scholars Program.

Travel Grant, 2012
California State University, Los Angeles

William Hobson & Evelyn Trou Scholarship, 2012
California State University, Los Angeles
Awarded to high-performing psychology students nominated by the Chair and faculty members of the psychology department.

Mahatma Rice Scholarship, 2008
California State University, Los Angeles
A scholarship awarded to six senior students across several U.S. states for winning an essay competition explaining the importance of attending college.

University and Professional Activity

06/2019	**Identifying Challenges and Supports for Diverse Parents** SCRA, Chicago Illinois Role: Chair of the paper symposium and presenter
03/2019	**Familial and Contextual Influences on Media Use for Families with Young Children** SRCD, Baltimore Maryland Role: Chair of the paper symposium and presenter
02/2019	**Culturally Responsive Workshop** Math CEO program, UC Irvine Role: Collaborated with other graduate students in organizing and facilitating a workshop for undergraduate students and staff.
02/2019	**What Next? Life after College**

University of California, Irvine

Role: Collaborated with other graduate students in organizing the workshop for undergraduate students.

10/2018 **The Ins and Outs of Becoming a Research Assistant Workshop**
University of California, Irvine

Role: Took the lead on designing and facilitating the undergraduate student workshop.

06/2018-Present **Diverse Educational Community and Doctoral Experience (DECADE) Higher Education Outreach Team**
University of California, Irvine

Role: Organize and lead workshops that provide resources to undergraduate and high school students to access higher education.

12/2017-03/2018 **PhD Student Recruitment Weekend Co-Coordinator**
University of California, Irvine

Role: Helped coordinate recruitment weekend for incoming PhD students. My tasks included coordinating faculty-student meetings, deciding and facilitating activities throughout the weekend, planning the venue and working with professors, staff, and current students.

09/2017-Present **UROP Student Mentor**
University of California, Irvine

Role: Mentor multiple undergraduate, fist-generation students to complete a research project that was be presented in the UROP symposium.

02/2018 **Research Posters 101**
University of California, Irvine

Role: Taught undergraduate students how to create a research poster.

06/2016- 08/2017 **Mentoring Excellence Program Training**
University of California, Irvine

Role: Learned how to be an effective mentor to underrepresented college students through a series of courses.

06/2016-08/2017 **Competitive Edge Peer Mentor**
University of California, Irvine

Role: Mentored a first-generation, college student in the transition to his first year into the PhD program. My tasks included guiding him through his summer research project and providing encouragement and advice.

12/2015-2016 **Mentor for DECADE Mentor Program**
University of California, Irvine

Role: University trained to be a mentor to first-year PhD students who are first generation college students and from under-represented minority groups in higher education.

02/24/2015 **The Know-How Sessions- Starting Now: How to Prepare for Graduate School as an Undergraduate Student**
University of California, Irvine

Role: Collaborated in preparing a power-point presentation and orally presented my share of information & answered student questions

08/2011 **Data Input Assistant Summer Internship**
Mexican-American Opportunity Foundation (MAOF) Youth Program Summer Opportunity

Role**:** Data entry and management, budget and billing management customer service, and fundraising for senior programs

University Teaching Experience

12/2018 **Guest Lecturer**
University of California, Irvine
Course: Child Development in Education
Topic: Young Children and Screen Technology

04/2017 **Guest Lecturer**
University of California, Irvine
Course: Origins, Purposes, and Central Issues in K-12 Education
Topic: Technology and Education

07/2015-08/2015 **Teaching Assistant and Guest Lecturer**
University of California, Irvine
Course: Designing Learning Environments for Teachers in Secondary School Subjects
Topic: Bilingual Language Development

Community Service

05/2018 **Parent Workshop Facilitator & Presenter**
Anaheim School District
Title of Presentation: Is Technology Good or Bad for Young Children?

Responsibilities: Designed and delivered a presentation, with a Q & A section, in Spanish and English for parents.

04/15/2016 **Book Fair Volunteer**
Orange County Head Start 9th Annual Family Festival
Responsibilities: Organized a booth that gave away free books to families in low income communities.

04/18/2015 **Preschooler Story-Teller**
Orange County Head Start 8th Annual Family Festival
Responsibilities: Engaged individual children and groups of children with the stories via asking developmentally appropriate questions and the use of puppets.

05/02/2014 **Parent Workshop Co-Presenter**
Asuza Unified's Parent University Workshops to Promote Parent Engagement and Involvement:
Title of Presentation: Promoting Your Child's Bilingual Language Development through Story Telling
Responsibilities: Collaborated with a lab-mate in preparing a power-point presentation in English and Spanish, which provided low-income parents with practical tips (informed by research) on ways to foster the bilingual language development of children, and answered questions.

03/02/2015 **Story-Teller for Second Grade Children**
Read Across America: Azusa Elementary School, second grade classroom
Responsibilities: Read stories to a group of children in an elementary school located in a low-income community, prepared questions about the story, sang and danced with them, and encouraged them to go to college.

07/2010 - 9/2010 **Downey Community Health Center**
Responsibilities**:** Conducted and developed activities for the seniors, provided emotional and physical support, administered assessments and evaluated cognitive performance among the seniors.

Professional Memberships

06/2017-Present	Member of the Society for Community Research and Action
04/2013- Present	Member of the Society for Research in Child Development (SRCD)
04/2017- Present	Member of the Society for Research in Child Development Latino Caucus
05/2013	Psi Chi The International Honor Society in Psychology (Psi Chi)

Software Skills

STATA, SPSS, HLM7, Filemaker, SALT, CLAN, MAXQDA, Epidata, Remark

Languages

Fluent in Spanish and English

ABSTRACT OF THE DISSERTATION

Mobile Screen Technologies and Parents of Young Children:
Investigating Diverse Parents' Attitudes, Beliefs, and their Interactions with Children

By

Wendy Ochoa

Doctor of Philosophy in Education

University of California, Irvine, 2019

Professor Stephanie M. Reich, Chair

Mobile screen technologies, such as smartphones and tablets, permeate the lives of most U.S. families with young children (Common Sense Media, 2017). However, very little is known about the role these technologies play on the quality of interactions between caregivers and their young children, and even less is known about parents' beliefs of these technologies. Specifically, scarce research has explored parents' beliefs about how these devices both support and hinder their parenting experiences and their children's learning, particularly among parents from ethnic minorities, such as Latino mothers and fathers. Therefore, this dissertation focuses on exploring the associations between mobile screen technologies and the quality of caregiver-child interactions, and on investigating socioeconomically diverse Latino parents' beliefs about the ways mobile screen technologies have supported and/or hindered their parenting and young children's learning.

Study 1 focused on understanding whether caregiver use of a mobile screen device was related to the quality of interactions they had with their young child (i.e. joint attention, talk, positive emotion, initiating interactions, responding to the child) in public settings. To address this question, two researchers anonymously and systematically observed and coded the behavior

of 98 caregiver-child dyads during naturally occurring interactions in public settings across low and middle-high income neighborhoods. Findings showed that caregiver use of mobile devices was negatively associated with joint attention, caregivers' talk to their child, caregivers' display of positive emotions, and caregivers' initiation of interactions with their children. However, caregivers' use of a mobile device was not significantly associated with caregiver responsiveness to the child, children's talk or displays of positive emotions. Furthermore, when looking at the specific ways caregivers used their mobile device, we found that looking at the screen was positively associated with most components of quality interaction compared to activities involving more fine motor use such as texting or swiping. Finally, we also found that a higher proportion of device use by caregivers and their children was significantly associated with a lower proportion of most of the key components of high quality interactions.

Study 2 focused on understanding how a socioeconomically and linguistically diverse sample of Latino mothers (n = 20) and fathers (n = 20) with young children (0-4 years) believed mobile screen devices supported and/or hindered their parenting experiences. A total of seven themes emerged, capturing the ways mobile screen devices had served as a support (i.e. access to information, social support access, parent-child bonding, facilitates teaching), hindrance (i.e. disrupts parent-child interactions), or both (i.e. child behavior management, parental psychological effects) for parents. However, although most of these themes were spread across diverse parents, a few differences by parent gender, language, and income, but primarily by parent education, emerged.

Study 3 used the sample of parents from study 2 to investigate how these parents believed mobile screen devices had supported and/or hindered their children's learning. Findings showed that one major theme emerged centering on parents' opinions about the types of mediation

practices (i.e. monitoring content, setting time limits, co-using of the device) they believed contributed to mobile devices being beneficial or detrimental towards children's learning.

Collectively, these three studies suggest that mobile screen devices can both negatively and positively contribute to the quality of family interactions, parenting experiences, and parents' perceptions of children's learning among diverse families, depending on how the device is used. Therefore, future work on mobile screen technologies should go beyond just observing or asking questions about whether a device was used or not and focus on the specific ways devices are used and how that use relates to parenting practices, parent-child interactions and positive and negative learning outcomes.

Keywords: mobile screen devices, caregiver-child interactions, Latino parents

CHAPTER 1: INTRODUCTION

Mobile screen technologies, such as smartphones and tablets, have rapidly become ubiquitous among most families in the United States (Common Sense Media, 2017; Pew Research Center, 2017). Today, 95% of U.S. families with children under the age of eight own at least one smartphone, up from 63% in 2013, and 78% own at least one tablet compared to 40% in 2013 (Common Sense Media, 2017). Moreover, recent examinations have shown that device ownership is comparable across families from diverse ethnic and socioeconomic groups (Common Sense Media, 2017). With the portability and multifunctional capabilities of these newer screen technologies, such as instant access to the Internet, games, social media, contacts, information, entertainment, and work email, families are staying more connected throughout the day than ever before. However, the seemingly endless range of functions these devices can offer might also contribute to differences in the ways families are taking advantage of these features and using their devices. For example, a bilingual family might use a smartphone to find videos in their non-English language to support their children's bilingual language development (Barron & Levinson, 2018), while other parents might spend more time working from home rather than the office because they can easily communicate with their employers through their smartphones (Radesky et al., 2016). Irrespective of how devices are used, being constantly connected might have implications on family interactions (Duggan, Lenhart, Pew Research Center, 2015a; Radesky, Schumacher, & Zuckerman, 2015; Radesky et al., 2016).

To date, our knowledge of how and why families with very young children are using these mobile devices and the influences they have on caregiver-child interactions is currently limited because research on this topic is just starting to emerge and continues to be scarce among ethnic minority families with young children. It is important that we study this topic among

diverse families with young children because the quality of face-to-face parent-child interactions are particularly critical for children's development during the first few years of their life (Hertlein, 2012; Radesky et al., 2014; Radesky et al., 2016), and may differ in characteristic among different types of families (Ispa et al., 2004) .

The Influence of Screen Technologies on Parent-Child Interactions

From past research on television (TV), it is well known that the presence of screen technology can have both positive and negative effects on the amount and quality of parent-child interactions (Barr, Brito, Zocca, Reina, Rodriguez, & Shauffer, 2011; Kirkorian, Pempek, Murphy, Schmidt, & Anderson, 2009; Schmitt, Woolf, & Anderson, 2003). However, very few studies have explored how families with young children are using mobile screen technologies and even fewer have studied parent-child interactions in the presence of mobile screen devices (Hiniker et al., 2015; Radesky et al., 2014; Radesky et al., 2015). Given the interactive and multimodal nature of smartphones and tablets, coupled with their instant accessibility, there might be more opportunities for mobile screen technologies to influence parent-child interactions throughout the day compared to television (TV). For example, whereas TV mainly influenced families' interactions at home during consistent times, newer mobile technologies can continuously influence interactions both at home and during family outings to places such as the park, restaurants, and the mall (Radesky et al., 2014). Knowing this, it is important that we investigate the ways in which mobile screen technologies may be enhancing, supplanting, and/or detracting from day-to-day parent-child interactions.

Factors Related to Family Use of Mobile Screen Technologies

In seeking to understand how mobile screen technologies may be influencing daily parent-child interactions, we also need to consider factors that may relate to parents' and

children's use of these devices. Two of the factors that have been most consistently linked to families' uses of technology are parents' beliefs about technology along with parents' socioeconomic status (Rideout, 2014; Certain & Kahn, 2002; Njoroge, Elenbaas, & Garrison, 2013). However, most of these findings are based on maternal attitudes and beliefs about TV (Certain & Kahn, 2002; Njoroge et al., 2013). Limited research has explored parents' beliefs about mobile screen technologies, and the few studies that exist tend to include a majority of middle-class, White mothers or parents of older children (Hiniker et al., 2016; Sergi, Gatewood, Elder, & Xu, 2017; Radesky et al., 2016a; Radesky et al., 2016b). Because ownership of mobile screen technology is widespread across mothers, fathers, and ethnic and socioeconomic groups (Pew Research Center, 2017), and there is evidence that socioeconomic status is related to parents' beliefs, attitudes, and use of technology (Certain & Kahn, 2002; Njoroge et al., 2013; Radesky et al., 2016; Rideout, 2014), it is important that we do research with socioeconomically and ethnically diverse mothers AND fathers.

The Need for Research on Diverse Latino Families

A particular ethnic group that remains largely understudied in the topic of technology, despite being the largest ethnic minority in the U.S., are Latino parents (Pew Research Center Hispanic Trends, 2014). To date, very little is known about the ways in which Latino parents of young children use technology or their beliefs about mobile device use, even though recent reports suggest that Latinos are among the ethnic groups that most heavily rely on their smartphones for access to information (Pew Research Center, 2015b). Additionally, fathers and Spanish-speaking parents are even more underrepresented within the Latino samples. Not including fathers is limiting because Latino fathers make unique and important contributions to their children's development (Cabrera, Fitzgerald, Bradley, & Roggman, 2007). Furthermore, it

is important to include linguistically diverse Latino parents because research in various areas of parenting has shown that English- and Spanish-speaking parents sometimes differ in their ideas about parenting practices and child development (Keels, 2009). Thus, these parents might also hold different ideas about mobile device use for themselves and for their children. An additional limitation among the few studies that have examined Latino parents' attitudes, beliefs, and use of technology, is that in the majority of these studies, the parents are either from a low socioeconomic status or their socioeconomic status is not stated (Radesky et al., 2015; Rideout, 2014). This makes it difficult to discern whether the findings are related to parents' cultural and/or socioeconomic status (Cabrera & the SRCD Ethnic and Racial Issues Committee, 2013).

In sum, it is important to know how Latino families from linguistically and socioeconomically diverse backgrounds use mobile screen technologies and to also understand their beliefs about these devices. Once we have a better understanding about how diverse families are using mobile screen technologies and what they think about them, we will be better equipped to assess the impacts of their use and make recommendations about best practices that could foster young children's optimal development.

Three-Study Dissertation Goal

Given the clear gaps in the current research as to 1) how families with young children (under age five) use mobile screen technologies, especially Latino families 2) if parent-child interactions vary in the presence or absence of mobile screen technology, 3) whether mothers and fathers differ in their beliefs and practices regarding mobile technology use, and 4) how income and language might relate to parental beliefs and use of mobile devices, this three-study dissertation uses both interviews and systematic field observations to understand the use and beliefs about mobile screen technologies of low- and middle-to-high-income, linguistically

diverse Latino mothers and fathers of young children. It also explores the role of these devices on the quality of face-to-face interactions between caregivers and their children. Parents of children ages 0-4 years old are the focus of this dissertation because this is the time when parenting behaviors and parent-child interactions tend to have the strongest influence on children's development and wellbeing (Greenberg & Crnic, 1988), yet limited studies have explored parents' use and beliefs about mobile screen technologies or parent-child interactions in the context of mobile technologies among parents of very young children.

Study 1: Exploring the Association of Mobile Device Use and the Quality of Caregiver-Child Interactions in Public Settings

Study 1 aims to understand how caregivers' and children's use of mobile screen technologies is related to the quality of their every-day interactions in public places. To address this question, caregiver-child dyads were anonymously and systematically observed during naturally occurring interactions in public settings across low and middle-to-high income neighborhoods (e.g. mall food courts, parks, town centers). During these observations, caregivers and children's behaviors were systematically coded in real-time using a structured coding scheme developed for this study. By doing anonymous systematic observations in public settings, we were able to capture how caregivers and children typically and naturally interact with each other in the presence or absence of mobile screen technologies, as opposed to a controlled lab setting where they may interact differently than usual. Since caregivers often used their smartphones intermittently while being with their children, the time-sampled nature of the coding scheme allowed us to capture how these screen devices weaved in and out of these dyadic interactions. Thus, this method provides a more nuanced and realistic way to consider media use in real time interactions.

Studies 2 and 3: Latino Parents' Use and Beliefs about Mobile Screen Technologies

To understand Latino parents' motivations for their own and their young children's use of mobile screen technologies (i.e. smartphones and tablets), Studies 2 and 3 utilized semi-structured interviews with low and middle-to-high income Latino mothers and fathers. Specifically, Study 2 explored how Latino parents used mobile screen devices in their role as parents, and also their beliefs about the ways in which these devices and accompanying social media supported and/or hindered their parenting. Study 3 investigated Latino parents' beliefs about the ways in which mobile screen technologies supported and/or hindered their children's learning, along with the types of games/apps or activities their child typically played while using these devices. Because previous research on TV has shown difference in parents' use and beliefs by income, equal numbers of middle-to-high income and low-income mothers and fathers were interviewed. Additionally, we purposely sampled for equal numbers of mothers and fathers because fathers have rarely been included in technology-related research, even though they also play a vital role in children's development. Altogether, this sample allowed for comparisons of parents' use, beliefs, and attitudes by SES, primary language spoken, and gender.

Conclusion

Mobile screen technologies are almost ubiquitous in the homes of most U.S. families with young children. However, research investigating how and why diverse families use these newer and more interactive technologies has not kept pace with the rate at which these devices are being adopted. Because mobile screens are now accessible to families across socioeconomic and ethnic groups, there is great potential for these devices to be used as a parenting tool that supports diverse parents in their goals of fostering their children's success. However, before capitalizing on the potential of mobile screen technologies to support parenting and children's

learning, we first need to investigate how these devices affect the quality of interactions between caregivers and their children and we also need to understand how families currently use them and their reasons why. Understanding parents' attitudes and beliefs about mobile screen technologies is important because this will allow us to create media recommendations that build on parents' existing ideas and experiences, which might increase the usefulness of these recommendations for diverse families. Taken together, findings from this dissertation will increase our understanding of how mobile screen technologies impact day-to-day parent-child interactions and if and how Latino parents' use these devices as a resource or barrier to high-quality parenting practices. Importantly, findings will help inform optimal use of mobile screen technologies among socioeconomically diverse families with young children, especially Latinos, a group largely omitted in the extant current literature.

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Chapter 2: Study 1

Exploring the Association of Mobile Device Use and the Quality of Caregiver-Child Interactions in Public Settings

Mobile screen technologies, such as smartphones and tablets, have rapidly permeated the everyday lives of most families across ethnic and socioeconomic groups in the United States (Common Sense Media, 2017; Kabali, Irigoyen, Ninez-Davis, Budacki, Mohanty, Leister, & Bonner, 2015). Today, 98% of families with children under the age of eight years own at least one TV, 95% own a smartphone, and 78% own a tablet (Common Sense Media, 2017). Due to the portability and multifunctional capabilities of these devices, such as instant access to the Internet, games, social media, contacts, entertainment, and email, families are able to engage in a multitude of activities with their devices throughout the day from virtually any place (Hiniker, Sobel, Suh, Sung, Lee, & Kientz, 2015; Radesky et al., 2014). Being constantly engaged with a mobile device, however, might influence the quality of face-to-face parent-child interactions, which are particularly critical for children's development during the first few years of their lives (Estrada, Arsenio, Hess, & Holloway, 1987).

From past research, primarily done in the context of TV, it is well known that the presence of screen media can both negatively and positively influence the way parents and children interact with each other (Barr et al., 2011; Kirkorian, Pempek, Murphy, Schmidt, & Anderson, 2009; Pempek, Demers, Hanson, Kirkorian, & Anderson, 2011; Schmitt, Woolf, & Anderson, 2003). For example, numerous studies have shown that parents tend to talk less to their child during TV viewing, while other studies have found that certain programs can encourage parents to engage in high quality conversations with their children, such as prompting the parent to ask the child questions (Barr, Brito, Zocca, Reina, Rodriguez, & Shauffer, 2011;

Mendelsohn, Brockmeyer, Dreyer, Fierman, Berkule-Silberman, Tomopoulos, 2010). Given that mobile screen devices allow for the same types of activities we typically engage in with TV (e.g., watching a show), but are also interactive, multimodal, and easily accessible at home and in public settings (e.g., fast food restaurants, parks) (Hons, Leavy, Jancey, 2017; Hiniker et al., 2015; Kellershohn, West, & Vriesekoop, 2018; Radesky, Schumacher, & Zuckerman, 2015; Radesky et al., 2014), it is important that we also understand how their use relates to the quality of face-to-face parent-child interactions.

To date, the few studies that have examined parent-child interactions in the context of mobile screen devices similarly suggest that these devices may positively and negatively influence components of parent-child interactions, such as caregivers talking and responding less to children while using a mobile device (Hiniker et al., 2014; Hons, Leavy, Jancey, 2018; Kellershohn, West, Vriesekoop, 2018; Radesky et al., 2014; Radesky, Miller, Rosenblum, Appugliese, Kaciroti, Lumeng, 2015). However, the majority of these studies have been done in controlled lab settings, where parents and children may use devices and interact differently than they do in their day-to-day lives (Reed, Hirsh-Pasek, & Golinkoff, 2017; Radesky et al., 2015; Zack & Barr, 2010). In an attempt to address this limitation and capture more typical behavior, a handful of studies have recently been done in more naturalistic settings, such as fast food restaurants and parks, where researchers collect data via anonymous observations. Nevertheless, these few observational studies have generally had small sample sizes and wide child age ranges. Additionally, they only focused on caregivers' behavior, were limited to one setting, either observed a large group of people, or captured only one or two components of interaction quality (e.g., parent responsiveness to the child) (Hiniker et al., 2015; Hons, Leavy, Jancey, 2018; Kellershohn, West, Vriesekoop, 2018; Radesky et al., 2014). Although these studies have

provided valuable insights, we still do not have a clear and detailed understanding of the extent to which mobile screen device use by caregivers is associated with the quality of interactions with their very young children, or if specific activities with devices are more strongly associated with high quality interactions than others.

Therefore, the aim of this study was to investigate whether mobile device use is related to several key components of high quality parent-child interactions (i.e. joint attention, parental and child initiation of interactions, parental sensitivity and responsiveness, parental and child talk, and parental and child emotional input) via systematic, naturalistic observations in public settings across socioeconomically diverse neighborhoods. Moreover, we explore whether specific types of mobile devices use are differentially associated with the quality of caregiver-child interactions.

The Role of Screen Media on Key Quality Components of Parent-Child Interactions

Most of the research examining how screen media relates to parent-child interactions has been done in the context of viewing TV (Barr et al., 2011; Kirkorian et al., 2009; Pempek, Kirkorian, & Anderson, 2014; Schmitt, Woolf, & Anderson, 2003). These studies have focused on five key aspects of high-quality parent-child interactions that are important for families with young children to engage in. These aspects include: 1) joint attention: the parent and child are mutually focused on the same object or activity (Dodici, Draper, & Peterson, 2003), 2) parental initiation of interactions: the caregiver attempts to engage the child in an interaction (Lewis & Feiring, 1989), 3) parental sensitivity and responsiveness: the parent provides prompt, contingent, and appropriate responses to the child's cues and vocalizations (Nathanson & Rasmussen, 2011), 4) parental talk: the parent exposes the child to conversations and words (Dodici et al., 2003), and 5) parental positive emotional input: the parent provides positive

statements and/or comments to the child (Dodici et al., 2003). Additionally, parents may also display a positive affect that can include smiling and physical affection towards the child (Dodici et al., 2003). The presence of these five components of high quality parent-child interactions have been linked to positive child outcomes (Dodici et al., 2003). To better contextualize the association of these aspects of parent-child interactions and screen media, the following sections review findings in the context of TV and mobile screen devices.

Joint Attention. The extent to which a parent and a child are mutually focused on the same object or activity, known as joint attention, has been linked to children's language and cognitive development (Dodici et al., 2003). This is because parents may use this time as an opportunity to bridge the gaps in their child's knowledge (Dodici et al., 2003; Zack & Barr, 2016). Indeed, some research on TV has found that the quality of parent-child interactions may be enhanced when parents and children co-view a program together, because parents may use the content of the program to ask their child questions, answer their child's questions, or engage in conversations about the program with the child (Anderson & Hanson, 2017). These conversations also provide an opportunity for the child to understand and talk about the content they are viewing, which helps develop their critical thinking skills. In contrast to these findings, however, many other studies have also found that TV viewing detracts from joint attention when the parent becomes more engaged with the program than with the child, which often occurs when the program is oriented towards the adult (Kirkorian et al., 2009). Emerging research in the context of mobile screen technologies also suggests that these devices might both encourage and discourage joint attention (Kirkorian et al., 2009; Zack & Barr, 2016).

From the few lab experiments and field studies that have explored the association between mobile screen devices and joint attention, findings suggest that mobile devices might

both enhance or detract from joint attention. For instance, two recent studies conducted in lab settings showed that touchscreen devices facilitated joint attention between parents and their children (refs). Specifically, the first study showed that toddlers were able to transfer what they learned from a 2D touchscreen device to a 3D object when their predominantly White, middle-class mothers scaffolded them during the task. Scaffolding behaviors often included mothers using the touchscreen features to model behaviors they wanted their child to learn and apply to the 3-D objects (Zack & Barr, 2016). The second study was done among highly educated Canadian mothers and fathers and their 2-to-6-year-old children. Parents in these dyads were given an iPad and instructed to use the iPad with their child the way they would normally use it. Results indicated that mothers and fathers equally provided a great deal of support to their children while they navigated the new tablet device together (Wood, Petkovski, Pasquale, Gottardo, Evans. & Savage, 2016). Together these lab study findings demonstrate that caregivers can capitalize on the features of mobile screen technologies to engage in joint attention with their children. Nevertheless, these studies were done in lab settings, which might have influenced the behavior of dyads. Thus, the extent to which parents and young children take advantage of these features and co-use mobile screen devices in their everyday lives is still largely unknown.

To our knowledge, only three studies have specifically captured joint attention in the context of mobile device use in more naturalistic settings (Radesky et al., 2014; Hons et al., 2018). The first study involved anonymous observations in U.S. fast food restaurants, where researchers took field notes of the interactions between 55 families and their 0-10-year-old children (Radesky et al., 2014). Findings from this study showed that when there was a mobile device present, the eye gaze of many caregivers was primarily on the device rather than on their children, and joint attention with a device only happened among four out of the 40 families who

used a mobile device (Radesky et al., 2014). These findings were corroborated by 200 Canadian parents who participated in an experimental field study while visiting a museum with their children (Kuslev & Dunn, 2019). Specifically, findings showed that parents who were instructed to use their mobile device frequently during their visit felt less attentive and more socially disconnected from their children than parents who were instructed to refrain from using their device as much as possible (Kuslev & Dunn, 2019). In contrast to these findings, a study done among 50 caregivers and their young children in Australian parks found that although caregivers individually used a mobile device for a large percentage of the time they were anonymously observed, they also engaged in activities with their child for a good portion of the time (41%) (Hons, Leavy, & Jancey, 2018). However, it was unclear whether the instances of joint attention also involved mobile device use or not. Further research in more socioeconomically diverse and naturalistic settings is needed to better understand the link between mobile device use and joint attention.

Parental Initiation of Interactions. Overall, studies investigating the extent to which parents initiate an interaction with a child when using media have been very limited in TV research, and particularly absent in studies of mobile device use (Domoff, Radesky, Harrison, Riley, Lumeng, & Miller, 2019). Instead, the research has mainly focused on investigating the extent to which children try to initiate an interaction with a caregiver when viewing TV and exploring the caregiver's responsiveness to the child (Domoff et al., 2019; Radesky et al., 2014). However, one recent study with a majority of affluent, White families did find that parents rarely initiated interactions with their children in their homes when screen media was audible. This study involved having children wear audio recorders and only captured electronic media use when it could be heard; thus, it was difficult to discern whether instances when caregivers did

initiate an interaction with children in the presence of electronic media pertained to situations when the caregiver was viewing TV or using a mobile device (Domoff et al., 2019). Furthermore, many of the activities people can engage in with a mobile device could also be silent (e.g. texting, scrolling through social media); hence, it is unlikely that this study captured moments when a caregiver was silently using a mobile device. Given that the emerging research on mobile device use suggests that parents are usually absorbed by their mobile device (Hons et al., 2018; Kellershohn, West, Vriesekoop, 2018; Radesky et al., 2014), and that face-to-face parent-child interactions are essential for the development of very young children (Estrada et al., 1987), it is important to examine the extent to which parents try to engage their young children in interactions when there is a mobile device present (Estrada et al., 1987).

Parental Sensitivity and Responsiveness. Parents who are sensitive and responsive typically provide prompt, contingent, and appropriate responses to their children's cues and vocalizations (Cabrera, Shannon, West, & Brooks-Gunn, 2006; Nathanson & Rasmussen, 2011). Conversely, parents who display low sensitivity and responsiveness to their child tend to ignore or respond inappropriately to their children's requests (Nathanson & Rasmussen, 2011). When parents are responsive, children learn to trust them and they also learn that they can affect and control their environment, which is associated with children's secure attachment and socio-emotional skills (Cabrera, Shannon, West, & Brooks-Gunn, 2006).

Extensive research on parental sensitivity and responsiveness in the context of TV, and a handful of studies on mobile screen devices, have generally found the same patterns. That is, parents tend to be less engaged and responsive to their children's bids for attention when they are watching adult-directed programs and when they are using their mobile screen devices compared to when screen media is not used (Pempek, Kirkorian, & Anderson, 2014; Radesky et al., 2014).

This is especially the case for parents of very young children (i.e. infants) compared to parents of slightly older children (i.e. toddlers) (Kirkorian et al., 2009; Nathanson & Rasmussen, 2011). Similarly, four anonymous and naturalistic observational studies of caregivers and their children in the park and fast food restaurants noted that some caregivers tended to ignore or respond negatively (e.g. kicking the child's foot under the table) to their children's bids for attention when they were using a mobile screen device (Hiniker et al., 2015; Hons et al., 2018; Kellershohn et al., 2018; Radesky et al., 2014). It is speculated that parents are less responsive to their children when they are using mobile devices because they become less aware of their children's cues for attention while their eye gaze is on the device (Radesky et al., 2015). Indeed, a majority of White parents validated these findings in two interview studies, when they reported feeling like they were less "present" with their children while they were using a mobile device (Hiniker et al., 2015; Radesky et al., 2016). In sum, findings from TV and mobile screen devices indicate that parents tend to be less sensitive and responsive to their children in the presence of screen media. However, more research is needed to explore the way in which caregivers respond to their young child's bids for attention when they are using a mobile screen device and if their responsiveness differs from when a device is not being used.

Parental Talk. Exposure to conversations and words at an early age is crucial for children's language, cognitive, and socio-emotional development (Dodici et al., 2003). However, extensive studies on TV have consistently shown that parents engage in fewer verbal interactions with their children when the TV is on compared to when the TV is off, even if no one is watching it (Kirkorian et al., 2009; Pempek et al., 2011). The few studies that have examined parental talk while using mobile screen devices have found similar results (Radesky et al., 2014; Radesky et al., 2015). For example, in a study among socioeconomically diverse primarily White

mothers (72%), women who used their mobile devices during a structured lab task with their child engaged in fewer verbal and non-verbal interactions with them compared to mothers who did not use a mobile device during the task (Radesky et al., 2015). Despite these findings, not all of the influence of mobile screen devices on parent-child talk is negative. For example, the interactive features of mobile screen devices, such as Facetime, may encourage families to interact with each other, and research has shown that toddlers can learn new words from live conversations they have on Skype with other adults (Roseberry, Hirsh-Pasek, & Golinkoff, 2013). Further, naturalistic investigations of parental talk while using mobile screen technologies can help the field understand the extent to which mobile devices may be enhancing or detracting from parent-child conversations.

Parental Emotional Input. Although studies define "parental emotional input" with slight differences, parental emotional input generally includes positive statements, comments, smiles, laughter, nurturing embraces and touches by the caregiver (Dodici et al., 2003). Research often shows that parental positive affect (e.g., smiling, hugging, praising) is related to a host of positive child outcomes such as optimal socio-emotional and cognitive development (Barnard, 1997; Dodici et al., 2003).

In general, research on parental emotional input during digital use is virtually non-existent, but one recent observational study noted that when parents were highly engaged with their mobile device, they tended to have a flat affect while interacting or responding to their child (Radesky et al., 2014). Because mobile devices can be accessed at any time and from almost anywhere, parents' emotional input may be influenced throughout the day, and this may have implications for the child's socio-emotional development. Thus, it is important to further explore parents' emotional input while using mobile screen devices in the presence of young children.

Child Behavior and Mood. The way in which parents interact with their children is often also influenced by the child (Hudson & Rapee, 2001). Specific child characteristics and behaviors such as age, gender, the child's mood, and bids for attention from the caregiver may influence the quality of parent-child interactions in the context of mobile devices (Dodici et al., 2003; Kirkorian et al., 2009). For example, if the child is happy, the parent might interact differently with her/him than if the child is crying or being difficult. Similarly, parents may engage more frequently with a child when the child seeks their attention than when they do not (Kirkorian et al., 2009). However, research on TV has shown that when the TV is on, both parents and children are less likely to engage in social behaviors (Kirkorian, 2004). Furthermore, parents of toddlers have been found to be more responsive to their child than parents of infants (Kirkorian et al., 2009). It is speculated that this might be due to the toddlers being more vocal and seeking their parents' attention more frequently than infants (Kirkorian et al., 2009). Nevertheless, studies examining children's behaviors in the presence of mobile screen devices are largely absent, with the exception of one observational study in fast food restaurants. Findings from this study showed that when parents were using their phones, some children tended to bid for the parent's attention and other children did not attempt to obtain their attention, perhaps having grown used to their parents being on their mobile device (Radesky et al., 2014). Clearly, research needs to take into account children's characteristics and behavior when examining the association of caregiver device use with the quality of parent-child interactions. Moreover, research also needs to examine whether caregiver use of mobile devices also impacts children's behaviors.

In sum, most of what we know about the influence of technology on parent-child interactions has been informed by research on TV. The limited amount of studies that have

examined some aspects of parent-child interactions while using mobile screen technologies have found some of the same patterns, suggesting that these devices might also influence parent-child interactions. However, further research that consists of naturalistic, systematic observations and systematic coding of behaviors in socioeconomically diverse neighborhoods is needed to help clarify whether caregiver use of mobile screen devices directly relates to the quality of parent-child interactions with very young children. Additionally, given the diverse ways mobile devices could be used, research is needed to understand whether specific ways of using mobile devices are more detrimental or beneficial for the quality of interactions than others. Therefore, the aim of this study is to use anonymous, systematic observations in diverse public settings to explore whether the use of mobile screen devices is related to the quality of caregiver-child interactions, as measured by five key components of high quality interactions: 1) joint attention, 2) parental initiation of interactions, 3) parental responsiveness and sensitivity to the child, 4) parental and child talk, and 5) parental and child emotional input. We will also explore whether using mobile devices in different ways matters for the quality of caregiver-child interactions.

Research Questions

RQ1) Does the use of mobile devices by caregivers relate to five of the key components of caregiver-child interactions?

RQ1a) Is the specific way caregivers use mobile devices (e.g. texting, only looking at screen) associated with the quality of caregiver-child interactions?

RQ2) Does the proportion of device use by caregiver-child dyads relate to the proportion of high quality interactions they engage in throughout the time they are observed?

RQ3) Are there differences in the quality of interactions between dyads observed in settings located in low-to-middle income neighborhoods and dyads observed in settings located in high-income neighborhoods?

Method

Study Design

Caregiver-child dyads were anonymously observed in parks, food courts, and courtyards and lounging areas located in shopping centers and malls. The advantage of using this unobtrusive method of observation is that we are more likely to capture natural interactions in the context of device use because individuals are not likely to be influenced by the researcher (Radesky et al., 2014). Moreover, the approach of doing anonymous, systematic observations and coding of behavior is appropriate to use after patterns of a given phenomenon have been identified through the use of field notes and the researchers are interested in quantifying the prevalence of these patterns (McCall, 1984). Therefore, to systematically compare the quality of interactions in the presence and absence of device use within and between dyads, a structured coding scheme, rather than field notes, was developed for this study. The codes within the coding scheme are behaviors that often characterize the key indicators of quality interactions, and were primarily drawn from the robust literature on TV, and the handful of studies on mobile devices.

Participants and Observation Sites

Participants. Caregiver-child dyads were anonymously observed by two researchers in public settings in Southern California from August 2018 through March 2019. To be observed, all dyads had to meet the following criteria: 1) there was only one adult caregiver accompanied by one child. We made the decision to only observe dyads because we wanted to make sure we captured all of their behaviors accurately during the observations. Additionally, we suspected

that having multiple adults and/or children would change the dynamics of the interactions and would make it more difficult to understand the influence of the mobile device on the quality of interactions. For example, a caregiver might feel more comfortable using their device for a longer period of time if two children are playing and interacting with each other while at the park than if the child is alone. 2) The child looked four years old or younger, 3) the two researchers were close enough to the pair to be able to see at least half of their faces upon the start of the observation, 4) a mobile screen device was visibly present regardless if the caregiver or child were using it or not (e.g. the phone was on the table) before the researchers started coding. Additionally, because we were also interested in understanding whether caregiver-child dyads would interact differently in the absence of a mobile device, 29 (30%) of the observations were done among dyads that did not use a mobile device.

Using these criteria, a total of 98 caregiver-child dyads were observed and coded. Based on the joint agreement of the two coders, most of the caregivers appeared to be female (69%), and 57% of the caregivers seemed to be 31 years old or older. Gender appeared to be distributed more evenly for the accompanying children, with 46% of them estimated to be female and 54% estimated to be male. Sixty-eight percent of the children appeared to be between the ages of three and four, 27% between the ages of one and two, and only 5% of the children appeared to be under the age of one-year-old. Although it was very difficult to guess the ethnicity of the dyads observed, given the demographic diversity in Southern California, we estimated most of the dyads observed in middle-to-high income neighborhoods to be White and Asian, while the dyads observed in low-income neighborhoods were much more diverse (e.g., White, Asian, Latino, Black). These details are also described in Table 1.1

Settings. Given that parents' socioeconomic status (SES) has been found to influence their own and their children's use of mobile screen devices (Rideout, 2014), SES might also influence the way parents interact with their children in the context of mobile device use. Therefore, we observed caregivers and their young children in public settings across low, middle, and high income neighborhoods in Los Angeles and Orange County. Income for these settings was determined using Census tract data, which gives an estimated median household income for each of the neighborhoods immediately surrounding the setting. We decided to use the median household income of all the neighborhoods surrounding the setting with the assumption that most of the dyads visiting these settings would come from the surrounding neighborhoods, and that income would vary greatly from neighborhood to neighborhood given the demographics and gentrification process currently taking place in these two regions. Our speculation appeared to be confirmed. That is, median household income varied greatly for each of the neighborhoods surrounding most of the settings. For example, the median annual household income for the neighborhoods immediately surrounding one of the malls ranged from $53,000- $90,000. Please see Appendix 1.1 for the specific range of median total household annual income for each setting.

Dyads were observed in a total of twelve different settings that were clustered into three main types of places: 1) n = 31 dyads in parks/indoor playgrounds (n = 21 low to moderate income (range: $38,000-$90,000); n = 10 higher income (range: $80,000-$128,000), 2) n = 32 dyads in food courts (n = 32 low-middle income only (range: $42-000-$90,000), and 3) n = 35 dyads in court yards or lounging areas located in malls or shopping centers (n = 6 low-moderate income (range: $24,000-$84,000); n = 29 higher income (range: $90,000-$152,000). These settings were selected because they provide the ideal situations for families to engage in face-to-

face interactions with each other and also gives them the opportunity to engage in independent behaviors (Hiniker et al., 2015; Radesky et al., 2014). Additionally, these settings allowed the researchers to stay there for long periods of time and blend in with the setting.

Observational Methods

Two researchers arrived to an assigned public setting to anonymously and systematically observe caregivers and their accompanying child. Upon arrival, they chose a table or grass area to sit that would give them the best view of caregiver-child dyads while still being unobtrusive. Additionally, researchers often bought or brought snacks with them to further blend in with the setting. When multiple eligible dyads were present, the researchers observed the dyad that was the closest to them first.

Real-time coding. Systematic observations and coding of behavior were done in real time by two researchers. One researcher observed and coded the behavior of the caregiver while the other researcher simultaneously observed and coded the behavior of the accompanying child. Using a time sampled approach, dyads were observed for 10 seconds, followed by a 20-second coding period, then observed for 10-seconds again, and so on. This time-sampled method has been widely used in prior experimental studies of social behaviors, real-time classroom observations, and in-vivo and videotaped parent-child interactions (LaFrance & Mayo, 1976; Hintze, Volpe, & Shapiro, 2001; Kirkorian et al., 2009; Volpe, DiPerna, Hintze, & Shapiro, 2005). The time for coding was longer than the time of observation because the coding scheme had an extensive number of codes and additional spaces for field notes. The coders repeated the 10-20 second time interval for a maximum of 5 minutes. Hence, if the researcher observed a 5-minute interaction, there were a total of 10 intervals coded. To keep track of time, one of the researchers placed their phone between herself and the other researcher and played a 5-minute

pre-recorded audio track that told researchers to "start," and "stop" at the appropriate time intervals. This ensured the caregiver and child observations were aligned.

After the researchers coded the behaviors of the dyad, they jointly estimated the dyad's demographic characteristics (e.g. gender of caregiver and child, estimated parent and child's ages), site information (i.e. specific setting, city, time of the day, day of the week) and completed additional brief field notes to record anything they felt might not have been captured by the coding scheme.

Coding scheme. The coding scheme developed for this study used a binary scale (0 = not observed; 1 = observed) to record whether caregivers and their accompanying child used a device and displayed a list of specific behaviors associated with five key components of parent-child interactions at least once in each ten second interval of observation. These behaviors included: (1) joint attention, (2) initiation of interactions, (3) responsiveness and sensitivity, (4) talk, and (5) emotional input. When the same behavior was displayed multiple times within the same time interval, the behavior was coded the same as if it was displayed only once. Details on how device use and each of the five components were specifically coded are below:

Joint attention. An instance was only considered to be joint attention if the child and caregiver were jointly engaged in the same activity or with the same object for three seconds or more. Indicators of joint attention, that is looking that the same object or each other for 3 or more seconds, included a) joint attention, but without a device, b) joint attention with a device, c) no joint attention, parent and or child using a device, d) no joint attention, parent or child doing something else, e) no joint attention, parent or child looking at the child or parent. It is important to note that when both researchers coded the caregiver looking at the child and the child looking at the caregiver simultaneously, the instance was marked as joint attention. However, when one

of the individuals was looking at the other but the look was not reciprocated (i.e., looking at something else) the instance was not marked as joint attention.

Initiation of interaction. We coded an instance of initiation when a caregiver or child tried to get the attention of the other person verbally (e.g. look!) or with gestures (e.g. pointing).

Responsiveness and sensitivity. Responsiveness and sensitivity were coded if the caregiver or child displayed any of the following indicators: a) caregiver/child responded to child/caregiver positively and promptly (within one second), b) caregiver/child responded to child/caregiver positively and late (after 1 second), c) caregiver /child responded to child /caregiver with a neutral affect and promptly (within one second), d) caregiver/child responded to child/caregiver with a neutral affect and late (after one second), e) caregiver or child responded to child/caregiver negatively and promptly (within one second), f) caregiver/child responded to child/caregiver negatively and late (more than 1 second), and g) caregiver/child ignored the child/caregiver.

Talk. Talk was coded as a) no talk at all by the caregiver or child, b) minimal talk (1-3 words) by the caregiver or child, and c) a lot of talk by the caregiver or child (more than 3 words).

Emotional input. Emotional input was coded for any evidence of a) physical affection (e.g., hugging, kissing), b) smiling, c) praising the child, d) neutral or flat affect, e) sad, non-physical frustration (e.g., screaming), f) physical frustration (e.g., spanking the child). The coders reported whether they saw these behaviors or not within the 10 second segment of observation by placing a 1 next to it. Thus, there could only be a maximum of one "1" in each cell per time segment. It was possible for the caregiver/child to be coded with multiple of these indicators if they displayed them during the 10 second of observation. For example, if the child smiled and

the hugged parent within the same interval, they would be coded as 1 for each of these two behaviors.

In addition to these components of caregiver-child interactions, there were also three other factors that were coded. First, a list of five options to capture whether a device was used or not: a) used phone, b) used tablet, c) just holding the device and not using it, d) other device (e.g. game boy), e) no device used. Second, if a device was used, researchers indicated how the caregiver or child used the device: a) typing or swiping, b) calling, c) only looking at screen, d) taking a picture, e) facetiming, and f) other. Lastly, the proximity of the child to the parent was also coded as near (i.e. within five feet of each other) and far (i.e. more than five feet from each other). These factors were included because they may relate to parents' use of mobile devices and the quality of their interactions with their children. Please see Appendix 1.2 for the caregiver coding scheme and Appendix 1.3. for the child coding scheme.

Additionally, both researchers were asked to add field notes in the margins of the coding form while they were coding and by responding to the following three questions at the end of the observation: 1) Was there an event or something that stood out during the observation that you think might have influenced the interaction between the caregiver and the child? 2) Describe the environment, and 3) Is there something you want to mention about the interaction that you think we might have missed in the coding?

Coder training. A total of five people observed and coded dyadic interactions. Prior to coding, all researchers were extensively trained to use the coding scheme. The following steps were required to be completed in chronological order. Step 1) Research assistants read the coding manual (see Appendix 1.4) and memorized all of the definitions and labels in the coding scheme, with the goal of becoming a fast coder. Step 2) The lead researcher and research

assistants watched several video-recorded interactions between caregivers and their young children, and coded their behavior using the coding scheme. During this step, the lead researcher and coder-in-training compared how they each coded behavior and clarified any confusion. The coder-in-training was not allowed to move to the next step until s/he achieved at least 85% consistency with the lead researcher in every video. The videos used to train coders were of parent-child interactions in public settings. These videos were created by the lead researcher and showed a caregiver and child in public spaces with and without devices. Step 3) Once the lead researcher and coders-in-training achieved consistency, they went to public settings and anonymously coded caregiver-child dyads. Each time, only focusing on either the caregiver or the child. After each observation, the lead researcher and coders compared their codes. If the coders-in-training achieved 85% overlap with the lead researcher, they were ready to begin data collection. Having an 85% overlap in consistency of codes is a rule of thumb that has been used in previous studies (Cabrera et al., 2006).

Reliability. To ensure that the coders stayed consistent in their coding over time, dyads were double coded after every 10 observations, with the two coders observing and coding the same individual. These observations were not included in our count of observations because it was strictly done for the purpose of reliability and targeted only one member of the dyad at a time. Additionally, given that the two coders independently coded for joint attention, caregiver-child proximity, and the corresponding response for caregiver or child initiation of an interaction (e.g. if the child initiated a response, the researcher coding the caregiver had to code for the response of the caregiver and vice versa) during data collection, we were able to calculate reliability for these four domains after every observation. The interrater reliability score for each of the domains was as follows: caregiver and child phone use = 1.00, way in which the caregiver

and child used the mobile device = 1.00, caregiver emotional input = .84, caregiver talk = .87, caregiver initiation of interaction = .97, caregiver responsiveness to the child = .93, child emotional input = .82, child talk = .82, child initiation of interaction = .93, child responsiveness to the caregiver = .97, child and caregiver proximity = .97, and joint attention = .98.

Analytic Plan

Variable creation. To prepare the data for analysis, variables for device use and the five key indicators of interaction quality were created.

Device use. A dichotomous variable for "device used" was created for each interval by combining the three individual items (i.e. phone, tablet, other device) into the "1= device used" category and the two remaining items (i.e. no device used, just holding the device and not using it) into the "0 = no device used" category.

Joint attention. Joint attention was also dichotomized (0, 1), by combining joint attention with or without the device along with caregiver looking at child and child simultaneously looking at caregiver into the "1 = joint attention" category and all remaining items (i.e. no joint attention and parent using the device, no joint attention and parent doing something else, no joint attention and caregiver looking at child but child doing something else or child looking at the caregiver but caregiver doing something else) into the "0 = no joint attention" category for each interval. A total of 12 intervals out of 674 for joint attention were coded as missing data due to coder disagreement on the occurrence of joint attention.

Emotional input. To capture emotional input, two continuous variables were created for each interval. The first variable was labeled "positive emotions score" and was composed for the caregiver by giving a score of 1 to each of the following emotions displayed in each interval: physical affection, smiling, and praising the child. Hence, the maximum score a caregiver could

obtain in positive emotions for a single interval was 3 and a minimum score of 0 if they did not display any of these positive emotions. Similarly, children's "positive emotions" scores were computed by adding the scores for physical affection, smiling and seeming enthusiastic in each interval. Hence, a child could also earn a maximum score of 3 and a minimum score of 0 at each interval. A higher score on positive emotions meant more positive emotions were displayed by the caregiver or child. Additionally, all caregivers and children also obtained a score for a variable labelled "negative emotions score" for each interval. This variable was created by adding the scores of sad, non-physical frustration, and physical frustration for the caregiver (maximum score of 3) and sad, crying, non-physical frustration, and physical frustration for the child (maximum score of 4). A higher score on this variable meant more negative emotions were displayed by the caregiver or child. A total of 14 intervals out of 674 for caregiver emotional input were coded as missing data because the coder was unable to see the caregiver's face. Additionally, because we did not know whether a neutral expression was indicative of positive or negative emotion, this variable was not included in our positive or negative emotions score.

Talk. For the talk variable, all caregivers and children obtained an individual score. In this "talk" variable, a "0" represented no talk at all, "1" represented minimal talk, and "2" represented a lot of talk (maximum score of 2 = three or more words) for each interval. Given that 13 of the caregivers were talking on the phone in some or all of the intervals they were observed, and that their talk did not appear to be directed at the child, we gave these caregivers/children a score of 0 for this variable in intervals when they were talking on the phone. Additionally, a total of seven intervals out of 674 for caregiver talk were coded as missing because the coder was unable to see the caregiver's face or hear their voice. Similarly, a

total of 14 intervals out of 674 for child talk were coded as missing because the coder was unable to see or hear the child's voice.

Caregiver responsiveness and sensitivity. Although 55 out of 98 children tried to initiate an interaction with their caregiver, their overall incidence was low (91 instances in total); hence the incidence of caregiver responsiveness was low too. Therefore, caregiver responsiveness was dichotomized. In this variable, we combined caregiver responds positively and promptly, responds positively and late, responds neutrally and promptly, and responds neutrally and late into the "1= responds" category. For the second category, we combined responds negatively and promptly, responds negatively and late, and ignores into the "0=negative response." A total of seven intervals out of 674 were coded as missing due to coder disagreement or because the coder could not see the caregiver's face.

Initiation of interactions. The variable for initiation of interactions for the caregiver and child was coded in a dichotomized form (0 = no, 1 = yes). Out of 674 intervals, 15 were coded as missing for caregiver initiation of interactions with the child, due to coder disagreement or because the coder could not clearly see the caregiver. Similarly, a total of 17 intervals out of 674 were coded as missing for caregiver-child proximity due to coder disagreement.

Caregiver-child proximity. Caregiver-child proximity was also coded in a dichotomized form (0 = close, < 5 feet, 1 = far, >5 feet).

Income of setting variable. We created a variable that would allow us to make comparisons by the median income of the neighborhoods surrounding the settings. However, creating the variable was challenging due to the great variability in median income across the neighborhoods surrounding each setting. For example, while the median household income for one of the neighborhoods surrounding one of the playgrounds was $53,000, the median

household income for the neighborhood right next to it was $90,000. Similarly, the range in median household income for one of the courtyards was $24,000-$84,000. Thus, some settings were surrounded by middle-to-high income neighborhoods and others were surrounded by low-moderate income neighborhoods. Therefore, to obtain the clearest possible income comparisons, we decided to create a dichotomous variable. For this variable, "0" would include 59 dyads in parks (n= 21), courtyards (n = 6) and food courts (n = 32) located in low and middle income neighborhoods (income range: $24,000-$90,000), and "1" would include 39 dyads in parks (n = 10) and courtyards (n = 29) located higher income neighborhoods (income range: $80,000-$152,000). Food courts were not included in the "high income" category because we were unable to observe any eligible dyads in food courts located in high-income neighborhoods. Additionally, due to the variability in neighborhood median income some overlap occurred in income between both categories. Nevertheless, because $80,000-$90,000 was in the higher end of the spectrum for our low-middle income category and $80,000-$90,000 was in the lower end of the spectrum for settings located in high income neighborhoods, we judged this comparison to be acceptable.

Descriptive analysis. Descriptive statistics were first used to describe the general patterns of device use and the overall prevalence of the five key indicators of high quality interactions among the 98 caregiver-child dyads.

RQ1. *Does the use of mobile devices by caregivers relate to the five key components of caregiver-child interactions?* As previously mentioned, a total of 98 caregiver-child dyads were observed and coded. From these observations, a total of seven children independently used a mobile device at least once over the observed intervals. However, given that the main goal of research question one was to understand whether caregiver mobile device use was associated

with the quality of caregiver-child interactions, we focused only on mobile device use by the caregiver (with the exception of instances involving joint attention). Therefore, we excluded intervals in which the child used their own device independently without engaging in joint attention with the caregiver, instead of eliminating the entire case. For example, if dyad X was observed for five intervals, and the child independently used a mobile device for two intervals, but then did not use the device afterwards, we kept the three last intervals for dyad X and eliminated the first two intervals in which the child used the device independently. This resulted in a total of 44 coded intervals omitted, with one dyad completely eliminated from the analyses because the child used the device for the entire observation period. Thus, our final analytic sample consisted of 97 caregiver-child dyads, with a total of 674 coded intervals.

Before answering RQ1, we first conducted a set of t-tests and chi square analyses to understand how demographic variables (e.g. child and caregiver gender), settings of observation, and key variables (i.e. child and caregiver emotional affect, child and caregiver initiation of interactions, child and caregiver talk, joint attention, caregiver responsiveness and sensitivity to children's bid for attention, and child-caregiver proximity) were distributed across intervals when caregivers used a mobile device and intervals when they did not. Understanding how these variables were distributed among intervals with and without device use helped us better contextualize our findings.

Then, a twofold process was used to answer the first research question. First, we looked at the 674 coded intervals as independent observations. Although not accounting for the nested nature of the data (i.e. repeated measures nested within the same caregiver-child dyads over the course of multiple intervals) often results in standard error estimates that are too small, this first step allowed us to understand general patterns of association between the predictor and outcome

variables for the entire sample. Most analyses that take into account the nested nature of data omit variables that do not vary over time. In our case, caregivers who used their mobile device during all of the intervals in which they were observed and caregivers who did not use their mobile device for any intervals would be omitted from the analysis because there is no variability in their use of mobile devices across the intervals they were observed.

The second part of the analysis took into account the nested nature of the data through the use of fixed effects. For this analysis, only cases in which the caregiver intermittently used their mobile device were retained. The strength of using fixed effects is that it eliminates between-subject variability and only focuses on within-subject variability. Hence, each individual is used as their own control, and the analysis measures how much each of their scores deviates from their own mean over time. Therefore, any characteristic that is unchanging about the individual during the time of observation (e.g., gender, SES) is controlled for, including variables we did not measure.

The specific analyses we used for part one and part two of the analytic process involved a set of linear probability models for each of the five outcomes indicative of interaction quality: 1) joint attention (0 = No, 1= Yes), 2) caregiver initiation of an interaction with the child (0 = No, 1 = Yes), 3) caregiver sensitivity and responsiveness to the child (0 = negative response, 1 = responds), 4) caregiver talk to the child (0-2 score), 5) caregiver positive emotions (0-3 score), 6) child talk (0-2 score), and 7) child positive emotions (0-3 score). Models for the dependent variables of negative child and caregiver emotions were not included because their overall incidence was very low. The main predictor for all linear probability models was device use by the caregiver (0 = No, 1 = Yes). Covariates for joint attention and the four linear probability models containing caregiver quality outcomes included intervals observed (1-10), child and

caregiver gender (0 = female), setting of observation (food court = 0), caregiver-child proximity (close = 0), child positive emotions score, and child talks score. The covariates for the two linear probability models containing the child quality outcomes (i.e. child talks and child positive emotions) included intervals observed, income of setting, child and caregiver gender, setting of observation, and caregiver-child proximity. The variables of caregiver positive emotions and caregiver talks were included as covariates in the child models as well. Although "child initiates interaction" was significantly associated with most outcome variables, it was not included as a covariate because it was strongly correlated with "child talks."

RQ1a. To address the second portion of the first research question: *Is the specific way caregivers use mobile devices (e.g. texting, only looking at screen) associated with the quality of caregiver-child interactions?* A set of seven regressions were done with each of the five indicators of high quality interactions as the outcome variables: joint attention, caregiver initiates an interaction with the child, caregiver responsiveness to the child, caregiver and child talk, and caregiver and child positive emotions. The main predictor variable for all regression models was the way the device was used by the caregiver: only looking at the screen, taking a picture of the child, independent phone call, and texting/swiping. The reference group was texting and swiping since it was the most common way devices were used. Covariate variables for joint attention and the four caregiver outcomes included setting, caregiver-child proximity, child positive emotions, child talk, intervals, intervals, income of setting, setting, and caregiver and child gender. Similarly, the covariates for the child outcome variables included setting, caregiver-child proximity, caregiver positive emotions, caregiver talk, intervals, income of setting, setting, and caregiver and child gender. Fixed effects were not included because the majority of caregivers tended to engage in the same type of activity with their phone throughout the observation.

RQ2. To answer our second research question: *Does the proportion of device use by caregiver-child dyads relate to the proportion of high quality interactions they engage in throughout the time they are observed?* Proportion of mobile device use was calculated for each caregiver-child dyad by adding the numbers of intervals in which caregivers and children used a mobile device and dividing this number by the total number of intervals the dyad was observed. All 98 dyads and 718 intervals were included for this analysis. Hence, for the seven dyads in which a caregiver, child, or both used a mobile device, an interval was given a score of one if a mobile device was used, regardless if it was used by the caregiver, child, or both. For example, if dyad X was observed for three intervals and the caregiver used their mobile device for interval 1 while the child used their mobile device for interval 1 and interval 2, the dyad obtained a proportion score of (2/3) .667. Similarly, to calculate the proportion of high quality interactions caregivers and children engaged in throughout the time they were observed, we summed the total number of incidences or scores obtained in a given quality variable and divided it by the total number of intervals, enabling comparisons for dyads with different numbers of observed intervals. For example, a person could obtain a score ranging from 0-2 on each interval for the quality outcome of "caregiver talk." Therefore, if we observed individual X for three intervals and they obtained the scores of 0, 1, and 2 on "caregiver talk," their proportion of caregiver talk score would be (3/6) .50. Hence, caregiver X had a talk score of .50 for the entire observation.

Using these proportions, a regression model was done for each quality outcome: 1) proportion of joint attention, 2) proportion of caregiver initiating interactions, 3) proportion of caregiver responsiveness to the child, 4) proportion of caregiver talking to the child, 5) proportion of child talking, 6) proportion of caregiver positive emotions, and 7) proportion of child positive emotions. The main predictor for the seven regression models was the proportion

of device use. Covariates included child and caregiver gender, income of setting, setting of observation, percentage of caregiver-child proximity, percentage of children's positive emotions, and percentage of child talks.

RQ3. To address our third research question: *Are there differences in the quality of interactions between dyads observed in settings located in lower and higher income neighborhoods?* We decided to only compare parks and courtyards and omitted dyads in food courts (n = 32) because we were unable to observe any eligible dyads in food courts located in high-income neighborhoods. Thus, our income variable for the third research question only included dyads in parks and courtyards located in low-middle income neighborhoods and high income neighborhoods. Therefore, our analytic sample for this question consisted of 66 dyads instead of 98.

A set of linear probability models for each of the five outcomes indicative of interaction quality were conducted: 1) joint attention (0 = No, 1= Yes), 2) caregiver initiation of an interaction with the child (0 = No, 1 = Yes), 3) caregiver sensitivity and responsiveness to the child (0 = negative response, 1 = responds), 4) caregiver talk to the child (0-2 score), 5) caregiver positive emotions (0-3 score), 6) child talk (0-2 score), and 7) child positive emotions (0-3 score). The main predictor for all linear probability models was income of parks and courtyards (0 = low-middle income, 1 = high income). Covariates for joint attention and the four linear probability models containing caregiver quality outcomes included intervals observed (1-10), child gender and caregiver (0 = female), setting of observation (courtyards = 0), caregiver-child proximity (close = 0), child positive emotions score, and child talks score. The covariates for the two linear probability models containing the child quality outcomes (i.e. child talks and child positive emotions) included number of intervals observed, income of setting, child and caregiver

gender, setting of observation, and caregiver-child proximity. The variables of caregiver positive emotions and caregiver talks were included as covariates in the child models as well. Although "child initiates interaction" was significantly associated with most outcome variables, it was not included as a covariate because it was strongly correlated with "child talks."

Results

A total of 98 caregiver-child dyads were observed. From this sample, 29 dyads were observed interacting without the use of a mobile device. The remaining 69 dyads involved cases in which the child (n = 1) or caregiver (n = 18) used their device the entire time they were observed, and dyads in which both the child (n = 6) and the caregiver (n = 50) were on their device for some of the time they were observed. Descriptive analyses showed no significant differences between these three types of dyads in demographics variables (e.g. child gender, caregiver gender), settings where they were observed (i.e. food courts, courtyards, parks), income of the neighborhoods surrounding the settings, or the average number of intervals they were observed (M = 7, SD=3). See Table 1.2.

For the 69 caregiver-child dyads who did use a mobile device, smartphones were the most popular type of devices used by both caregivers (99%) and children (71%), followed by tablets (29%), and a smartwatch (1%). Additionally, most instances of mobile device use by caregivers involved texting or swiping (43%), followed by only looking at the screen (22%), making a phone call (22%), taking pictures of their child (9%), or doing other activities (4%) (e.g. Facetime). For the most part, male and female caregivers tended to engage in the same types of activities with their device. However, a slightly higher percentage of device use by male caregivers involved only looking at the screen (25%) compared to female caregivers (15%), and a slightly higher percentage of device use involved talking on the phone for female caregivers

(26%) compared to male caregivers (18%). In comparison to adults, children primarily looked at something on the screen (68%) or typed and swiped (32%) when they used a mobile device independently. Notably, six out of the seven children who used a mobile device were estimated to be between the ages of three and four, and the remaining child was estimated to be between the ages of one and two.

When examining the prevalence of the five key indicators of quality interactions among our entire sample, we found that most indicators had occurred at least once over the course of the observation for the majority of the dyads. For instance, joint attention occurred at least once over the course of the observation for 67% of the dyads. Similarly, 73% of caregivers and 68% of children said at least one word throughout the time they were observed. In line with these patterns, 64% of caregivers and 68% of children expressed a positive emotion at least once during the course of the time they were observed, and very few expressed any negative emotions (3% caregivers and 4% children). Furthermore, a little over half (53%) of the caregivers attempted to initiate an interaction with their child at least once during the time they were observed and the majority (88%) of caregivers responded to their children when the child attempted to initiate an interaction with the caregiver. It is important to note that a higher percentage of each of these components was observed when the caregiver or child were not using a mobile device.

RQ1: Does the use of mobile devices by caregivers relate to the five key components of caregiver-child interactions?

The analytic sample used to answer the first research question involved 97 caregiver-child dyads. Together, these dyads produced a total of 674 coded intervals, with 280 intervals pertaining to instances when caregivers used a mobile device and 394 intervals when caregivers did not use a mobile device. Descriptive analyses consistently showed no significant differences in the distribution of most demographic variables and settings between the intervals when caregivers used a device and intervals when they did not. However, two significant differences were found. First, a higher proportion of device use occurred when the caregivers were with a male child (.60) than female child (.40), $X^2 = 11.3$, $p = .001$, and the second was that a higher proportion of intervals with device used occurred among caregivers in settings surrounded by low and middle income neighborhoods compared to caregivers in settings surrounded by high income neighborhoods. Please see Table 1.3 for more details.

Similarly, comparisons in key variables of quality interactions between intervals when caregivers used a device and intervals when they did not revealed many differences (see Table 1.4). For instance, a higher proportion of joint attention (.45 vs. .13, $p < .001$), caregivers initiating interactions with (.19 vs. .09, $X^2 = 14.7$, $p < .001$) and responding to (.90 vs. .60, $X^2 = 11.5$, $p = .001$) their child, happened when caregivers did not use the mobile device compared to when they did. Additionally, children ($M = .49$ vs. $M = .31$, $p = .001$) and caregivers ($M = .46$ vs. $M = .16$, $p = .001$) tended to display more positive emotions in intervals when caregivers did not use a mobile device compared to intervals when caregivers did. Similarly, both children ($M = .37$ vs. $M = .29$, $p = .04$) and caregivers ($M = .61$ vs. $M = .24$, $p = .001$) tended to talk more in intervals when caregivers did not use a device than when they did. The only two variables in which no significant differences were found between intervals when caregivers used and did not use a mobile device were in the proportion of children initiating interactions with the caregiver

and the average amount of negative emotions displayed by caregivers and children. However, the latter finding could be attributed to the overall low incidence of negative emotions displayed by both caregivers (n = 9 intervals) and children (n = 8 intervals).

To determine whether caregiver mobile device use was significantly associated with each of the five key indicators of quality interactions after controlling for other variables, linear probability models were run. The results for each outcome variable are displayed in a table. Each table contains a total of nine models. Models one through seven for each of the outcome variables show the results of the linear probability models as each covariate is added into the model. Model eight and nine will contain the coefficients of the models with fixed effects. Specifically, model eight will only include the key predictor variable, and model nine will include the key predictor variable along with the time-varying covariates.

Joint Attention. Table 1.5 shows the results of estimating the effect of caregiver mobile device use on joint attention. Specifically, the first linear probability Model shows that the probability that caregivers and children engaged in joint attention in intervals when caregivers were not using a mobile device was .45. This probability decreased by 13 percentage points and resulted in the probability of .32 in intervals when caregivers used a mobile device. Models two through nine show that with the addition of covariates, the effect of caregivers using a mobile device on joint attention gradually decreased to .25 but remained significant. Additionally, joint attention between dyads was more likely to happen in courtyards and parks compared to food courts. Further, joint attention was more likely to occur in settings surrounding by lower than higher income neighborhoods. Being physically closer to each other and being with a child who talked and showed more positive emotions was also associated with a higher likelihood of engaging in joint attention. Interestingly, dyads with a female child were more likely to engage

in joint attention than dyads with a male child. Nevertheless, caregiver gender was not significantly associated with joint attention.

Model ten and eleven, with the fixed effects, show that although the effect of caregiver mobile device use on joint attention was reduced and the standard error increased when we accounted for the nested nature of the data, the results remained significant nonetheless. That is, the probability that caregivers and children would engage in joint attention when they were not using their mobile device was of .42. However, this probability decreased by 13 percentage points to .29 when they switched to using a mobile device. Model 11 shows that the effect of using a device on joint attention only slightly decreased to .25 with the addition of time-varying covariates but remained significant.

Caregiver Initiation of Interactions. Table 1.6 shows the results of estimating the effect of caregiver mobile device use on caregivers initiating an interaction with their child. Specifically, Model one shows that the probability of caregivers attempting to initiate an interaction with a child in intervals when they did not use a mobile device was.19. This probability decreased by eight percentage points to .11 in intervals when caregivers used a mobile device. Models two through nine show that as more covariates were added into the model, the effect of caregiver mobile device use slightly decreased to .08 but remained statistically significant. Additionally, caregivers in food courts were more likely to attempt to initiate an interaction with their child than caregivers in parks, but no significant differences in were found between dyads in courtyards and food courts. In these models, the majority of the other covariates (i.e., income of setting, proximity, caregiver and child gender, child talks and child positive emotions) were not significantly associated with caregivers initiating an interaction with their child.

Models ten and eleven, with fixed effects, show that the effect of caregiver mobile device use on caregivers initiating interactions stayed the same but the standard error slightly increased when we accounted for the nested nature of the data, the results remained significant nonetheless. Specifically, Model ten, with fixed effects, shows that among caregivers who used their mobile device intermittently, the probability that they would attempt to initiate an interaction with their child when they were not using their mobile device compared to when they were using it was .17. This probability decreased by 9 percentage points to .08 when the caregivers switched to using a mobile device. Model eleven shows that the effect of device use stayed the same (.08) with the addition of time-varying covariates and remained significant.

Caregiver Sensitivity and Responsiveness. Table 1.7 shows the results of estimating the effect of caregiver mobile device use on caregiver responsiveness to the child. Specifically, Model 1 shows that the probability that caregivers would respond to their child's bids for attention in intervals when they did not use a mobile device was .90. However, this probability dropped by 60 percentage points to .30 in intervals when caregivers used a mobile device. Models two through nine show that adding more covariates into the model slightly increased the effect of caregiver mobile device use on caregiver responsiveness to the child to .31. Additionally, most of the other variables (i.e., income of setting, settings, proximity, child and caregiver gender, child positive emotions) were not significantly associated with caregiver responsiveness except for child talk. That is, caregivers were more responsive to children who talked more than children who talked less.

Despite the significant findings in Models one through nine, Models ten and eleven with the fixed effects did not support the significant association between caregiver mobile device use and caregiver responsiveness to the child.

Caregiver Talk. Table 1.8 shows the results of estimating the effect of caregiver mobile device use on caregivers' talking to the child score. The first Model shows that mobile device use by caregivers was associated with a 0.36 unit decrease in caregivers talking to their children score compared to when they did not use a mobile device. Models two through nine show that adding covariates decreased the effect of caregiver mobile device use on caregiver talk score to 0.28 and remained significant. Additionally, when the child and the caregiver were closer in proximity to each other, the caregiver was more likely to talk to the child than when they were more than five feet away. Furthermore, caregivers tended to talk more to their children when the child displayed more positive emotions and also talked more. In line with previous models, caregivers in courtyards were more likely to engage in talking with the child than caregivers in food courts, but no significant differences were found between caregivers in food courts and parks. Finally, caregivers in settings surrounded by lower income neighborhoods were more likely to talk to their child than caregivers in higher income neighborhoods. Nevertheless, child and caregiver gender were not significantly associated with caregivers talking.

Model ten and eleven, with the fixed effects show that although the effect of caregiver mobile device use on caregivers' talk scores was slightly reduced and the standard errors increased when we accounted for the nested nature of the data, the results remained significant nonetheless. Specifically, Model ten shows that caregiver use of a mobile device was associated with a .34 unit decrease in talking to their child. With the addition of covariates, Model eleven shows that the effect of device use on caregiver talk slightly decreases to .28 but remained significant.

Caregiver Positive Emotions. Table 1.9 shows the results of estimating the effect of caregiver mobile device use on the average score of caregiver's positive emotions. Specifically,

Model one shows that the use of a mobile device by caregivers was associated with a 0.29 unit decrease in the average number of positive emotions a caregiver displayed. However, Models two through nine show that the effect of caregiver mobile device use on the average caregiver positive emotions decreased to 0.22 with the addition of covariates. Additionally, caregivers were more likely to show positive emotions when they were in close proximity to the child and when the child also displayed a higher average number of positive emotions. Caregivers were also more likely to display positive emotions in courtyards and parks compared to food courts. Interestingly, being with a female child was associated with caregivers displaying significantly more positive emotions than being with a male child. As previously noted, caregivers in settings surrounded by lower income neighborhoods were more likely to display positive emotions than caregivers in higher income neighborhoods. Finally, caregiver gender was not significantly associated with their display of positive emotions.

Model ten and eleven, with the fixed effects show that the effect of caregiver mobile device use on caregiver's positive emotions score increased when we accounted for the nested nature of the data, and the results remained significant. Specifically, Model ten shows that caregiver mobile device use compared to no mobile device use was associated with a .31 unit decrease in showing positive emotions. However, Model eleven shows that the effect of device use on the average number of caregiver positive emotions slightly decreased to .23 with the addition of time varying covariates, but remained significant.

Child Talk. Table 1.10 shows that caregiver use of a mobile device was not significantly associated with children's talking score. However, children were more likely to talk when they were in close proximity to the caregiver and when the caregiver engaged in more talk. Furthermore, children were more likely to talk when they were in food courts compared to parks

but no significant differences were found in child talk between courtyards and food courts. Interestingly, children accompanied by male caregivers tended to talk more than children accompanied by female caregivers. However, income of the setting and caregivers displays of positive emotions were not significantly associated with children talking.

Model ten and eleven, with fixed effects, show that among caregivers who used their devices intermittently, mobile device use was not significantly associated with their children's talking score.

Child Positive Emotions. Table 1.11 shows the results of estimating the effect of intervals involving caregiver mobile device use on the average number of positive emotions children displayed. Specifically, the Model one shows that without controlling for any covariates, the use of a mobile device by a caregiver was associated with a 0.19 unit decrease in the amount of positive emotions a child displayed. However, when covariates were included in the Model, this effect gradually decreased to 0.08, and became non-significant in Model six with the addition of caregiver positive emotions. Model nine shows that although caregiver device use was not associated with the average number of positive emotions children displayed, the variables of caregiver positive emotions, caregiver talks, and caregiver gender were associated with these variables. That is, children were more likely to display a higher average number of positive emotions when the accompanying adult also showed more positive emotions, talked more, and when they were male. Additionally, children were more likely to display positive emotions in parks compared to food courts but no significant differences were found between courtyards and food courts. In contrast with previous patterns, children in settings in higher income neighborhoods were more likely to display positive emotions than children in lower

income neighborhoods. However, caregiver-child proximity was not significantly associated with children displaying positive emotions.

Model ten, with fixed effects, shows that among caregivers who used their mobile device intermittently, using their mobile device was only marginally significantly associated with their children showing positive emotions. However, Model eleven shows that the effect of device use on child positive emotions became more non-significant with the addition of other time-varying covariates. That is, caregiver displays of positive emotions to their child were significantly associated with children's display of positive emotions rather than caregiver mobile device use.

RQ1a. Is the specific way caregivers use their mobile device (e.g. texting, only looking at screen) associated with the quality of interactions they have with their children?

Table 1.12 shows that among dyads who used their device at least once (n = 69), the way a caregiver used their mobile device was significantly associated with most quality outcomes. Specifically, looking at screens ($B = .37$, $p < .001$) and taking a picture ($B = .26$, $p < .001$) of the child was significantly associated with a higher probability of engaging in joint attention. Similarly, looking at screens ($B = .30$, $p = .004$) and taking a picture of the child ($B = .38$, $p < .001$) was significantly associated with caregivers displaying more positive emotions. In line with these patterns, looking at screens compared to texting or swiping was positively associated with caregivers talking to their child ($B = .60$, $p < .001$). However, children were significantly less likely to talk when the caregiver was taking a picture of them ($B = -.25$, $p = .03$) than when the caregiver was texting or swiping ($B = -0.25$, $p = .003$). Interestingly, among the other covariates included in the model we found that male caregiver were more likely talk to their child than female caregivers ($B = .25$, $p = .003$), and that children accompanied by male caregivers were more likely to display positive emotions ($B = .52$, $p < .001$) and talk more ($B =$

.19, p = .03) than when accompanied by a female caregivers. Additionally, female children were more likely to engage in joint attention (B = -.10, p = .04) and display more positive emotions (B = -.20, p = .03) than male children. Finally, the way caregivers used a mobile device was not significantly associated with caregivers initiating an interaction, caregiver responsiveness to the child, or the child's display of positive emotions.

RQ2: Does the proportion of device use by caregiver-child dyads relate to the proportion of high quality interaction characteristics observed?

Results from Table 1.13 consistently show that the proportion of device use was significantly associated with the proportion of most outcomes indicative of quality interactions. For instance, after controlling for several covariates, a higher proportion of device use by caregivers and children was significantly associated with a lower proportion of joint attention (B = -.37, p < .001) and caregiver responsiveness to the child (B = -.35, p < .003) during the observations. Similarly, caregivers tended to obtain lower overall scores in caregiver talk (B = -.19, p = .004) and expression of positive emotions (B = -.07, p = .02) when dyads used a mobile device for a higher proportion of the intervals they were observed. In contrast to these findings, however, the proportion of device use among caregivers and children was not significantly associated with caregivers attempting to initiate interactions with their children, or the overall scores in talk and expression of positive emotions among children. In this analysis, income of the setting was only positively associated with child talk. That is, children in settings in higher income neighborhoods were more likely to talk (B = .11, p = .04) than children in lower income neighborhoods. Additionally, children were more likely to display positive emotions when they were with a male (B = .10, p = .002) caregiver than female caregiver.

RQ3: Are there differences in the quality of interactions between dyads observed in settings located in lower and higher income neighborhoods?

Results from Table 1.14 show that the income of the neighborhoods surrounding the parks and courtyards was associated with some of the components of quality interaction. Specifically, dyads in parks and courtyards in lower income neighborhoods were more likely to engage in joint attention (B = -.21, p < .001) than dyads in parks and courtyards in higher income neighborhoods. Furthermore, caregivers in these lower income settings were also more likely to talk more to their children (B = -.29, p = .001) and display more positive emotions (B = -.14, p = .03) than caregivers in higher income settings. In contrast with these findings, children in parks and courtyards surrounded by higher income neighborhoods (B = .16, p = .02) were more likely to display positive emotions than children in parks and courtyards surrounded by lower income courtyards and parks. Neighborhood income was not significantly associated with caregivers attempting to initiate an interaction with their child, caregiver responsiveness to their child, or children talking.

Discussion

This study used anonymous, systematic observations to examine whether mobile device use was associated with several components of high quality interactions between caregivers and their young children in public settings. Overall, we found that most interactions between caregivers and their young children (0-4 years) displayed most of the components associated with high quality interactions, such as joint attention, caregiver initiated interactions, caregiver responsiveness to the child, caregiver and child talk, along with the expression of positive emotions from caregivers and children. However, the majority of these behaviors were significantly less likely to occur when caregivers used their mobile device as opposed to when

they did not. Furthermore, the way mobile devices were used was also found to matter for the quality of interactions. Specifically, looking at the screen was consistently associated with a higher likelihood of engaging in joint attention, caregivers talking, caregivers expressing more positive emotions, caregivers initiating interactions and responding more to their child as compared to when caregivers texted or swiped. In addition to the influence of mobile devices on the quality of interactions, however, we also found that factors such as the setting, income of the neighborhoods surrounding the setting, caregiver and child gender, along with physical closeness, and caregiver and child behaviors (emotion expression, talking) were also associated with the quality of caregiver-child interactions.

The Role of Mobile Devices in the Quality of Caregiver-Child Interactions

Consistent with findings from the extensive research on TV and the limited studies on mobile devices, this study found that caregivers were less likely to engage in most of the components that characterize high quality interactions with their young children when they used a mobile device compared to when they did not (Hiniker et al., 2014; Hons et al., 2018; Kellershohn et al., 2018; Radesky et al., 2014; Radesky et al., 2015; Schmitt et al., 2003). Specifically, when caregivers used a mobile device, they were less likely to engage in joint attention with their child, talk to their child, express positive emotions, or attempt to initiate interactions with their child than when they did not engage with the device. This is likely due to caregivers being more focused on an activity on their device rather than on their child (Radesky et al., 2014; Radesky et al., 2015). Indeed, survey and interview findings with predominantly White, middle-class parents corroborate these findings, because parents often report feeling like they are less present with their children when they are using their mobile devices (Kushlev & Dunn, 2019; Radesky et al., 2016).

In addition to these findings, however, we also found that the type of activity caregivers did with their device (e.g., looking at the screen, texting/swiping) was associated with the key components of quality interactions. Specifically, typing and swiping were associated with less joint attention and most of the other components of quality interactions than simply looking at the screen. Although virtually no studies, to our knowledge, have focused on investigating whether the way caregivers use their device is associated with the quality of interactions. However, one recent found that although caregivers' use of a device during their visit to museum with their children was associated with the caregiver feeling less socially connected, they also felt more socially connected when they used their device to access content related to the museum in order to enhance their children's experience (Kuslev & Dunn, 2019). In our study, looking at the screen might have been positively associated with most components of high quality interactions compared to texting because it is a motor skill that virtually all ages of children could do. This is particularly relevant for our study, given that the children in our sample were so young (0-4 years) and likely pre-literate. Hence, they would probably not know how to read whatever text the caregiver was typing or scrolling through. Caregivers knowing this could be one reason why they are less likely to engage with their child when they are typing or swiping, than simply looking at the screen.

These findings seem to suggest that it is not enough to examine whether a device was used or not when investigating the influence of devices on the quality of interactions, but that it is also important to also ask how the devices are being used. Hence, future studies should examine whether the type of activity on the device matters for the quality of interactions and caregivers' perceived feelings of the device interrupting their interactions with their children (i.e., technoference) (McDaniel & Radesky, 2017). Similar to the research in the context of TV,

which consistently finds that content of the program matters for the quality of interactions (e.g., Barr et al., 2011; Kirkorian et al., 2009), we might also find that activity type with the device matters for the quality of interactions and caregivers' perceptions of technoference.

Despite mobile device use being associated with most of the components of quality interaction, it is important to note that it was not significantly associated with the child outcome variables (i.e. child talks and displays of positive emotions). Instead, caregiver talking and displaying more positive emotions were significantly associated with children talking more and displaying more positive emotions. These findings are consistent with prior research finding that interactions between parents and children are bidirectional and that the behavior of one individual directly influences the behavior of the other individual (Cole, Martin, & Dennis, 2004; Sameroff, 2010). However, although the device did not directly influence the children, it did influence the behaviors of their caregivers, including the caregiver talking and displaying positive emotions. Thus, it is likely that there are direct and indirect paths at play, and future studies should attempt to disentangle the contribution of devices on child behavior versus the ways in which devices alter adult behavior, which subsequently influences child behavior.

Finally, although caregiver responsiveness to the child was not significantly related to caregivers' mobile device use after accounting for the nested nature of the data, we did find that a higher proportion of mobile device use was significantly associated with a lower proportion of caregivers responding to their children's bids for attention. This latter finding is consistent with the handful of observational studies done so far which have found that caregivers tend to be less responsive to their children while using a mobile device in public places (Hiniker et al., 2015; Radesky et al., 2014).

The Role of Additional Factors on the Quality of Caregiver-Child Interactions

In addition to the role of caregiver mobile device use on the quality of interactions, our study showed that factors such as the setting, income of the neighborhoods surrounding the settings, caregiver-child proximity, caregiver and child gender, along with child and caregiver behaviors were significantly and consistently associated with some of the components of quality interactions. Although most of these factors have not yet been explored in the context of screen media, some of these findings are aligned with those observed in the context of TV viewing (Hudson & Rapee, 2001; Kirkorian et al., 2009; Kirkorian et al., 2004). Specifically, research on TV has found that child behaviors (e.g., bidding for attention, talk) influence the way parents interact with their children when viewing TV (Kirkorian et al., 2009). For example, more talkative children might more clearly express their needs to their caregiver or ask for their attention than less talkative children. Additionally, being with a child who seems happy might motivate a caregiver to engage in joint attention, talk more, and reciprocate these positive emotions back to the child. Future studies should explore the bidirectional relationship between these variables.

Not surprisingly, our study also found that when caregivers and children were in close proximity to each other, there was a higher probability for joint attention, and children along with caregivers were more likely to talk and express more positive emotions. This is likely due to the great ease of co-attending to the environment when closer to target objects and activities. The few instances we observed joint attention when caregivers and children were far apart from each other was when the caregiver was taking a picture of the child and asked the child to pose, or when the child was using the game equipment at the park (e.g. slide, web) and they were talking

to the caregiver. Additionally, caregivers and children expressing positive emotions and talking might be more feasible when they are in close proximity to each other.

Overall, findings also showed more similarities than differences by caregiver and child gender in the key components of quality interaction. Although research on screen media has rarely compared mothers and fathers, our findings indicate more similarities than differences between males and females and are consistent with research in other areas of parenting (Lamb & Lewis, 2004; Pederson, 1980; Power, 1985), including a recent study which found that mothers and fathers tended to display the same types of scaffolding behaviors while navigating a tablet device together with their children (Wood et al., 2016). However, four differences are worth mentioning. Namely, joint attention was more likely to occur in dyads with a female child than a male child, and caregivers were more likely to display more positive emotions with a female child than a male child. Additionally, children were more likely to talk more and display more positive emotions with male caregivers than female caregivers. Although we could not find previous research similar patterns, the finding that caregivers displayed more positive emotions to their female children than male children is in contrast with findings from research in other areas of parenting. These studies have generally found that mothers and fathers are largely similar in their displays of affection towards their children (Lamb & Lewis, 2004; Lewis, 1997)

Among some of our most interesting finding were that the type of setting and income of the neighborhood were significantly associated with the quality of interactions between caregivers and children for a few aspects of quality interactions. Specifically, being in courtyards and parks compared to food courts, was significantly associated with a higher likelihood for joint attention, caregivers talking, and the expression of positive emotions by both children and caregivers. In contextualizing these findings, it is important that we also describe the settings.

The parks typically had numerous equipment tailored for children, such as slides, large webs and rocks for climbing, along with swings. In our field notes, we often noted that caregivers assisted their young children in accessing some of this equipment. For example, we often saw caregivers helping children climb the web or stairs and counting along with them while doing so. In fact, 84% of the instances involving joint attention without a device at the park were in situations when caregivers were helping their child access park equipment. These interactions were often characterized by joint attention and happy children and caregivers. Similarly, many of the courtyards we went to for observations, both in low and middle-to-high income neighborhoods, had water-related themes, such as a pond with fish, large water fountains, or a splash pad. In these settings, we noted that 66% of the instances involving joint attention were when the caregiver and children were jointly looking at the water. Food courts in contrast, were areas with many tables and chairs and very few objects that would draw the child's attention. In these settings, we noted that although there were instances of joint attention, many of the dyads were typically focused on eating or the caregiver seemed zoned out. In sum, our study showed that some settings might afford more opportunities for caregivers and children to engage in high quality interactions than others. This suggests that the influence of device use on caregiver-child interactions is not ubiquitous and might actually vary depending on the setting. Future studies should continue to explore whether the setting is differentially associated with device use and the quality of caregiver-child interactions.

In addition to setting, we also found that dyads in settings surrounded by less well resourced neighborhoods were more likely to engage in higher quality interactions for several of the interaction components than dyads in settings surrounded by higher income neighborhoods. Although we cannot corroborate this finding with past research because none of the

observational studies, to our knowledge, have made income comparisons, we have several hypotheses for this finding. The first is that we noticed the parks and courtyards in settings surrounded by higher income neighborhoods had comfortable couches, benches, and chairs close to the game equipment and water where the caregivers would usually sit to watch their children. In contrast, the settings surrounded by lower income neighborhoods did not have such comfortable and convenient arrangements. In these settings, we often observed the caregivers standing and following their young children around. It is possible that because of the convenience of the sitting arrangement in higher income settings, the caregivers were more comfortable and did not engage as much with their children, while the caregivers in lower middle income settings could be more engaged because they needed to follow their children around. The second possibility could be that more caregivers in higher income settings might be more likely to have white collar jobs and, thus, be required to be on their device more (e.g., access work email) or engage in activities with their device that require more attention than caregivers in lower income settings. Hence, the device might be more disruptive for higher income parents, which might consequently influence how they engage with their children in public settings. In sum, our findings suggest that the influence of mobile devices on the quality of caregiver-child interactions is not always the same, and a number of factors might also need to be considered.

Limitations

Although a strength of this study was the systematically coding of behaviors of caregiver-child dyads in the presence and absence of a mobile device, we only observed dyads for a maximum of five minutes. Within these five minutes, we also intermittently coded their behavior for ten 20-second intervals. Therefore, in reality, we only observed caregivers and children for a combined maximum total of 100 seconds. Because this was such a short glimpse

of the interactions between caregivers and children, it is likely that we did not capture the entire picture of how a given dyad typically interacts in public places. Moreover, the number of intervals we observed dyads greatly varied due to the anonymous nature of the study and various activities dyads engaged in; hence, some dyads were observed for the entire five minutes and others for just one minute. Additionally, it is possible that children and caregivers interacted differently in public places than they do at home. For example, caregivers in food courts might be exhausted after a day of shopping or running errands; hence, that might be a reason why we often noted that they looked exhausted or inattentive (e.g., zoned out). An additional limitation associated with this study was the small sample size for some of the quantitative analysis we did. Specifically, because fixed effects analyses only include caregivers who used their device intermittently (n = 50), our sample was reduced, lessening our ability to test for smaller effects. Future studies should observe a larger sample of caregiver-child dyads to determine whether mobile device use is associated with caregiver responsiveness over the course of the observation.

Another limitation of this study was that because our coding scheme was binary, we were not able to quantify behaviors when they happened more than once at a given interval. Additionally, because we were observing in 10-20 second intervals, it is possible that while we were coding we missed important aspects of the interactions that might have provided more context to what we were seeing during the 10-second windows of observation. Future studies should observe dyads for a longer period of time, and have an additional coder who is solely in charge of writing field notes while the two other coders systematically code for behavior. This would provide a more complete picture of the interactions. Furthermore, our sample was comprised of predominantly female caregivers with children estimated to be older than one. Hence, our findings might not be representative of the interactions between male caregivers and

their children or the interactions between younger children and their caregivers. Future studies should sample more equal numbers of male and female caregivers and make a greater effort to observe infants as well. Finally, although we estimated what caregivers were doing with their device based on their behavior (e.g., typing, just looking at the screen), we do not know about the specific content they were viewing or reading, which might provide additional context for our findings. Future observational studies might consider interviewing parents after they are observed and asking them about the types of activities they use their device for while being out in public, with a child.

Conclusion

Smartphones and tablets are tools that have become an integral part in the everyday lives of many families with young children (Common Sense Media, 2017). Despite their increasing presence both inside and outside the home, very few studies have examined how their use is associated with the quality of interactions between caregivers and young children or if specific ways of using these devices are associated with high quality interactions (Hiniker et al., 2015; Hons et al., 2018; Kirkorian et al., 2009; Pempek et al., 2011; Radesky et al., 2014). To our knowledge, this was the first study to systematically code for five of the key components that characterize high quality interactions between caregivers and their young children in the context of mobile screen technologies. Overall, our findings showed that on the surface mobile device use was negatively associated with most components of high quality interactions. Nevertheless, the way the device was used was also associated with the quality of interactions in that typing and swiping was associated with lower quality interactions than simply looking at the screen. Therefore, when studying the association between mobile screen devices and the quality of interactions, it is important to take into account the way the device is being used. Parents'

distraction (e.g., technoference) may differ by the type of activity being done, rather than just the presence of a mobile device. Moreover, our study found that although the device was significantly associated with the behavior of caregivers, caregivers' behaviors were more predictive of children's talking and expressing positive emotions than the mobile device alone. Hence, parents should be more aware of their engagement with their devices that could be at the expense of the quality of interaction they have with their children. Findings from this study could inform future efforts that seek to promote optimal media habits among diverse families with young children.

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Table 1.1. Demographic characteristics of caregiver-child dyads (n = 98 dyads)

	%
Estimated Caregiver Gender	
Female	69
Male	31
Estimated Caregiver Age	
18-30 years old	43
31 years old and older	57
Estimated Child Gender	
Female	46
Male	54
Estimated Child Age	
Infants (less than 1 years old)	5
Toddlers (1-2 years old)	27
Children (3-4 years old)	68
Setting	
Parks	31
Food courts	33
Courtyards/lounging areas	34
Income of settings	
Lower income $38K-$90K	.60
Higher income $80K-152K	.40

Table 1.2. Distribution of key variables and setting across the three types of device users

Key Variables	**Non-Mobile Device Users (n = 29)**	**Intermittent Device Users (n = 50)**	**Absorbed Mobile Device Users (n = 19)**	**Statistic**
Child Gender				X^2= 4.82, p=ns
Female	.59	.46	.26	
Male	.41	.54	.74	
Child Age				
<= 2 years	.31	.36	.21	X^2= 1.43, p=ns
>2- 4 years	.69	.64	.79	
Caregiver Gender				
Female	.38	.66	.74	X^2= 0.56, p=ns
Male	.62	.34	.26	
Caregiver Age				X^2= 2.20, p=ns
<=30 years old	.38	.40	.58	
31 years old and older	.62	.60	.42	
Setting of Observation				X^2= 3.55, p=ns
Food court	.28	.34	.37	
Courtyard	.48	.30	.42	
Parks/Playground	.24	.36	.21	
Income of Settings				
Lower income	.45	.63	.68	X^2= 4.20, p=ns
Higher income	.55	.37	.32	
	M(SD)	M(SD)	M(SD)	F = 2.28, p=ns
Total number of intervals	6.76(2.98)	6.53(3.35)	7.92(2.48)	

Table 1.3. Distribution of demographic and setting variables by Intervals involving device and no device used

Key Variables	**Device NOT Used (n = 394 intervals)**	**Device Used (n = 280 intervals)**	
	Proportions	Proportions	
Child Gender			$X^2 = 11.3$, $p = .001$
Female	.54	.40	
Male	.46	.60	
Child Age			
<= 2 years	.33	.29	$X^2 = 0.82$, p = ns
>2- 4 years	.67	.71	
Caregiver Gender			
Female	.68	.69	$X^2 = 0.03$, p = ns
Male	.32	.31	
Caregiver Age			
<=30 years old	.38	.44	$X^2 = 2.41$, p = ns
>31 years old	.62	.56	
Setting of Observation			$X^2 = 3.39$, p=ns
Food court	.32	.32	
Courtyard	.38	.32	
Parks/Playground	.30	.36	
Income of Settings			
Lower income	.53	.67	$X^2 = 12.04$, p=.001
Higher income	.47	.33	

Table 1.4. Distribution of key variables by device and no device used across all intervals

Key Variables	**Total incidence of behaviors**	**Device NOT Used (n = 394 intervals)**		**Device Used (n = 280 intervals)**		**Statistic**
		M(SD)	Range	M(SD)	Range	
Child positive emotions score	232	.49(.03)	0-3	.31(.03)	0-2	$t = 3.80$, $p = .001$
Child negative emotions score	8	.01(.00)	0-1	.02(.01)	0-1	$t = -1.2$, p=ns
Child talks score	176	.37(.03)	0-2	.29(.03)	0-2	$t = 1.68$, $p = 0.04$
Child initiates interaction		Proportion		Proportion		
Yes	91	.13		.15		$X^2 = 0.21$, p=ns
No	563	.87		.85		
Far	95	.10		.21		
Joint attention						$X^2 = 77.9$, $p < .001$
Yes	210	.45		.13		
No	45	.55		.87		
Caregiver initiates interaction						$X^2 = 14.7$, $p < .001$
Yes	98	.19		.09		
No	561	.81		.91		
Caregiver responsiveness						
Yes	70	.90		.60		$X^2 = 11.5$, $p = .001$
No	21	.10		.40		
		M(SD)		M(SD)		
Caregiver positive emotions score	187	.46(.03)	0-2	.16(.02)	0-2	$t = 6.7$, $p < .001$
Caregiver negative emotions score	9	.01(.00)	0-1	.02(.01)	0-1	$t = -0.81$, p=ns
Caregiver talks score	211	.61(.04)	0-2	.24(.03)	0-2	$t = 6.66$, $p < .001$
Total number of intervals		8.12(2.33)	2-10	8.53(2.35)	1-10	$t = -2.25$, p=ns

Table 1.5. Linear probability Models predicting the association between caregiver mobile device use and joint attention

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Caregiver device used	-0.32***	-0.32***	-0.31***	-0.30***	-0.27***	-0.25***	-0.25***	-0.24***	-0.25***	-0.29***	-0.25***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.06)
Number of intervals		-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		(0.01)
Setting (Food court = 0)											
Courtyards			0.21***	0.24***	0.20***	0.23***	0.23***	0.24***	0.35***		
			(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.05)		
Parks/Playgrounds			0.03	0.10*	0.05	0.08	0.09*	0.09	0.13**		
			(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)		
Far caregiver proximity to child				-0.24***	-0.24***	-0.20***	-0.20***	-0.21***	-0.23***		-0.28*
				(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)		(0.12)
Child positive emotions					0.15***	0.13***	0.12***	0.12***	0.12***		0.16**
					(0.03)	(0.03)	(0.02)	(0.03)	(0.03)		(0.05)
Child talks						0.12***	0.12***	0.12	0.12***		0.09
						(0.03)	(0.03)	(0.03)	(0.03)		(0.07)
Male Child							-0.05	-0.06	-0.08*		
							(0.03)	(0.03)	(0.03)		
Male Caregiver								0.05	0.04		
								(0.04)	(0.04)		
Income of Setting									-0.14**		
									(0.05)		
Constant	0.45***	0.46***	0.36***	0.36***	0.31***	0.24***	0.26***	0.25***	0.27***	0.42***	0.38***
	(0.02)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.03)	(0.08)
Observations	662	662	662	646	646	625	625	625	625	364	219
r^2	.12	0.12	0.15	0.19	0.23	0.26	0.26	0.26	0.27	0.11	0.19

Note. *$p < .05$. **$p < .01$. ***$p < .001$. Models 10 and 11 include fixed effects.

Table 1.6. Linear probability Models predicting the association between caregiver mobile device use and caregiver initiated interactions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Caregiver device used	-0.11***	-0.11***	-0.10***	-0.10**	-0.09**	-0.09**	-0.09**	-0.09**	-0.08**	-0.08*	-0.08*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)
Number of intervals		-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00		0.00
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		(0.00)
Setting (Food court = 0)											
Courtyards			-0.03	-0.02	-0.03	-0.03	-0.02	-0.02	-0.03		
			(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)		
Parks/Playgrounds			-0.10**	-0.10**	-0.11**	-0.10*	-0.10*	-0.10*	-0.11*		
			(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)		
Far caregiver proximity to child				-0.05	-0.05	-0.04	-0.04	-0.04	-0.04		0.01
				(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)		(0.10)
Child positive emotions					0.04	0.03	0.03	0.02	0.02		-0.01
					(0.02)	(0.02)	(0.02)	(0.02)	(0.02)		(0.04)
Child talks						0.04	0.04	0.04	0.03		0.07
						(0.02)	(0.02)	(0.02)	(0.03)		(0.04)
Male Child							-0.01	-0.01	-0.01		
							(0.03)	(0.03)	(0.03)		
Male Caregiver								0.03	0.03		
								(0.03)	(0.03)		
Income of Setting									0.02		
									(0.04)		
Constant	0.19***	0.22***	0.26***	0.26***	0.24***	0.23***	0.24***	0.23***	0.23***		0.14
	(0.02)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	0.17***	(0.05)
										(0.02)	
Observations	659	659	659	642	642	625	625	625	625	361	344
r^2	0.02	0.02	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.01	0.03

Note. *$p < .05$. **$p < .01$. ***$p < .001$. Models 10 and 11 include fixed effects.

Table 1.7. Linear probability Models predicting the association between caregiver mobile device use and caregiver responsiveness to the child

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Caregiver device used	-0.30**	-0.28**	-0.33***	-0.31**	-0.31**	-0.31**	-0.31**	-0.31**	-0.31**	-0.33	-0.17
	(0.08)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.10)	(0.10)	(0.19)	(0.24)
Number of intervals		0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.04
		(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)		(0.04)
Setting (Food court = 0)											
Courtyards			-0.23*	-0.23*	-0.23*	-0.24*	-0.23*	-0.23*	-0.26		
			(0.10)	(0.10)	(0.11)	(0.11)	(0.11)	(0.11)	(0.21)		
Parks/Playgrounds			-0.02	-0.05	-0.05	-0.05	-0.04	-0.05	-0.05		
			(0.10)	(0.11)	(0.11)	(0.11)	(0.12)	(0.12)	(0.13)		
Far caregiver proximity to child				0.26	0.26	0.27	0.27	0.27	0.27		
				(0.24)	(0.24)	(0.26)	(0.26)	(0.26)	(0.26)		
Child positive emotions					0.00	0.00	0.00	0.01	0.01		0.19
					(0.06)	(0.06)	(0.07)	(0.06)	(0.07)		(0.18)
Child talks						0.01	0.01	0.01	0.01		0.54*
						(0.07)	(0.07)	(0.07)	(0.07)		(0.25)
Male Child							-0.02	-0.02	-0.01		
							(0.09)	(0.09)	(0.09)		
Male Caregiver								0.01	0.01		
								(0.10)	(0.09)		
Income of Setting									0.03		
									(0.19)		
Constant	0.90***		0.96***	0.95***	0.95***	0.93***	0.93***	0.93***	0.93***		-0.00
	(0.05)	0.81***	(0.12)	(0.13)	(0.13)	(0.15)	(0.16)	(0.16)	(0.17)	0.95***	(0.43)
		(0.10)								(0.12)	
Observations	91	91	91	87	87	86	86	86	86	48	47
r^2	0.13	0.14	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.12	0.38

Note. *$p < .05$. **$p < .01$. ***$p < .001$. Models 10 and 11 include fixed effects.

Table 1.8. OLS regression Models predicting the association between caregiver mobile device use and caregiver talk to the child

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Caregiver device used	-0.36***	-0.36***	-0.35***	-0.33***	-0.28***	-0.27***	-0.27***	-0.26***	-0.28***	-0.34***	-0.28***
	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.07)	(0.07)
Number of intervals		0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00		0.02
		(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)		(0.01)
Setting (Food court = 0)											
Courtyards			0.10	0.14*	0.07	0.11	0.12	0.13*	0.31***		
			(0.06)	(0.07)	(0.07)	(0.06)	(0.06)	(0.07)	(0.09)		
Parks/Playgrounds			-0.12	-0.04	-0.12	-0.04	-0.03	-0.04	0.03		
			(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)		
Far caregiver proximity to child				-0.28**	-0.27**	-0.21**	-0.21**	-0.23**	-0.26**		-0.41*
				(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)		(0.17)
Child positive emotions					0.23***	0.16***	0.16**	0.15**	0.16**		0.18*
					(0.04)	(0.04)	(0.05)	(0.05)	(0.05)		(0.07)
Child talks						0.28***	0.28***	0.27***	0.27***		0.25**
						(0.05)	(0.05)	(0.05)	(0.05)		(0.07)
Male Child							-0.06	-0.07	-0.10		
							(0.05)	(0.05)	(0.05)		
Male Caregiver								0.10	0.09		
								(0.06)	(0.06)		
Income of Setting									-0.23**		
									(0.08)		
Constant	0.61***	0.59***	0.59***	0.58***	0.50***	0.39***	0.41***	0.40***	0.42***	0.54***	0.34***
	(0.03)	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.05)	(0.09)
Observations	667	667	667	650	650	632	632	632	632	365	348
r^2	0.06	0.06	0.07	0.10	0.13	0.18	0.18	0.18	0.20	0.06	0.16

Note. *$p < .05$. **$p < .01$. ***$p < .001$. Models 10 and 11 include fixed effects.

Table 1.9. OLS regression Models predicting the association between caregiver mobile device use and caregiver positive emotions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Caregiver device used	-	-	-0.29***	-0.27***	-0.23***	-0.22***	-0.21***	-0.21***	-0.22***	-	-0.23***
	0.29***	0.29***	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	0.31***	(0.05)
	(0.04)	(0.04)								(0.05)	
Number of intervals		-0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.02*
		(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)		(0.01)
Setting (Food court = 0)											
Courtyards			0.24***	0.26***	0.19***	0.21***	0.23***	0.22***	0.33***		
			(0.05)	(0.16)	(0.05)	(0.05)	(0.05)	(0.05)	(0.07)		
Parks/Playgrounds			0.12	0.16**	0.08	0.11	0.12*	0.13*	0.17**		
			(0.05)	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)		
Far caregiver proximity				-0.17**	-0.17**	-0.16*	-0.15*	-0.15*	-0.17**		-0.18
to child				(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)		(0.12)
Child positive emotions					0.24***	0.23***	0.23***	0.23***	0.24***		
					(0.03)	(0.04)	(0.04)	(0.04)	(0.04)		0.28***
											(0.05)
Child talks						0.05	0.05	0.05	0.05		-0.04
						(0.04)	(0.04)	(0.04)	(0.04)		(0.05)
Male Child							-0.11*	-0.10*	-0.12**		
							(0.04)	(0.04)	(0.04)		
Male Caregiver								-0.03	-0.04		
								(0.05)	(0.05)		
Income of Setting									-0.14*		
									(0.06)		
Constant	0.45		0.33***	0.33***	0.25***	0.21***	0.25***	0.25***	0.27***	0.43***	0.22**
	(0.03)	0.47***	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.03)	(0.06)
		(0.05)									
Observations	660	660	660	643	643	624	624	624	624	363	345
r^2	0.06	0.06	0.09	0.11	0.17	0.18	0.19	0.19	0.19	0.11	0.20

Note. *$p < .05$. **$p < .01$. ***$p < .001$. Models 10 and 11 include fixed effects.

Table 1.10. OLS regression Models predicting the association between caregiver mobile device use and child talk

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Caregiver device used	-0.08	-0.08	-0.06	-0.03	0.00	0.04	0.05	0.05	0.06	-0.04	0.01
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)	(0.06)
Number of intervals		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
		(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)		(0.01)
Setting (Food court = 0)											
Courtyards			-0.01	-0.01	-0.05	-0.04	-0.03	-0.02	-0.08		
			(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)	(0.08)		
Parks/Playgrounds			-0.23***	-0.16**	-0.19**	-0.15*	-0.14*	-0.17**	-0.19**		
			(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)		
Far caregiver proximity to child				-0.21**	-0.19**	-0.15*	-0.14*	-0.17*	-0.16*		-0.13
				(0.07)	(0.07)	(0.07)	(0.06)	(0.07)	(0.07)		(0.14)
Caregiver positive emotions					0.14**	-0.03	-0.04	-0.03	-0.03		-0.07
					(0.04)	(0.05)	(0.05)	(0.05)	(0.05)		(0.07)
Caregiver talks						0.25***	0.25***	0.23***	0.24***		
						(0.04)	(0.04)	(0.04)	(0.04)		0.21***
											(0.05)
Male Child							-0.05	-0.06	-0.05		
							(0.05)	(0.05)	(0.05)		
Male Caregiver								0.17**	0.17**		
								(0.05)	(0.05)		
Income of Setting									0.08		
									(0.06)		
Constant	0.37***		0.43***	0.41***	0.37***	0.27***	0.30***	0.26***	0.25***	0.32***	0.23**
	(0.03)	0.35***	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.04)	(0.07)
		(0.05)									
Observations	653	653	653	636	624	624	624	624	624	357	345
r^2	0.00	0.00	0.03	0.04	0.06	0.12	0.12	0.14	0.14	0.00	0.07

Note. *$p < .05$. **$p < .01$. ***$p < .001$. Models 10 and 11 include fixed effects.

Table 1.11. OLS regression Models predicting the association between caregiver mobile device use and child positive emotions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Caregiver device used	-0.19***	-0.19***	-0.19***	-0.17***	-0.09	-0.08	-0.07	-0.06	-0.05	-0.11	0.01
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)
Number of intervals		-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01		-0.01
		(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)		(0.00)
Setting (Food court = 0)											
Courtyards			0.29***	0.27***	0.19**	0.20***	0.21***	0.23***	0.10		
			(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.08)		
Parks/Playgrounds			0.31***	0.30***	0.27***	0.29***	0.31***	0.26***	0.20**		
			(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)		
Far caregiver proximity to child				-0.01	0.03	0.04	0.04	0.01	0.04		0.06
				(0.07)	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)		(0.14)
Caregiver positive emotions					0.29***	0.24***	0.23***	0.24***	0.24***		0.25**
					(0.04)	(0.05)	(0.05)	(0.05)	(0.05)		(0.07)
Caregiver talks						0.08*	0.08*	0.05	0.06		0.10*
						(0.04)	(0.04)	(0.04)	(0.04)		(0.05)
Male Child							-0.09	-0.10*	-0.08		
							(0.05)	(0.05)	(0.05)		
Male Caregiver								0.23***	0.23***		
								(0.05)	(0.05)		
Income of Setting									0.16*		
									(0.06)		
Constant	0.49***	0.55***	0.33***	0.33***	0.22***	0.19**	0.22**	0.18**	0.16*	0.43***	0.29***
	(0.03)	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.04)	(0.07)
Observations	674	674	674	657	643	642	642	642	642	372	357
r^2	0.02	0.02	0.07	0.07	0.14	0.14	0.15	0.17	0.18	0.01	0.09

Note. *$p < .05$. **$p < .01$. ***$p < .001$. Models 10 and 11 include fixed effects.

Table 1.12. Linear probability Models predicting the association between activity type with device and key components of interaction quality

	Joint Attention	Caregiver Initiates Interaction	Caregiver Responsiveness	Caregiver Talks to Child	Caregiver Positive Emotions	Child Talks	Child Positive Emotions
How device is used: (Texting/Swiping = 0)							
Looking at screen	0.29***	0.15**	0.36	0.49***	0.23***	-0.21*	-0.12
	(0.05)	(0.06)	(0.22)	(0.11)	(0.06)	(0.10)	(0.09)
Taking a picture	0.24***	0.02	-0.30	0.14	0.32***	-0.21	0.14
	(0.06)	(0.06)	(0.78)	(0.09)	(0.07)	(0.12)	(0.12)
Independent call	-0.07	0.00	1.57	0.09	0.02	-0.28**	-0.15
	(0.04)	(0.04)	(0.76)	(0.08)	(0.05)	(0.08)	(0.08)
Other activities	0.05	-0.07	1.32	-0.06	0.07	-0.08	0.03
	(0.10)	(0.09)	(0.74)	(0.43)	(0.12)	(0.18)	(0.18)
Interval	0.01	-0.01	-0.03	-0.01	0.01	0.01	-0.01
	(0.00)	(0.00)	(0.04)	(0.01)	(0.00)	(0.01)	(0.01)
Income of setting	-0.13	0.01	-0.71	-0.28**	-0.26***	0.14	0.22*
	(0.06)	(0.05)	(0.55)	(0.10)	(0.07)	(0.11)	(0.10)
Setting (Food court = 0)							
Courtyards	0.22**	-0.02	0.15	0.06	0.28**	-0.06	0.04
	(0.06)	(0.06)	(0.54)	(0.21)	(0.07)	(0.12)	(0.11)
Parks/Playgrounds	0.05	-0.11	-0.19	-0.24	0.18	0.01	0.22
	(0.05)	(0.05)	(0.23)	(0.20)	(0.06)	(0.09)	(0.09)
Far caregiver-child proximity	-0.17**	-0.01	0.82	-0.17*	-0.21**	-0.25**	-0.04
	(0.05)	(0.05)	(0.57)	(0.08)	(0.06)	(0.09)	(0.09)
Child positive emotions	0.05	0.02	0.24	-0.12	0.11*	-	-
	(0.03)	(0.03)	(0.15)	(0.06)	(0.04)		
Caregiver positive emotions						-0.14	0.20*
						(0.10)	(0.10)
Child talks	0.02	-0.00	0.07	0.28***	-0.01	-	-
	(0.03)	(0.03)	(0.17)	(0.06)	(0.04)		
Caregiver talks						0.37***	0.04
						(0.07)	(0.06)
Child gender	-0.07	0.04	-0.07	-0.03	-0.04	-0.11	-0.19**
	(0.04)	(0.03)	(0.19)	(0.07)	(0.04)	(0.07)	(0.07)
Caregiver gender	0.00	0.02	0.12	0.25**	0.02	0.25**	0.33***
	(0.04)	(0.04)	(0.20)	(0.08)	(0.05)	(0.07)	(0.07)
Constant	0.02	0.11	0.54	0.31	-0.01	0.33***	0.22*
	(0.05)	(0.05)	(0.27)	(0.19)	(0.06)	(0.09)	(0.08)
Observations	266	266	39	269	267	267	274
r^2	0.28	0.09	0.39	0.29	0.24	0.23	0.19

Note. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 1.13.OLS regressions predicting the association between proportion of intervals dyads used a mobile device and the proportion of intervals they engaged in key components of high quality interactions

	Joint Attention	Caregiver Initiated Interactions	Caregiver Responsiveness	Caregiver Talks to Child	Caregiver Positive Emotion	Child Talks	Child Positive Emotions
Proportion of intervals with device use	-0.37***	-0.10	-0.35**	-0.19**	-0.07*	0.03	-0.06
	(0.07)	(0.05)	(0.13)	(0.05)	(0.03)	(0.05)	(0.04)
Income of settings	-0.08	-0.00	-0.05	-0.10	-0.06	0.11*	0.05
	(0.08)	(0.05)	(0.16)	(0.05)	(0.03)	(0.05)	(0.04)
Male caregiver	0.06	0.06	0.09	0.05	-0.02	0.05	0.10**
	(0.06)	(0.04)	(0.11)	(0.05)	(0.03)	(0.04)	(0.03)
Male child	-0.08	0.01	-0.07	-0.05	-0.06	-0.01	-0.03
	(0.05)	(0.04)	(0.10)	(0.04)	(0.03)	(0.03)	(0.03)
Setting (Food court = 0)							
Courtyards	0.24*	-0.00	-0.11	0.09	0.10*	-0.02	0.06
	(0.31)	(0.06)	(0.17)	(0.07)	(0.04)	(0.06)	(0.05)
Parks/playgrounds	0.08	-0.10	0.07	-0.01	0.04	-0.08	0.05
	(0.07)	(0.05)	(0.13)	(0.05)	(0.03)	(0.05)	(0.04)
Proportion of intervals child and caregiver are in close proximity	-0.18	-0.02	0.12	-0.02	-0.06	-0.04	-0.01
	(0.12)	(0.09)	(0.19)	(0.09)	(0.06)	(0.08)	(0.06)
Proportion score of child positive emotions for models	0.19	0.07	-0.84*	0.07	0.31**	-	-
	(0.20)	(0.14)	(0.34)	(0.14)	(0.09)		
Proportion score of child talk	0.16	0.03	-0.28	0.32**	0.01	-	-
	(0.16)	(0.11)	(0.26)	(0.11)	(0.07)		
Proportion score of caregiver positive emotion	-					-0.14	0.43**
						(0.16)	(0.12)
Proportion score of caregiver talk	-					0.32**	-0.07
						(0.11)	(0.08)
Constant	0.38***	0.19**	1.13***	0.25***	0.12**	0.08	0.07
	(0.07)	(0.05)	(0.12)	(0.05)	(0.03)	(0.05)	(0.04)
Observations	98	98	50	98	98	98	98
r^2	0.38	0.13	0.33	0.29	0.34	0.22	0.37

Note. *$p < .05$. **$p < .01$. ***$p < .00$

Table 1.14. Linear probability models predicting the association between income of the neighborhoods surrounding the courtyards and parks and the key components of high quality interactions

	Joint Attention	Caregiver Initiated Interactions	Caregiver Responsiveness	Caregiver Talks to Child	Caregiver Positive Emotion	Child Talks	Child Positive Emotions
High income parks and courtyards	-0.21***	0.03	-0.03	-0.29**	-0.14*	0.06	0.16*
	(0.05)	(0.04)	(0.19)	(0.08)	(0.07)	(0.07)	(0.07)
Intervals	0.00	-0.01	-0.01	-0.00	0.00	-0.01	-0.03**
	(0.01)	(0.01)	(0.02)	(0.01)	(0.00)	(0.01)	(0.01)
Caregiver device use	-0.34***	-0.08*	-0.45**	-0.39***	-0.28***	0.05	-0.08
	(0.04)	(0.03)	(0.14)	(0.06)	(0.05)	(0.06)	(0.06)
Male caregiver	0.08	0.06	-0.00	0.20**	-0.07	0.09	0.38***
	(0.04)	(0.03)	(0.13)	(0.07)	(0.06)	(0.06)	(0.07)
Male child	-0.08	-0.02	0.03	-0.09	0.11	0.07	-0.04
	(0.05)	(0.03)	(0.11)	(0.06)	(0.05)	(0.05)	(0.06)
Setting (Food court = 0)							
Courtyards	0.51**	0.13	-0.68	0.28	0.48	-0.25	-0.22
	(0.19)	(0.15)	(0.38)	(0.30)	(0.25)	(0.25)	(0.28)
Parks/playgrounds	0.24	0.07	-0.50	-0.07	0.33	-0.38	0.18
	(0.19)	(0.15)	(0.34)	(0.29)	(0.25)	(0.25)	(0.28)
Child and caregiver close proximity	-0.26***	-0.05	0.23	-0.29**	-0.16*	-0.19**	0.04
	(0.05)	(0.04)	(0.28)	(0.08)	(0.06)	(0.07)	(0.07)
Child positive emotions	0.12***	0.01	-0.08	0.10*	0.23***	-	-
	(0.03)	(0.02)	(0.09)	(0.05)	(0.04)		
Child talk	0.09*	0.06*	-0.06	0.24***	0.03	-	-
	(0.04)	(0.03)	(0.10)	(0.05)	(0.04)		
Caregiver positive emotions	-					-0.05	0.29***
						(0.05)	(0.06)
Caregiver talk	-					0.20***	0.00
						(0.04)	(0.05)
Constant	0.24	0.06	1.66***	0.63*	0.16	0.49	0.56*
	(0.18)	(0.15)	(0.42)	(0.29)	(0.24)	(0.25)	(0.28)
Observations	415	415	56	418	416	416	429
r^2	0.34	0.08	0.27	0.25	0.19	0.13	0.17

Note. *$p < .05$. **$p < .01$. ***$p < .00$

Appendix 1.1
Range of median total household annual income for each setting according to Census Tract data

Setting	Median household income range for neighborhoods surrounding each setting	Income Category
Courtyards/lounging areas		
Fashion island fountain (n = 4)	$90,000-$152,000	High
Fashion island pond (n = 25)	$90,000-$152,000	High
South Gate Azalea courtyard (n = 2)	$48,000-$62,000	Low-middle
Montebello Mall lounging area (n = 2)	$54,000-$82,000	Low-middle
University Town Center Irvine (n = 2)	$24,000-$84,000	Low-middle
Parks/Indoors play areas		
Main Place mall play area (n = 3)	$53,000-$90,000	Low-middle
South Gate park (n = 13)	$41,000-$66,000	Low-middle
Bell park (n = 5)	$38,000-$50,000	Low-middle
Woodbridge park (n = 10)	$80,000-$128,000	High
Food courts		
Main Place Mall food court (n = 24)	$53,000-$90,000	Low-middle
Stonewood Mall food court (n = 7)	$42,000-$80,000	Low-middle
Montebello Mall food court (n = 1)	$54,000-$82,000	Low-middle

Appendix 1.2

Front and back of caregiver coding scheme

Caregiver Codes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Mobile device used?	Phone	1	2	3	4	5	6	7	8	9	10
	Tablet	1	2	3	4	5	6	7	8	9	10
	None	1	2	3	4	5	6	7	8	9	10
	Other device (e.g. game boy)	1	2	3	4	5	6	7	8	9	10
	Other object (e.g. toy or stickers)	1	2	3	4	5	6	7	8	9	10
How is the mobile device being used? Mark N/A if the individual did not use a phone	Typing/Swiping	1	2	3	4	5	6	7	8	9	10
	Calling	1	2	3	4	5	6	7	8	9	10
	Looking at screen	1	2	3	4	5	6	7	8	9	10
	Taking picture	1	2	3	4	5	6	7	8	9	10
	Facetiming (i.e. talking to screen)	1	2	3	4	5	6	7	8	9	10
	Other	1	2	3	4	5	6	7	8	9	10
	NA	1	2	3	4	5	6	7	8	9	10
Proximity of caregiver to child?	Close (within 2 feet)	1	2	3	4	5	6	7	8	9	10
	Near (3-5 feet)	1	2	3	4	5	6	7	8	9	10
	Far (more than 5 feet)	1	2	3	4	5	6	7	8	9	10
Joint attention?	**Yes**, NO device (e.g. toy) (3 secs+)	1	2	3	4	5	6	7	8	9	10
	Yes, with device (3 secs +)	1	2	3	4	5	6	7	8	9	10
	No, **parent using device**	1	2	3	4	5	6	7	8	9	10
	No, **parent doing something else**	1	2	3	4	5	6	7	8	9	10
	No, **parent looking at child**										
Caregiver emotional input?	Physical affection (e.g. hug)	1	2	3	4	5	6	7	8	9	10
	Smiling	1	2	3	4	5	6	7	8	9	10
	Praises child	1	2	3	4	5	6	7	8	9	10
	Neutral/flat affect	1	2	3	4	5	6	7	8	9	10
	Sad	1	2	3	4	5	6	7	8	9	10
	Frustration (**non-physical**)	1	2	3	4	5	6	7	8	9	10
	Frustration (**physical**)	1	2	3	4	5	6	7	8	9	10
	Other	1	2	3	4	5	6	7	8	9	10
Is there talk?	No talk at all	1	2	3	4	5	6	7	8	9	10
	Yes minimal (1-3 words)	1	2	3	4	5	6	7	8	9	10
	Yes a lot (more than 3 words)	1	2	3	4	5	6	7	8	9	10
	Other: Specify	1	2	3	4	5	6	7	8	9	10
Caregiver initiates interaction with child?	Initiates interaction (YES)	1	2	3	4	5	6	7	8	9	10
	N/A	1	2	3	4	5	6	7	8	9	10
Caregiver responds to child?	Yes, **positively** (appropriately) & promptly	1	2	3	4	5	6	7	8	9	10
	Yes, **positively** (appropriately) & late	1	2	3	4	5	6	7	8	9	10
	Yes, **neutral**/flat affect & promptly	1	2	3	4	5	6	7	8	9	10
	Yes, **neutral**/flat affect & late	1	2	3	4	5	6	7	8	9	10
	Yes, **negatively** & promptly	1	2	3	4	5	6	7	8	9	10
	Yes, **negatively** & late	1	2	3	4	5	6	7	8	9	10
	Ignores	1	2	3	4	5	6	7	8	9	10
	NA	1	2	3	4	5	6	7	8	9	10

Please circle the best estimated answer for the following questions:

1) Gender of caregiver: F M **2) Estimated age of caregiver:** 18-20 21-25 26-30 31 & older

3) Gender of child: F M **4) Estimated age of the child:** Infant (less than 1yr) Toddler (1-2yr) Child (3-4 yrs)

5) Setting of observation: _____ 6) City:_____ 7) Time of the day:_____

8) Total time of observation:_____ 9) Coder Initials:_____

Field Notes:

1) Was there an event or something that stood out during the observation that you think might have influenced the interaction between the caregiver and the child?

2) Describe the environment (e.g. it was very crowded, hot, loud).

3) Is there something you want to mention about the interaction that you think we might have missed in the coding?

Appendix 1.3

Front and back of child coding scheme

Child Codes		1	2	3	4	5	6	7	8	9	10
Is a Mobile device being used?	Phone	1	2	3	4	5	6	7	8	9	10
	Tablet	1	2	3	4	5	6	7	8	9	10
	None	1	2	3	4	5	6	7	8	9	10
	Other device (e.g. game boy)	1	2	3	4	5	6	7	8	9	10
	Other object (e.g. toy or stickers)	1	2	3	4	5	6	7	8	9	10
How is the mobile device being used? Mark N/A if the individual did not use a phone	Typing/Swiping/tapping phone	1	2	3	4	5	6	7	8	9	10
	Calling	1	2	3	4	5	6	7	8	9	10
	Looking at screen	1	2	3	4	5	6	7	8	9	10
	Taking picture	1	2	3	4	5	6	7	8	9	10
	Facetiming (i.e. talking to screen)	1	2	3	4	5	6	7	8	9	10
	Other	1	2	3	4	5	6	7	8	9	10
	NA	1	2	3	4	5	6	7	8	9	10
Proximity of caregiver to child?	Close (within 2 feet)	1	2	3	4	5	6	7	8	9	10
	Near (3-5 feet)	1	2	3	4	5	6	7	8	9	10
	Far (more than 5 feet)	1	2	3	4	5	6	7	8	9	10
Joint attention?	**Yes**, NO device (e.g. toy) (3 secs+)	1	2	3	4	5	6	7	8	9	10
	Yes, with device (3 secs +)	1	2	3	4	5	6	7	8	9	10
	No, **child using device**	1	2	3	4	5	6	7	8	9	10
	No, **child doing something else**	1	2	3	4	5	6	7	8	9	10
	No, child **looking at parent**										
Child emotional input?	Physical affection (e.g. hug)	1	2	3	4	5	6	7	8	9	10
	Smiling	1	2	3	4	5	6	7	8	9	10
	Enthusiastic	1	2	3	4	5	6	7	8	9	10
	Neutral/flat affect	1	2	3	4	5	6	7	8	9	10
	Sad	1	2	3	4	5	6	7	8	9	10
	Crying	1	2	3	4	5	6	7	8	9	10
	Frustration (**non-physical**)	1	2	3	4	5	6	7	8	9	10
	Frustration (**physical**)	1	2	3	4	5	6	7	8	9	10
	Other	1	2	3	4	5	6	7	8	9	10
Is there talk?	No talk at all	1	2	3	4	5	6	7	8	9	10
	Yes, minimal (1-3 words)	1	2	3	4	5	6	7	8	9	10
	Yes, a lot (more than 3 words)	1	2	3	4	5	6	7	8	9	10
	Other: Specify	1	2	3	4	5	6	7	8	9	10
Does the child initiate interaction with the caregiver?	Initiates interaction (YES)	1	2	3	4	5	6	7	8	9	10
	N/A	1	2	3	4	5	6	7	8	9	10
Does the child responds to caregiver?	Yes, **positively** (appropriately) & promptly (within 1 second)	1	2	3	4	5	6	7	8	9	10
	Yes, **positively** (appropriately) & late (after 1 second)	1	2	3	4	5	6	7	8	9	10
	Yes, **neutral**/flat affect & promptly (within 1 second)	1	2	3	4	5	6	7	8	9	10
	Yes, **neutral**/flat affect & late (after 1 second)	1	2	3	4	5	6	7	8	9	10
	Yes, **negatively** & promptly (within 1 second)	1	2	3	4	5	6	7	8	9	10
	Yes, **negatively** & late (after 1 second)	1	2	3	4	5	6	7	8	9	10
	Ignores	1	2	3	4	5	6	7	8	9	10
	NA	1	2	3	4	5	6	7	8	9	10

Please circle the best estimated answer for the following questions:

1) Gender of caregiver: F M **2) Estimated age of caregiver:** 18-20 21-25 26-30 31 & older

3) Gender of child: F M **4) Estimated age of the child:** Infant (less than 1yr) Toddler (1-2yr) Child (3-4 yrs)

5) Setting of observation: _____ 6) City:_____ 7) Time of the day:_____

8) Total time of observation:_____ 9) Coder Initials:_____

Field Notes:

1) Was there an event or something that stood out during the observation that you think might have influenced the interaction between the caregiver and the child?

2) Describe the environment (e.g. it was very crowded, hot, loud).

3) Is there something you want to mention about the interaction that you think we might have missed in the coding?

Appendix 1.4

Coding manual of coding schemes

Caregiver-Child Interactions in the Presence of Mobile Technology: A Real-Time Coding-Scheme

The goal of this real-time coding scheme is to capture caregivers and children's' behavior with each other in the presence of mobile technology as they are happening in public places. All coders will code for behavior for a maximum of 5 minutes. Coders will select to observe caregivers with children that meet the following criteria:

1) The caregiver is with a child who looks four years of age or younger. If there is more than one adult or child, the coder will not observe them. The only exception will be when the caregiver is with two children and one of them is sleeping.

2) The caregiver is not another child. While it is impossible to determine the exact age of a caregiver, the researcher should use their judgment to speculate on the age of the caregiver. For example, if a 10-year-old sibling is taking care of a 3-year-old child at the park, the researcher should not code for their behavior.

3) The researcher is close enough to the caregiver and the child to be able to see half or all of their face and see if they are talking (e.g. mouths moving).

4) A mobile device must be visibly present for n = 69 of the observations, whether the child or caregiver is using it or not. In other words, the coder **will only begin** coding for behavior when they see a mobile device present. For example, if the coder is sitting near a child and caregiver and no mobile device is present, the coder will not code their behavior. However, if the caregiver suddenly takes their phone out from their purse, the coder may begin coding for their behavior from that point forward. Another scenario can be that a caregiver and a child are sitting in a food court and the coder sees a mobile phone on the table but neither the child or caregiver are using the phone. In this case, the coder should begin coding for their behavior from the time they first saw the phone on the table. Additionally, n n = 29 of the sample will consist of dyads in which a mobile device is NOT present, to serve as the comparison group.

Definition of constructs:

Child and Caregiver Codes

Mobile Device Used – What type of mobile device is the caregiver and/or child using if any? The options are:

- **Phone** = smartphone/cell phone. The parent or child must be holding the device with their hand. The only exception of when this should be marked down and

neither the child or parent are holding the phone is if they put it on the table and it is clear that they are looking at a video, text, or playing a game.

- **Tablet** = The parent or child must be holding the device with their hand. The only exception of when this should be marked down and neither the child or parent are holding the phone is if they put it on the table and it is clear that they are looking at a video, text, or playing a game
- **None** = If the caregiver and/or child is not using a mobile device, the researcher would put a tally under N.
- **Other device** = Other types of mobile devices such as such as a Gameboy or laptop.
- **Other object (e.g. toy or stickers) =** They are using another type of object (e.g. stickers, doll).

Modality of Devise Use – If the caregiver and/or child is using a mobile device, what do they appear to be doing with it? If the caregiver or child are not using a mobile device, it automatically should be marked as N/A.

- **Typing/Swiping tapping screen –** typing with her/his fingers (e.g. texting) or using her/his fingers to swipe up and down on the device
- **Calling–** using the device to make a phone call (e.g. caregiver appears to be talking to someone on the phone).
- **Looking at screen–** the caregiver and/or child is looking at something on the screen but is not swiping or typing (e.g., watching a video).
- **Picture–** The caregiver and/or child is taking or posing for a picture.
- **Facetiming–** The caregiver and or child appear to be talking to someone through facetime or skype.
- **Other–** The caregiver and/or child is doing something else with the device.
- **NA** = Not Applied**–** None of the options apply because the adult and/or child are not using a mobile device.

Proximity to Child– Roughly, how close is the caregiver from the child? The options include:

- **C** = Close**–** The child is sitting on the caregiver's lap, or is within 2 feet of the adult.
- **F** = Far**–** The child is more than 5 feet away from the caregiver.

Joint Attention with Child or Caregiver– Are the caregiver and child paying attention to the same object or thing? The options include:

- **Yes, NO device (e.g. toy) (3 secs+)** = This would be an instance of when the child and the caregiver are focused on the same object that does not involve the mobile device (e.g. reading a printed book or each other (e.g. looking at each other).
- **Yes with device (3 secs+)** = This would be an instance of when the child and the caregiver are focused on the SAME mobile device (e.g. looking at a video together).

- **No, caregiver/child using device** = This would be an instance when the caregiver/child is using the mobile device but not with the child/caregiver (e.g. texting alone).
- **No, caregiver/child doing something else =** The caregiver/child is not paying attention to the same thing as the child but they are also not looking at their device (e.g. the caregiver is spaced out while child is playing).

Note: Only one option will marked in this category. Hence, if the caregiver and child engage in joint attention for 3 seconds or more with a device, the coder will just check off "yes, with device," and nothing more even if they also use their device alone for 2 seconds within those two seconds. We don't want to split hairs.

Parental/Child Emotional Input– The caregiver's physical and verbal affection towards the child. Mark as many as you see in one interval. Hence, you might mark "praises child" and "Physical affection" The options include:

- **Physical Affection–** Any form of physical affection from the caregiver to the child (e.g. hugs, kisses, caressing the child, rubbing their back or hair).
- **Smile –** The caregiver smiles at the child.
- **Praises child –** The caregiver praises the child (e.g. the caregiver tells the child "good job honey!")
- **Neutral/Flat affect–** The adult has a blank/neutral or flat expression.
- **Sad–** The caregiver looks sad (e.g. frowning, crying)
- Frustration (*non-physical*)**–** The caregiver seems frustrated at the child or may scold the child, but never physically shows it.
- **Frustration, (*physical*)–** The caregiver physically shows her/his frustration with the child (e.g. restricting the child's behaviors through behaviors such as covering their face, hands, hitting their feet, pinching, pushing etc.).
- **Other–** any other behavior not covered by the options.

Talks with the Child/Caregiver– Does the caregiver/child talk to the child/caregiver? The options include:

- **No talk at all** = no, the coder should put a tally under no if the caregiver never talks to the child.
- **Yes minimal** = yes, the coder should put a tally under this if they see that the caregiver said 1-3 words to the child.
- **Yes a lot** = If the caregiver said more than 3 words to the child.
- **Other** = the coder should put a tally under "other" if they are unsure of whether the adult talked to the child or not, but they should write why in their notes section.

Initiates Interaction- This is an attempt by the caregiver/child to start up a conversation or to get the child's/parent's attention or to start something new. For example, tapping the child's shoulder or calling them by their name, or turning to talk to them if they are not talking. Young, non-verbal infants might turn to look at the caregiver or point. This should be marked if at any point within those 10 seconds you saw an attempt by child or caregiver to interact. You cannot mark this, if you did not see the individual start up the interaction.

- **Initiates interaction**- The caregiver/child attempts to start up the interaction, as described above.
- **N/A-** The caregiver/child does not try to start up an interaction.

Responds to Child's/caregiver's Bids for Attention– If the child/caregiver appears to be trying to obtain the caregiver'schild's attention, does the caregiver respond? The options include:

- **Yes, positively (appropriately) & promptly–** The caregiver responds to the child's bids for attention in a positive manner and right away (within 3 seconds). This can include responding with a smile, a soft tone of voice, or in a manner that indicates the adult is happy to respond to the child.
- **Yes, positively (appropriately) & late–** The caregiver responds to the child's bids for attention in a positive manner but late (after 3 seconds). This can include responding with a smile, a soft tone of voice, or in a manner that indicates the adult is happy to respond to the child.
- **Yes, neutral/flat affect & promptly–** The caregiver responds to the child in a neutral (neither positive or negative) manner (e.g. what?, mhmm, yeah?, looks over) right away.
- **Yes, neutral/flat affect & late–** The caregiver responds to the child in a neutral (neither positive or negative) manner (e.g. what?, mhmm, yeah?, looks over) but late.
- **Yes, negatively & promptly–** The caregiver responds to the child in a negative manner right away (within 3 seconds). This can include scolding, yelling, pushing, glaring, or any other form of physical or verbal response that appears negative toward the child
- **Yes, negatively & late–** The caregiver responds to the child in a negative manner right away (after 3 seconds). This can include scolding, yelling, pushing, glaring, or any other form of physical or verbal response that appears negative toward the child.
- **Ignores–** The caregiver does not respond to the child's bids for attention and simply ignores the child. (e.g. The child is calling for her father's attention but the father continues looking at the device and does not acknowledge the child).
- **NA =–**if the child did not attempt to obtain the caregiver's attention there is no reason for the caregiver to respond.

Chapter 3: Study 2

Exploring Diverse Latino Mothers and Fathers' Beliefs About the Role of Mobile Devices in their Parenting Experiences

Since their inception in the early 2000s, mobile screen devices, such as smartphones and tablets, have been widely adopted by most families across socioeconomic and ethnic groups in the United States (Common Sense Media, 2017). Today, 95% of US families with children under the age of eight years own at least one smartphone and 78% own at least one tablet device (Common Sense Media, 2017). Noticeably, although higher-income families are still slightly more likely than lower-income families to own a tablet (85% vs. 61%) and have access to high speed internet (96% vs. 74%), low-income and higher-income families are just as likely to own a smartphone and have children who own a personal tablet device (Common Sense Media, 2017). The rapid uptake of mobile devices by diverse families is likely due to the devices' increasing affordability, along with their portability and multifunctional capabilities, such as instant access to the internet, entertainment, contacts, social media, and email (Campbell, Ling, & Bayer, 2014; Katz, 2002). Together, these features give families the opportunity to engage in a wide range of activities with their device at any time and from virtually any place (Radesky et al., 2016). Having the opportunity to be constantly connected, however, might influence daily parenting practices (Radesky et al., 2016).

Indeed, the limited but growing body of research suggests that using mobile devices might both support and detract from the daily parenting experiences of parents (Hiniker, Sobel, Suh, Sung, Lee, & Kientz, 2015; Radesky et al., 2014). However, most of the studies to date have been done in controlled lab settings, via anonymous observations in public settings, or using surveys (Hons, Leavy, Jancey, 2017; Radesky et al., 2016; Radesky et al., 2015; Radesky

et al., 2014; Wartella, Rideout, Lauricella, & Connell, 2014). While these methods have provided valuable information, they have not offered an in-depth and complete understanding about how and why parents might choose to incorporate these devices into their daily parenting role. Such thorough exploration might be particularly critical for the study of mobile devices because the numerous functions they offer could contribute to meaningful differences in how diverse families are using them (Neuman & Celano, 2012; Rideout, 2014). Thus, in-depth interviews might be the best avenue to obtain a more nuanced understanding about the ways mobile devices and their features are supporting and detracting from parents' daily parenting experiences in their particular context, which might better support future design of useful and sensitive media guidelines for diverse families.

Unfortunately, and despite the widespread adoption of mobile devices by diverse families, the handful of studies that have explored parents' use and beliefs about mobile devices in-depth have disproportionately been done with middle-class, White mothers and parents of older children (Radesky et al., 2016; Sergi, Gatewood, Elder, & Xu, 2017). Consequently, our understanding of socioeconomically and linguistically diverse, ethnic minority parents' use and beliefs of mobile devices remains scarce, particularly for Latino parents, especially fathers, of very young children. Therefore, this study used in-depth, semi-structured interviews with a sample of socioeconomically and linguistically diverse Latina mothers *and* Latino fathers of young children (ages 0-4 years old) to explore their beliefs about the ways mobile devices and accompanying social media have supported and/or hindered their parenting experiences. We focused on parents of children 0-4-years-old because research is most lacking in this age group, even though this is the age when most children tend to primarily depend on their parents to shape their everyday experiences (Hertlein, 2012).

The Role of Mobile Devices on Parenting Experiences

To date, research examining the influence of mobile devices on parenting experiences is still limited, particularly among ethnic minority families. However, the bulk of the existing research has shown that these devices have the potential to both detract and enhance parenting practices. For example, through the use of anonymous observations in public settings and controlled experiments, a handful of studies have shown that mobile device use is associated with lower quality caregiver-child interactions (Hiniker et al., 2015; Radesky et al., 2014). For instance, many caregivers have been observed being less engaged and responsive with their children when they use a mobile device in fast food restaurants and parks compared to caregivers who do not use a device (Hiniker et al., 2015; Radesky et al., 2014). In line with these patterns, a study conducted in a controlled lab setting with low-income, White (72%) and Latina (28%) mothers and their 6-year-old children found that mothers who used a mobile device during the task tended to talk less to their children than those who did not use a mobile device (Radesky et al., 2016). These observations have been corroborated by parents in survey and interview studies (Hiniker et al., 2015; Kushlev & Dunn, 2019; Radesky et al., 2016). For example, Hiniker and colleagues (2015) interviewed a sample of predominantly White female caregivers of a higher socioeconomic status (SES) supervising a child under the age of 10 years old in parks, and found that caregivers reported having more difficulty paying attention to their child when they used a device than when they did not (Hiniker et al., 2015). These sentiments were also voiced more recently by Canadian parents visiting a museum with their children (Kushlev & Dunn, 2019).

Although findings from survey and interview studies have, thus far, corroborated most of the parental behaviors observed in observational and experimental mobile device studies (Radesky et al., 2016; Hiniker et al., 2015), results from in-depth interviews have revealed more

intricate connections between the advantages and disadvantages associated with device use. For instance, Radesky et al. (2016) conducted semi-structured interviews among a majority of female (74%), White (57%) and Black (29%) socioeconomically diverse caregivers of children ages 0-8 years and found that while mobile devices allowed caregivers to spend more time with their family because they could take their work with them, caregivers often felt like they were "less present" with their children because of the perceived pressure to stay connected and instantly respond to work and friends (e.g. email, texts) (Radesky et al., 2016). Additionally, many of these same parents described noticing more attention-seeking behaviors from their children when they were highly engaged with their device, and some admitted to responding more negatively to their children's bids for attention during these situations (Radesky et al., 2016). Thus, thorough interviews seem to suggest that parents have mixed feelings about the ways mobile devices affect their parenting.

Despite the ambivalence many parents have expressed about mobile devices, recent survey and interview studies show that parents frequently use these devices as aids for managing their children's behavior, accessing parenting information, and seeking social support (Kostyrka-Allchorne, Cooper, & Simpson, 2016; Radesky et al., 2016). For example, a group of primarily middle-to-high SES mothers of children ages 2-4 years old in the United Kingdom described that while they preferred to use toys to occupy their children, they also used a mobile device when alternative activities were not as viable (e.g. car rides, doctor's office) (Bentley, Turner, & Jago, 2016). These views have been expressed by many US parents through national surveys and in-depth interviews as well (e.g., Radesky et al., 2016; Wartella et al., 2014). In addition to using mobile devices to entertain their children, many parents, across socioeconomic groups, have also described capitalizing on their children's interest in mobile devices to increase desirable behavior

by sometimes using them as rewards and punishment for specific behaviors (Bentley et al., 2016; Radesky et al., 2016; Sergi et al., 2017).

Beyond using devices to help manage their children's behavior, many parents also describe using them to access information and social support through social media (Duggan & Lenhart, 2015; Lauricella, Ellerbe, & Wartella, 2018). For instance, a recent national survey among a majority of socioeconomically diverse White (56%) and Latino parents (21%) of children under the age of 18 years found that mothers were more likely than fathers to use social media platforms, such as Facebook, to obtain social support from friends and family (Duggan & Lenhart, 2015). Similarly, more mothers than fathers viewed social media as a resource for obtaining useful parenting information and support (Duggan & Lenhart, 2015). In line with these findings, a mixed-method study done among a majority of low-income, foreign-born Latina mothers (81%) of children under the age of seven years (quantitative portion), and 15 low-middle income Latino families with at least one child between the ages of six and nine years (qualitative portion) found that most parents had a strong family network from whom they often sought out parenting information and emotional support from both online and offline (Lauricella et al., 2018). For example, while parents described sometimes using Facebook to contact distant family and friends when they needed support, they also had an extensive support system in-person from whom they frequently received different forms of support (Lauricella et al., 2018). Such forms of support often included parenting advice, child care, and access to additional enriching activities for their children (Lauricella et al., 2018). Thus, this sample of Latino parents appeared to have access to social support online but relied on their nearby network of social support more frequently.

Along the lines of using mobile devices to access support, a recent study found that an additional way that socio-economically diverse Latino families take advantage of mobile devices is by using them to facilitate and tailor their children's learning. For example, parents were observed and also talked about using mobile devices to find content that reinforced their children's (ages 4-8 years old) heritage language (Barron & Levinson, 2018). Additionally, parents also reported conducting searches based on their children's interests and using online videos to better illustrate answers for their children (Barron & Levinson, 2018). Thus, digital devices appear to be a resource for fostering children's learning and also for accessing parenting information and support.

In sum, there is a growing body of research on the role mobile devices may play in parents' parenting experiences, and two notable studies have specifically targeted socioeconomically diverse Latino parents. Nevertheless, more research is needed that continues exploring the benefits and also the potential detriments that mobile devices might have on the parenting experiences of socioeconomically and linguistically diverse Latino parents, particularly those with very young children.

The Need to Study Diverse Latinos in Media Research

Despite the widespread adoption of mobile devices by Latino families, media research on this ethnic group is sparse (Pew Research Center, 2017). This is an important limitation to address because not only are Latinos the largest ethnic minority in the United States (Pew Research Center, 2017), but they are also among the ethnic groups who rely the most heavily on their smartphones for access to information (Pew Research Center, 2017). Furthermore, more efforts should be made towards recruiting socioeconomically diverse Latino parents because previous national surveys have found that SES and ethnicity influence parents' use and views

about mobile screen devices. However, because most of these studies have disproportionately sampled low-income Latino parents, only included a small sample of them, or not stated their SES (e.g., Common Sense Media, 2017; Rideout, 2014; Wartella et al., 2014), it has been difficult to interpret the generalizability of the results due to the entanglement of SES and ethnicity (Cabrera & the SRCD Ethnic and Racial Issues Committee, 2013). As a result, our understanding about the role of SES on parents' use and views of mobile devices within the Latino population is virtually non-existent.

Further, within most of these studies, Spanish-speaking parents have often been excluded or their responses have been interpreted in aggregate with those of English-speaking parents. Given that Spanish-speaking Latinos make up 31% of the US Latino population (Pew Research Center, 2015), and that language has been found to influence other aspects of parenting, such as parental knowledge of child development (Keels, 2009; Cabrera, Shannon, West, & Brooks-Gunn, 2006), it might also contribute to differences in Latino parents' use and beliefs about the role of mobile devices in their daily parenting experiences. Therefore, it is also essential that samples in media research are representative of linguistically and socioeconomically diverse Latino parents.

The Importance of Including Fathers in Media Research

In seeking to obtain a more complete understanding about the way diverse families are using mobile devices, it is also important that we include a group that is a critical part of many families but has often been omitted in media studies, fathers. It is particularly limiting for research on Latino families to omit fathers because two out of three Latino children live in two-parent households (Pew Research Center Social and Demographic Trends, 2015), and research in other areas of parenting has shown that fathers make unique and important contributions to their

children's development (Cabrera, Fitzgerald, Bradley & Roggman, 2007). Moreover, according to Bowen's family systems theory (1978), families often function as a system in which all subsystems are interrelated and influence each other. Thus, to have a more complete understanding about all the different ways mobile devices are being incorporated into the parenting experiences of diverse Latino families, it is also important to understand the use and views of socioeconomically and linguistically diverse mothers *and* fathers.

The Present Study

To address some of the gaps in the literature, this qualitative study used semi-structured interviews to understand how a sample of 40 socioeconomically (i.e. low income and middle-to-high income) and linguistically diverse mothers and fathers of young children (ages 0-4 years) believe mobile devices and accompanying social media have supported and/or hindered their parenting experiences. In exploring this question, we also investigate how parents compare based on: a) SES, b) gender, and c) language spoken (English and/or Spanish).

Method

Study Design

A semi-structured interview design was used to obtain a deeper understanding of how and why diverse Latino parents of young children might incorporate mobile devices into their parenting practices. Qualitative approaches are appropriate to use when the goal is to identify and understand different perspectives about a given phenomenon (Giacomini & Cook, 2000).

Recruitment and Participants

Recruitment. Latino mothers and fathers of children under the age of five, living in Southern California were invited to participate in one-on-one interviews. Recruitment was done in one of three ways. The first method involved asking participants who were interested but

ineligible to participate in another UCI study if they would be interested in participating in this study instead. The second method included posting flyers at businesses, churches, and grocery stores. Finally, the third method was through snowball sampling. All parents were asked to participate in a 45- to 60-minute audio-recorded, in-person interview in English or Spanish. To be eligible to participate in the study, parents needed to report 1) owning at least one mobile screen device and having access to the Internet on it, 2) self-identify as Latino/a, and 3) have at least one child who was four years old or younger. No restrictions were placed on the parents' age, number of children, marital status, nationality, or primary language spoken.

Given that we were interested in understanding the role of SES and parent gender on Latino parents' use and beliefs about mobile devices, we wanted to ensure equal representation of socioeconomically diverse mothers and fathers. Therefore, using the approach of previous researchers, we used income as a proxy for SES and recruited parents into one of two income groups during recruitment, low-income and middle-to-high income (Bodnar-Deren, 2017; Davis-Kean, 2005; Hauser & Warren, 1997). In total, we purposefully recruited 20 low-income parents (10 mothers and 10 fathers) and 20 middle-to-high income parents (10 mothers and 10 fathers). Although we initially aimed to recruit equal numbers of low-income and middle-to-high income Spanish-speaking mothers and fathers, we were not successful because all monolingual Spanish-speaking parents who expressed interest in participating in our study had low incomes and all middle-to-high income parents were fluent in English (although virtually all parents spoke Spanish too). Therefore, Spanish-only-speaking parents are not represented in the middle-to-high income groups.

Participants. In total, 40 Latino parents (n = 20 mothers, n = 20 fathers) of children between the ages of 0-4 years of age participated. All mothers and fathers were distributed

equally across the low-income (n = 20) and middle-to-high income (n = 20) categories. There was a total of four couples two in each income category. The next sections describe the demographic characteristics of parents from each of the four groups.

Low- income mothers. Low-income mothers (n = 10) ranged in age from 22 to 36 years (*M* = 28.77, *SD* = 5.33). On average, they had two children (*M* = 2.1, *SD* = 1.37) and at least one child under the age of five years old (*M* = 1.9 yrs., SD = 1.5). From the target children (i.e. under the age of 4 years old), 21% were female and 79% were male. Sixty percent of the mothers had a high school education or less, 20% had some college, and 20% obtained a Bachelor's degree. Additionally, 60% of the mothers were born in Mexico or Ecuador and had been in the U.S. for an average of 15 years (*M* = 15.08, SD = 9.19). Finally, the majority of mothers (70%) were Spanish-English bilingual and only 30% were monolingual Spanish-speakers. Noticeably, two monolingual Spanish-speaking mothers had an elementary school education and one had a Bachelor's degree. Please see Table 2.1 for more details.

Low-income fathers. Low-income fathers (n = 10) ranged in age from 26 to 45 years (*M* = 31.50, *SD* = 6.28). On average they had two children (*M* = 1.9, *SD* = 0.87) and at least one child under the age of five years old (*M* = 2.0 yrs., SD = 1.2). From the target children (i.e. under the age of 4 years old), 36% were female and 64% male. Forty percent of the fathers had a high school education or less, 50% had completed some college or a two-year degree, and 10% obtained a Bachelor's degree. Additionally, 40% of the fathers were born in Mexico and had been in the U.S. for an average of 24 years (*M* = 24.14, SD = 14.45). Finally, the majority of fathers (70%) were Spanish-English bilingual and only 30% were monolingual Spanish-speakers. Noticeably, these two monolingual Spanish-speaking fathers had a middle-school education or less. Please see Table 2.2 for more details.

Middle-to-high income mothers. Middle-to-high income mothers (n = 10) ranged in age from 23 to 35 years (*M* = 30.60, *SD* = 4.74). On average they had one child (*M* = 1.20, *SD* = 0.42) and at least one child under the age of five years old (*M* = 2.0 yrs., SD = 1.3). From the target children (i.e. under the age of 4 years old), 33% were female and 67% male. Twenty percent of the mothers had completed some college, 20% had a Bachelor's degree, and 60% had a Master's degree or beyond. Additionally, only one of the mothers was born in Peru and had been in the U.S. for 10 years. Finally, all mothers were Spanish-English bilinguals. Please see Table 2.3 for more details.

Middle-to-high income fathers. Middle-to-high income fathers (n = 10) ranged in age from 23 to 41 years (*M* = 33.50, *SD* = 5.72). On average they had two children (*M* = 1.90, *SD* = 0.99) and at least one child under the age of five years old (*M* = 2.3 yrs., SD = 1.4). From the target children (i.e. under the age of 4 years old), 38% were female and 62% male. Sixty percent of the fathers had completed some college or a two-year degree and 40% had a Master's degree or beyond. Additionally, only one of the fathers was born in Mexico and had been in the U.S. for 20 years. Finally, 90% of the fathers were Spanish-English bilinguals and only one was an English-monolingual speaker. Please see Table 2.4 for more details.

Procedure

Once the lead researcher confirmed that the interested parent was eligible to participate in the study, a date and time was set to interview the parent. The interview either took place in the parent's home or in a public place the parent chose. At the start of the interview, the researcher provided the parent with an informed consent form. The form included a description and goals of the study, the parent's right to stop the interview at any time or to opt to not answer any question that made them uncomfortable, and it also asked parents for permission to audio-record the

interview. All parents were assured that their confidentiality would be protected. After the parent signed the informed consent form, the researcher turned on an audio-recording device and began the interview. When the interview was over, parents were compensated with a $10 Target gift card and a bilingual children's book. A university Institutional Review Board (IRB) approved all procedures and materials.

Measures

Parents' income category. Parents were asked to report on their: 1) total household annual income, 2) total number of people living in their household at least four days of the week, and 3) the number of these individuals who were minors and adults. Using this information, parental income level was determined by calculating their poverty index, which compared a family's annual household income to an income threshold level that varied by family size and composition (i.e. number of children and adults).

The threshold levels are updated every year for inflation with the Consumer Price Index (United States Census Bureau, Poverty Thresholds 2016). A family is considered to be living in poverty if their household annual income is less than the threshold level (United States Census Bureau, Poverty Thresholds 2016). In their study, Brooks-Gunn, Duncan, and Britto (1999) identified five income-to-needs ratio: 1) deep poverty (income-to-needs ratio less than .50), 2) poverty (income-to-needs ratio greater than or equal to .50, but less than 1.0), 3) near poverty (income-to-needs ratio between 1.0 and 1.5), low income (income-to-needs ratio between 1.5 and 2.0) and middle income (income-to-needs ratio greater than or equal to 2.0). However, we only identified two categories for this study: Low income (income-to-needs ratio: less than 2.0) and middle-to-high income (income-to-needs ratio: equal to or greater than 2.0).

Background questionnaire. Parents were asked to answer a 15-item background questionnaire created for this study (see appendix 2.1). Questions included the relationship to the target child(ren), their and their children's gender, ages, ethnicity, income, number of people living in their household, education level, marital status, nationality, years living in the United States, and the language(s) spoken.

Semi-structured interview. A Spanish and English semi-structured, in-depth interview with open-ended questions was created for this study (See Appendix 2.2). The semi-structured interview was composed of four main sections. Section 1 aimed to elicit parent beliefs and attitudes about the ways in which mobile devices and social media supported and/or hindered their parenting (e.g. *As a parent, how has having a smartphone/tablet helped you*). Section 2 asked parents about their beliefs and attitudes about the ways in which mobile devices had supported and/or hindered their children's learning (e.g. *Do you think smartphones and or tablets have benefited your children's learning? How?*). Section 3 asked parents about the types of device limits they set for their children (e.g. *Do you have specific time limit for your children to use mobile devices? Why?*). Section 4 asked parents to describe their children's use of mobile devices (e.g. *Do you and your children ever use mobile devices together? Can you describe that experience?*). It is important to note that in answering the questions for sections two, three, and four, we asked parents to think about their child(ren) who were four years of age and/or younger. Because of the limited research on this topic with the Latino community, the interview process was iterative in nature and a few questions were added to the interview throughout the process of data collection, especially when parents brought up an important new point the researcher was not aware of (items highlighted in purple). Thus, not all parents were asked the entire set of questions, but all were asked the major questions related to the main research questions. To

ensure that the questions were clear and being interpreted as intended in both languages, extensive Spanish and English cognitive interviews were done with target parents prior to data collection (Beatty & Gordon, 2007).

Qualitative Coding and Analysis

The first author of this study, a native Spanish-speaker, conducted the interviews and transcribed the audio recordings. All parents were given a pseudonym to protect their identity. The transcripts were then coded in their original language both inductively and deductively using a combination of Descriptive (i.e., summarize the main idea in a word or phrase) and Process (i.e., captures action) codes (Miles & Huberman, 1994; Saldaña, 2003; Wolcott, 1994) using MAXQDA qualitative software. Deductive codes were derived from the existing literature exploring the influence of mobile screen devices on parenting experiences (e.g., device used to manage children's behavior, device used to access social support). Several cycles of coding were done by the lead author to identify all possible codes that were relevant to the research question. Then, additional researchers independently coded excerpts from ten random interviews and met with the lead researcher to determine the most commonly identified codes by most researchers. The codes that were the most frequently agreed upon were then explored further and used to develop the coding scheme, which eventually helped create the broader themes (Bryman & Burgess, 1994; Morse, 1991; Thorne, 2000). Please see Table 2.5 for the specific final coding scheme for all interviews. To ensure data trustworthiness, not only did the lead researcher hold peer debriefing meetings with other researchers but also often asked interviewees if her interpretation of what they had just said during the interview was correct. Across all stages of the analytic process, the lead researcher referenced the memos she had written after each interview and transcript and also wrote new ones during the coding process. Finally, after all transcripts

had been coded using the final coding scheme, the researchers used the features of MAXQDA software to obtain frequencies and make SES, gender, and linguistic comparisons to answer the research question. A ratio of 2:1 was used to judge whether there were differences by income, parent gender, and language.

Results

Seven themes emerged that captured the ways parents described mobile devices supported and/or hindered their parenting. Although five of these themes primarily captured the ways mobile devices had supported (i.e., information access, social support access, parent-child bonding, teaching) or hindered (i.e., disrupts parent-child interactions) parents' parenting experiences and two themes encompassed a combination of both supports and hindrances (i.e., child behavior management, parental psychological effects). Further, while the seven themes were distributed across income and mothers and fathers, some of the subthemes associated with the larger themes differed for parents from different SES or genders. Additionally, not all themes were spread across monolingual Spanish-speaking (n = 6) and English-Spanish-speaking parents (n = 36). Table 2.6 shows the detailed breakdown of differences and similarities in specific themes and sub-themes by parent gender, income, language, and education.

The first theme, *information access*, was centered on parents' descriptions of how mobile devices had given them instantaneous access to parenting-related information. The second theme, *social support access*, captured the ways parents believed mobile devices had facilitated access to social support, both informational and emotional. The third theme, *parent-child bonding*, described parents' beliefs about the ways mobile devices facilitated bonding and time together with their children. Finally, the fourth theme, *teaching*, revolved around parents' descriptions about how they had used mobile devices as a tool to facilitate their children's

learning. In contrast, the fifth theme, *disrupts parent-child interactions*, clustered around parental reports of how they believed mobile devices prevented or interrupted interactions with their children. Interestingly, the sixth theme, *child behavior management*, captured the ways mobile devices aided or introduced more challenges for parents to manage their children's behavior, and the seventh theme, *parental psychological effects*, included the way mobile devices contributed to parents' positive and negative emotions. It is also important to note that the theme of parental psychological effects was related to most themes because some parents described positive or negative emotions when also talking about most of the other six themes. For example, Joshua, a middle-to-high income father, described feeling "warm and fuzzy" about being able to look up any information he needed about his child on his smartphone.

Mobile Devices Supporting Parenting Experiences

Information Access. The majority of parents (95%) across income ranges (n = 18 low, n = 20 middle-to-high), parent gender (n = 19 mothers, n = 19 fathers), and linguistic groups (n = 5 Spanish-speaking, n = 33 English-speaking: n = 32 bilingual, n = 1 English only) talked about the convenience of having their mobile devices to seek out information related to parenting or their child. As Carmen, a middle-high income mother with a PhD, described, "*um, so any kind of information from child health to like education to any question I have it's always my Smartphone where I go to.*" Nevertheless, despite the widespread use of mobile devices to access parenting-related information, important differences in responses were noted for Spanish-speaking parents with very low levels of formal education (n = 3). Specifically, two of the three Spanish-speaking parents with an elementary-school education did not use their mobile devices to look up parenting or child-related information as other parents did. However, they used it to help their older children find answers to their homework assignments. The other Spanish-speaking mother,

Esperanza (low-income mother with an elementary school education), shared her experience of searching for parenting-related information occasionally but not trusting the information she obtained online "*por hay me da miedo darle a mis niños cosas. Como nunca lo eh usado [mobile device] para eso [look up information], en veces veo que dicen mira que esto es para la caida del pelo. Y en veces me digo, lo voy a hacer pero despues digo, hay no que tal si llego a hacer algo a mis niños o algo*." [English translation: "*I'm afraid to give my kids things. Since I've never used it [mobile device] for that [look up information], sometimes I notice that they say, look this is for hair loss. And sometimes I tell myself that I'm going to do it but then I say no, what if I end up doing something to my children*"]. In contrast, Spanish-speaking parents with a middle school education or higher (n = 3) reported using their device to access parenting-related information about their young children. Thus, education, rather than income or language, appeared to be more related to parents using their mobile devices to access information about their young children. However, the sample is too small to truly disentangle these patterns.

Although the majority of parents described using their mobile device to access parenting-related information, important differences were noted in the types of information they searched for and the number of sources they used. Namely, while middle-to-high income parents and low-income mothers mentioned looking for a wide range of topics related to parenting and/or their child, low-income fathers often reported only looking for information related to their child's health. While looking for child health information was the most commonly searched topic by middle-to-high income parents too (90%), these affluent parents also searched for parenting advice (50%) and child development topics (25%). In line with wealthier parents, a high percentage of low-income mothers also searched for parenting advice (50%) and child development information (50%), but not for child health information. Furthermore, while Google

was the most commonly used resource for accessing information, those parents with a high school degree or more described using more sources (e.g., Google, parenting forum), and several parents with a master's degree or beyond specifically mentioned also referencing research articles. For instance, Luis, a middle-high income father with a Master's degree, said, "*so I'm not really reading um... you know, your .coms or, or stuff like that… my first go to is if there's something that I wanna read about, you know… how is it being defined in the research?*" No differences in the number of sources used or types of information searched were found for Spanish-speaking parents with a high school degree or more. In sum, most parents, except for low-income fathers, searched for a diverse number of parenting or child-related information. Furthermore, parents with a higher level of education tended to use more sources during their searches than parents with a lower level of education.

Interestingly, within the theme of "information access," two additional sub-themes emerged. The first, labeled *helpfulness to new parents*, was described by 17% of mothers and fathers across income groups when they explicitly talked about how beneficial it had been for them to be able to access information on their device as a new, and sometimes young, parent with many questions. For example, Daisy, a low-income mother with a high school degree, mentioned, "*it's been pretty helpful because um… since I'm a young parent, I, I don't know a lot, but you know, it's hard for me cuz sometimes I don't like asking for help from my mother-in-law, my mom. So, I rather do my searching.*" Being able to do their own research about their children's health helped several parents with a high school degree or more (3 middle-to-high income, 1 low-income father) feel empowered enough to present the information they had gathered to their child's doctor and facilitate a diagnosis for their child. Hence, producing the second sub-theme, *information access and empowerment*. Joshua, a middle-high income father

with a 2-year Associate's degree illustrated this sentiment when he said, "*I presented that [information gathered] to the doctor and they said yeah, you know what? You're right. It would be a concern, so it's like, it's kind of cool cuz it kinda helped me diagnose what things that she's been going through already.*"

Altogether, most parents across gender and linguistic groups believed mobile devices had supported their parenting experiences by providing them with instant access to parenting-related information. Nevertheless, important differences in how and what parents searched did emerge for low-income fathers and parents with very low levels of education. Additionally, a few new parents found being able to access information on their device extremely helpful, and a handful of parents even felt empowered to present the information they obtained to their child's doctor.

Social Support Access. In addition to talking about the benefits of being able to access information, a large percentage of parents (42%) discussed using their mobile device to obtain social support on social media. Social support was often described as being in the form of informational (e.g., remedy suggestions for the child by friends and family), emotional (e.g., validation from other parents), or both (e.g., family reassures parent the child will be ok and suggests remedies). While no income differences were found in accessing social support online, clear differences by parent gender and language did emerge. That is, more mothers (n = 12) than fathers (n = 5) and more English-speaking (n = 17 Bilingual, n = 1 monolingual) than monolingual Spanish-speaking (n = 1) parents reported using their device to access social support on social media. However, across all groups, parents reported accessing social support from their families via phone calls with their device. Most of the support parents received online was provided by friends and family via Facebook messages and fewer through comments on

posts. In fact, the most common source of social support for parents across all groups both online (social media) and offline was their family (70%).

Many of the parents who did not use social media to obtain social support mentioned not feeling the need to look for social support online because they had their family nearby or just a phone call away (texting was not mentioned or asked about) - and they trusted their experience raising children. In addition to these responses, more fathers than mothers talked about not wanting to discuss family-related issues on social media. Moreover, even among the parents who mentioned having sought out social support from their family or friends online in the past, most expressed preferring to obtain their support in-person and from family more frequently. For example, Jorge, a middle-high income father who completed some college, discussed preferring to receive support in person than online, "*um... just more, more comfortable and um... even if there's a problem with her, I can just take her to my mom and show her what the symptoms are and she could see, and she'll compare, cuz my mom had four kids so... she'll compare it to one of us that it happened to.*" In sum, parents across all groups primarily relied on their family for social support both online and offline. However, more mothers than fathers, and English-speaking than Spanish-speaking parents reported also using their device to access this social support through social media.

Although the majority of the parents relied on their immediate family as their main source of social support, and most frequently in person, a few parents (n = 7) across income and gender groups sought out additional social support online from Facebook parenting groups or parenting pages. A common theme among these few parents was that they were either experiencing a unique situation, such as having a child with a medical condition, or they felt like they needed additional support from people whom they could relate to more (e.g., breastfeeding).

Gerardo, a low-income father (2-year college certificate) who has a child with a kidney problem, described his experience joining a Facebook parenting group for parents who have children with kidney issues as follows, "*I liked it, like having that exchange of like seeing what they were going through and then what we're going through. It's kind of like compare it. Um… not compare it in a bad way, like as a competition, but kind of like just seeing what they're doing and what I'm doing and kind of what can work out better, like for ourselves and for our children.*" Similarly, Yesenia a low-income mother with a Bachelor's degree, talked about feeling validated by parents on a Facebook parenting page after the people around her did not support her decision to breastfeed her child, "*some people around me put me down a little bit… and um… sometimes I would read stuff that people would post about breastfeeding that like, was like oh ok. That's good. That's how I feel and that's how a lot of people feel, and so it made me feel more reinforced in what I was doing and like better about what I was doing.*" Although the few parents who sought out additional social support from online parenting groups were distributed across income and gender groups, none were Spanish-speaking parents. At the same time however, none of the Spanish-speaking parents discussed experiencing a unique situation or difficulty. Thus, Facebook parenting groups and pages appear to be an additional source of support for socioeconomically diverse mothers and fathers experiencing unique situations.

Parent-Child Bonding. While virtually all parents (97%) reported using a device together with their child, 23% of these parents went into detail about how much they had enjoyed the co-engagement experience. Importantly, these parents were distributed evenly across income (n = 5 low, n = 4) and parent gender (n = 4 mothers, n = 5 fathers). Additionally, parents with children ranging in age from 3 months to 4 years described using the device to bond with their children. Most of the descriptions parents used to describe their enjoyment of co-using the device

with their child clustered around parent-child bonding, such as being able to spend extra time with their child watching something they both liked and enjoying learning about their child's interests. For instance, Eric, a middle-high income father with some college, talked about why he enjoyed co-watching Youtube videos on a device with his child, "*I feel like, I connect with her in what she likes and I could just, I could just see more of what she enjoys, like she loves My Little Pony.*" Additionally, three of the mothers described enjoying the physical closeness and affection that watching something on a mobile device facilitated. For instance, Daisy, a low-income mother with a high school degree, described her experience co-watching a movie with her child on her mobile device as follows, "*all of the sudden he just starts kissing me, hugging me, so and we'll watch the movie and he's just like you know? And um... he starts acting like a baby.*"

Although all Spanish-speaking (n = 6) parents reported also co-using the device with their children, none talked about their enjoyment for doing so. However, two of these parents were the first to be interviewed and were not prompted with the follow up question of "i*s there something you enjoy about being able to co-use the device with your child?*" and two of them had a 1-month old child and only used the device to Facetime family in Mexico. Therefore, it is possible that the lack of mention of enjoyment during co-use was due to not being prompted or because their child was too young. In sum, most socioeconomically diverse mothers and fathers used mobile devices to co-engage with their child, and a portion of them particularly enjoyed the benefit of being able to bond with their child while co-using the device.

Facilitates Teaching. When discussing how mobile devices had supported parents in their parenting role, 35% of all parents talked about using mobile devices to supplement or aid them in their goal of teaching something to their child. Noticeably, parents across income (n = 7 low, n = 7 high), gender (n = 7 mothers, n = 7 fathers), and linguistic groups (n = 2 monolingual

Spanish-speaking, n = 12 English-speaking: n = 12 bilingual, n = 1 monolingual) talked about using a mobile device to facilitate teaching. Specifically, many parents described using their device to further illustrate a point to their child via Youtube videos (e.g., science concept), teach their child desirable behavior through Youtube videos (e.g., toilet training), or find answers or resources to teach their child specific concepts. For example, Anthony, a low-income father who completed some college, described using his mobile device to search for videos that not only expanded on his child's interest but also taught him concepts, "*my son right now is into like dinosaurs so … I find videos on Youtube and I show it to him… there's this one guy called Brave Wilderness and right now it's like a series he's going through dinosaur things and I've been showing him… names of dinosaurs [laughs]. He's like that's a T-Rex, that's a Stegosaurus.*" Additionally, it is important to note that with the exception of the two parents with a 1-month old baby, parents with children who ranged in age from 3 months to four years reported using mobile devices to facilitate learning.

Another sub-theme that emerged from this larger theme was that most of the bilingual parents (n = 8) who described using their mobile device to facilitate learning, also reported using it to foster their children's Spanish language development. With this goal, many of them reported actively searching for Spanish programs and songs on Youtube to foster their children's Spanish language development. For instance, Ricardo, a middle-high income father with a PhD, mentioned using the device to search for Spanish songs to show his children " *I put songs in Spanish for the kids, like pop songs, and they start picking up on Spanish words and phrases, so that one, vamos a la playa [sings], they know that "vamos a" means we're going somewhere and then you just have to add the noun.*" No meaningful differences were found by income or gender. However, while none of the Spanish-speaking parents specifically talked about actively looking

for Spanish/English programs or games to help their children develop their language(s), most did mention noticing that their children were learning English words from the programs they were watching or games they were playing on the device. Thus, a sizable portion of the parents described using their mobile device to facilitate teaching their children concepts, skills, and behaviors. Additionally, bilingual parents also used their device to find resources in Spanish that would help maintain or develop their children's Spanish language.

Disrupts Parent-Child Interactions. In addition to all parents believing mobile devices had supported their parenting experiences in some way, many parents of children ages one to four years also felt that these devices had detracted from their experiences as well. For example, 47% of the parents described feeling like mobile devices had disrupted or displaced many of their interactions with their children. Jennifer, a middle-high income mother who had completed some college, described this sentiment, "*I think it's a... how do I put it? we're not really engaging with our daughter the right way when we have our phones in front of us. Like when we're playing um... like play pretend, like it's not the same.*" Although this theme was spread across income, parent gender, and linguistic groups, a higher percentage of middle-high income parents (n = 13) than low-income parents (n = 7) reported this concern.

Noticeably, none of the Spanish-speaking parents with less than a high school degree (n = 4) described feeling like mobile devices had disrupted or displaced interactions with their children. Additionally, within the low-income groups, the two mothers and one father with a Bachelor's degree reported that mobile devices had disrupted interactions with their children. Therefore, it appears that parents with higher levels of education report more disruptions in their interactions with their children due to their mobile device than parents with lower levels of education. Martin, a low-income Spanish-speaking father with a middle school education,

illustrated a common response given by low-income parents with less than a high school degree, "*mas que nada ahorita el tiempo. Si tengo tiempo, lo uso y si no. Primero esta el trabajo, mi familia, trabajo y si me queda un poquito de tiempo, lo agarro. El teléfono no es de que me voy a morir*" [English translation: "*more than anything right now, the time. If I have time, I'll use it, if I don't, I won't. My priority is my job, my family, my job and if I have a little bit of time left over, I'll use it. I'm not gonna die if I don't use it.*"].

Mobile Devices Both Supporting and Detracting from Parenting Experiences

In addition to the five themes that primarily captured the supports or hindrances associated with mobile devices, two themes (i.e. *child behavior management* and *psychological effects*) emerged that described situations when the device served as both the tool that supported the parent in dealing with an issue or the instrument that actually contributed to the issue.

Child Behavior Management. One of the benefits most parents (90%) consistently associated with mobile devices was their effectiveness to entertain children during challenging situations. This theme was widespread among parents of children of all ages (3 months through 4 years), from each income (n = 16 low, 20 middle-high), gender (n = 18 mothers, n = 18 fathers), and linguistic (n = 2 Spanish-speaking, n = 32 English-speaking: n = 31 bilingual, n = 1 monolingual) group. From these parents (n = 36), all of them talked about using a mobile device to entertain their children during difficult situations, such as when the child was fussy (most often in public), the parent needed to do chores, or the parent felt like they needed a break. For example, Lorena, a low-income mother with a high school degree, described using a mobile device to manage her child's behavior when they were out in public, "*for the baby, when he's behaving bad… if we're out though! Not at home. Like if we are out and about…* Interviewer: Why more outside? Lorena: *Than inside the house? Cuz at home I could control him and outside*

he screams or people look at you and the first reaction is, oh here's my phone so you could be quiet." Interestingly, an additional reason that only emerged among middle-to-high income parents and low-income parents who were attending college was using the device to entertain their children when they had to work from home and had no other means to keep their child busy. Nonetheless, despite the high prevalence of parents using their device to entertain their children, most stressed that they also often used other means of entertainment (e.g., toys) for their children. However, they opted for the device when the situation did not allow for other means of entertainment or when their child was bored of playing with toys during these situations.

Aside from using their mobile devices to entertain their children during difficult situations, almost half of the parents (47%) also discussed using mobile devices to reward or punish their children's behavior. For example, Aniceto, a low-income father with an elementary school education, explains, "*a veces cuando no se estan portando bien, les remuevo el celular. Y ya una vez que los miro que estan calmados entonces lo volvemos a intentar de nuevo.*" [English translation: *"sometimes I remove the smartphone when they're not behaving well. Once I see that they calmed down, then we try it again*"]. It is important to mention that all of the parents using mobile devices to reward or punish their children only used it with children who were two and half years old (n = 6) or older (n = 13). Further, these parents were distributed across income (n = 9 low, n = 10 middle-high), parent gender (n = 8 mothers, n = 11 fathers) and linguistic groups (n = 2 Spanish-speaking, n = 17 English-speaking: n = 16 bilingual, n = 1 monolingual). Altogether, mothers and fathers across groups used mobile devices in some way to help manage their children's behavior. However, while virtually all parents used the device to entertain their children, only about half used it to reward or punish their two and half-year-old or older child.

Although virtually all parents described using their mobile device as a tool to help manage their children's behavior, a good portion (45%) also talked about situations when mobile devices actually caused or contributed to their children's misbehavior. These parents were distributed roughly equally across income (n = 10 low, n = 8 middle-high) and gender (n = 10 mothers, n = 8 fathers). Furthermore, the two Spanish-speaking parents who had described using it to manage their children's behavior, also talked about situations when the device had contributed to their child's misbehavior. Some of the situations parents described included their child pestering them for the device, becoming upset or throwing a tantrum when the parent took the device away, or fighting with their siblings over the device. Carlos, a middle-high income father with a Master's degree perfectly illustrated a situation when the device served as both an aid to get his child to behave at the grocery store and a stressor for their child's behavior once they were out of the store, "*the thing is, we don't let him use it [tablet] as much because whenever we do take it away from him, he throws the biggest fit. He starts crying and kicking, so we always have to remind him, like hey, once we get to the car, like we're gonna take the phone away. Um... that doesn't always work.*" Altogether, mobile devices appear to help the majority of these diverse parents control their children's behavior during difficult situations; however, the devices also contribute to children's misbehavior for about half of the parents.

Parental Psychological Effects. Throughout the interviews, many parents talked about their feelings while describing their experiences with mobile devices. Naturally, these emotions ranged from positive (75% of parents) to negative (50% of parents), depending on the specific topic that was being discussed. We conceptualized experiences as contributing to positive emotions when parents talked about how using their device helped them relax/de-stress, escape boredom, feel relief after obtaining information online, or feel validated by other parents online

in their parenting role. For example, Eric, a middle-high income father who completed some college, described how he felt being able to access parenting-related information online with his device, "*it lets us know we're not alone in how we feel, as much as we don't wanna be frustrated or stressed out, it still happens, you know? But I mean it happens to everyone, we're not alone. We're not the only parents that feel that way. We just wanna make sure our child is ok, you know? So that's a great relief, at least for me it's like ok like we're not bad parents.*"

Similar to other themes, we found that equal numbers of parents across income (n = 15 low, n = 16 middle-high), gender (n = 16 mothers, n = 15 fathers), and linguistic (n = 4/6 Spanish-speaking, n = 27 English-speaking: n = 26 bilingual, n = 1 monolingual) groups talked about ways in which mobile devices had contributed to positive feelings. However, within these descriptions we noticed slight differences by parent group. Specifically, while a handful of middle-to-high income parents (n = 4 mothers, n = 3 fathers) and low-income mothers (n = 3) described feeling relieved or validated after obtaining information or emotional support online, only one low-income father described feeling this way. Noticeably, the low-income parents who reported feeling relieved or validated also had a high school education or higher, and none were monolingual-Spanish speakers.

In addition to feeling relieved and validated as a result of using their mobile device, a good percentage of the parents (55%) also reported using their mobile device to de-stress or to escape boredom. These parents were distributed across income (n = 13 low, n = 9 middle-high) and gender (n = 12 mothers, n = 10 fathers) groups. Further, unlike the previous difference noted, Spanish-speaking parents with low levels of formal education also reported using their device to de-stress or combat boredom. For instance, Alvaro, a low-income father talked about using his mobile device to escape boredom, "*cuando a veces me siento como aburrido o triste o*

desesperado, simplemente con ver algo divertido borra un poco el sentimiento, si mas que nada es el sentimiento." [English translation: "*sometimes when I feel bored or sad or anxious, I erase some of those feelings by simply looking at something funny, yes more than anything it's the feeling*"]. Thus, mobile devices contributed to parents' positive emotions by helping them avoid boredom or de-stress, and for some parents with high levels of formal education, use also brought a sense of relief or validation.

Despite the high prevalence of parents describing mobile device use to improve mood, 50% of parents also felt that mobile devices had negatively contributed to their emotions. Interestingly, a higher number of middle-to-high (n = 15) than low-income (n = 5) parents attributed negative emotions to their device use. Further, the five low-income parents were Spanish and English-speaking and also had an education that ranged from middle school to some college. Hence, this pattern was not solely found among highly educated parents. Negative emotions were clustered around parents' feelings of guilt or stress due to their mobile device. For example, Marcos, a middle-high income father with a two-year certificate, felt that mobile devices caused him to be more stressed because of the constant work reminders, "*my worries are on the phone. You know, like tasks that you have to get done and stuff like that. You know, like events are coming up or your loads schedules or you know, stuff like that. But I guess it depends on the industry that you're in.*"

Additionally, the majority of parents who reported having feelings of guilt were middle-to-high income mothers (n = 8) compared to middle-to-high income fathers (n = 4) and low-income parents (n = 2 mothers, n = 3 fathers). Parents often described feeling guilty when they used their mobile device around their children or when they gave their child the device to be entertained. For example, Yaritza, a middle-high income mother with a Master's degree, talked

about feeling guilty because she constantly receives phone calls and texts from her supervisees while she is at home with her child, "*so she's aware that I'm on the phone and so I think for me it was more of that thing, like ok I need to make sure that [pauses] I don't wanna be that work mom for her. You know? Where it's like, she's talking and I'm going yeah, yeah, yeah. Yeah, yeah, oh good, oh good, good. You know? Cuz I feel like she picks up on it and so I feel so bad!*"

Noticeably, parents who reported not feeling guilty often said that they felt they had control over their own and their children's use of a mobile device, only used it to entertain their child when they needed to in public, or simply did not care about other people judging their and their children's use of a device. Lupe, a low-income mother who completed some college, explained why she did not have feelings of guilt related to using mobile devices, "*porque como tenemos limites, entonces pienso que estamos bien. Y al fin y al cabo es mi... mi manera pensar y de hacer las cosas [laughs]*." [English translation: "*because since we have limits, I think we are ok. And after all, it's my… it's my way of thinking and of doing things* [laughs]." While the majority of parents across income, gender, and linguistic groups described ways in which mobile devices had positively contributed to their emotions, more educated parents also reported feeling a sense of relief and validation than less educated parents. Furthermore, only about half of the parents felt like mobile devices had contributed to negative emotions, and the disproportionate majority of these parents were middle-to-high income, with higher resourced mothers expressing the most feelings of guilt related to their mobile device use.

Discussion

Despite the widespread adoption of mobile screen technologies among diverse Latino families, little is known about the ways mothers and fathers of young children are incorporating them into their parenting role. To address this gap, this study did an in-depth investigation into

how and why socioeconomically and linguistically diverse mothers and fathers of young children believed mobile devices supported and/or hindered their parenting. Parent descriptions of their experiences centered on seven themes that illustrated the ways mobile devices had primarily served as a support (i.e. access to information, social support access, parent-child bonding, facilitates teaching), hindrance (i.e. disrupts parent-child interactions), or both (i.e. child behavior management, parental psychological effects) for parents. Furthermore, although most of these themes were spread across diverse parents, a few differences by parent gender, language, and income, but primarily by parent education, emerged. Overall, our findings suggest that across income, parent gender, linguistic groups, and education levels, Latino parents have both positive and negative views about the role of mobile screen technologies on their parenting experiences. These mixed feelings are consistent with those expressed by a sample of socioeconomically diverse majority of White and Black parents (Radesky et al., 2016).

Access to Information

Our findings showed that most mothers and fathers, across income groups, linguistic ability, and education levels described using their mobile device to access parenting and/or child-related information online. Although few studies have investigated parents' use of mobile screen technologies to access parenting or child-related information online, extensive research has explored mothers' use of the Internet to access parenting information and health-related information (Khoo, Bolt, Babl, Jury, & Goldman, 2008; Plantin & Daneback, 2009; Radey & Randolph, 2009; Rothbaum, Martland, & Jannsen, 2008). Findings from these studies are partially consistent with the findings from our study. Specifically, while previous research has found that fathers and lower SES parents are less likely to use the Internet to access parenting information than mothers and higher SES parents (Plantin & Daneback, 2009; Radey &

Randolph, 2009), we found that most socioeconomically diverse mothers and fathers reported using their mobile devices to access information about some aspect of their parenting or child's health. One possibility for not finding SES differences in information searching could be that because smartphones have increasingly become more accessible to socioeconomically diverse families in the last few years (Common Sense Media, 2017), diverse mothers and fathers are now just as likely to have access to the Internet and thus are more able to search for parenting-related information. Another explanation for the lack of differences between mothers and fathers could be that because the majority of past research on fathers' use of the Internet to access parenting information has been conducted among middle-class White fathers, these finding are not representative of Latino families. For instance, other areas of parenting research have found that Latino fathers are highly involved in the caretaking responsibilities of their children (Cabrera, Shannon, Mitchell, & West, 2009; Tamis-LeMonda, Kahana- Kalman, & Yoshikawa, 2009). In fact, studies have found Latino fathers to show more warmth towards their children and spend more time caring for them than White fathers (Cabrera et al., 2009; Tamis-LeMonda et al., 2009). Hence, their high involvement in the caretaking responsibilities of their children might also include accessing parenting and child-related information online to the same extent as mothers.

Interestingly, our findings also showed that searching for health-related topics was highly prevalent among mothers and fathers, and this was the only low-income fathers described searching. Although research has scarcely studied the types of information fathers, particularly Latino fathers, search for online, a survey study done among Swedish fathers found that they were highly involved and informed about their young children's health (Hallberg, Kristiansson, Beckman, Petersson, Rastam, & Hakansson, 2007). Thus, knowing about children's health might

be a particularly important topic for both mothers and fathers, across income levels. Nevertheless, more research with a larger sample of parents should be done to determine the specific topics mothers and father search for online.

Although we found that most diverse parents reported using their mobile screen devices to search for information about some aspect of parenting or their child, slight differences were noted in what and how parents searched for information by their education level. That is, consistent with prior research, parents with higher levels of education reported using more sources during their searches than parents with lower levels of education (Plantin & Daneback, 2009; Radey & Randolph, 2009). Additionally, parents with very low levels of education, who were also Spanish-speaking, described using their devices to search for information but this information was related to their older children (i.e. finding answers to homework assignments) and some of these parents described searching and finding information but being uncertain about its trustworthiness. These findings suggest that while access to information might no longer be an issue, parents with low levels of education might need additional support in improving their digital literacy skills to maximize the use of their smartphones to access diverse topics of information about parenting and also learn ways to evaluate the credibility of the information they obtain. Overall, however, these findings are meaningful because they suggest that most diverse mothers and fathers are using their mobile devices as a tool to access parenting information and this access is particularly useful to new parents and parents of children with medical needs.

Social Support Access

The majority of parents in our study described relying on their family, in person, as their primary source of social support. However, a large percentage of our sample (42%), primarily

mothers, also described using their mobile device to occasionally access emotional and informational support from friends and family on social media. The finding that parents primarily rely on their family for support is consistent with recent findings from a mixed methods study among socioeconomically diverse Latino parents of children ages 0-13 years who found that parents often cited their family as their primary source of support, mostly offline but online too (Lauricella et al., 2018). Additionally, the gender difference we found in seeking social support online has also been documented in the few studies that exist among socioeconomically and ethnically diverse parents (Duggan & Lenhart, 2015). This might suggest that mothers feel more comfortable reaching out to others online for support than fathers. Interestingly, no gender differences in seeking additional support from Facebook parenting groups and pages were found among the few socioeconomically diverse mothers and fathers in our sample who reported experiencing unique situations. These parents often talked about the emotional and informational benefits of being able to interact with people who were going through similar situations (e.g., breastfeeding, having a child with a medical condition, being a Latino graduate student and father). These findings are consistent with prior research among a majority of middle-class, White mothers that have shown that single parents and parents who feel isolated tend to look for additional support online (Fletcher & St. George, 2011; McDaniel, Coyne, & Holmes, 2012). Thus suggesting that most parents primarily rely on their family for social support; however, when parents need additional support that they feel their close network cannot provide them, many resort to social media to find this additional help. Interestingly, very few Spanish-speaking parents reported accessing social support online compared to English-speaking parents. This finding could be because the Spanish-speaking parents felt they had all the support they needed in their immediate social network, were not going through a unique

experience, or it could also be because most of these parents had the lowest levels of formal education in the sample and might not be aware of online parenting groups or how to access them. Given that having access to social support is associated with the wellbeing of children and parents (e.g., Oakley, 1992), future work should investigate whether there are enough resources available online for Spanish-speaking parents and fathers, and what components or topics they would find useful for these groups to cover.

Parent-Child Bonding

A unique theme that emerged among our sample was that while virtually all parents used mobile devices with their young children, a quarter of them found these co-use experiences particularly rewarding because they facilitated bonding with their children. Moreover, this theme was spread across socioeconomically diverse mothers and fathers with children of all ages, but not among Spanish-speaking parents. Spanish-speaking parents that did not talk about enjoying the bonding that mobile devices facilitate might be due to several factors. First, two of the six parents had a one-month old child and reported rarely using mobile devices with the baby because he was too young. Additionally, two other parents were the first to be interviewed and were not prompted with the follow up questions of "is there something you enjoy about being able to co-use the device with your child?" Therefore, not finding these theme among Spanish-speaking parents might be due to our limited sample and interview process. Future studies should interview more Spanish-speaking parents. Overall however, diverse parents are taking advantage of the features mobile devices offer, such as searching for videos on Youtube that their child would like to using screen time as cuddle-time. Thus, future studies can capitalize on this benefit of mobile device use and create public content or activities that diverse families could watch or do together to increase particular skills on their children or facilitate parent-child interactions.

Facilitates Teaching

Similar to findings from a recent qualitative study among Latino parents of older children (Barron & Levinson, 2018), a theme emerged around parents actively using mobile devices to facilitate teaching their children particular concepts and behaviors. More importantly, this theme was spread across parents from diverse socioeconomic, gender and linguistic backgrounds. Additionally, bilingual parents also discussed using these devices to foster their children's Spanish language because it was very important for them that their child maintained or gain these skills. These findings suggest that diverse parents are aware of the usefulness of mobile devices as teaching tools and are actively using them to curate and tailor the specific content or language skills they want their child to obtain (Barron & Levinson, 2018). Drawing on this, intervention work could build on parents' views of mobile devices as a learning tool to create digital learning interventions for young children to do with their parents.

Disrupts Parent-Child Interactions

In line with findings from previous work among a majority of socioeconomically diverse White parents (McDaniel & Radesky, 2018; Radesky et al., 2016), a large portion of the parents in our sample talked about also feeling like mobile devices disrupted their interactions (i.e., technoference) with their young children. Unexpectedly, this concern was more prevalent among middle-to-high income parents and parents with higher levels of education. A possible explanation for this finding is that more educated parents might be more likely to have jobs that rely more heavily on digital technology. Hence, even when these parents are at home with their children, they are interrupted often by updates or other employees when they have their device near them. Indeed, Radesky and colleagues (2016) found that parents often talked about the difficulty of feeling "present" around their children when their mind was on the device because

they were worried about responding in a timely manner to work related messages and emails. Although scarce research has examined the ways mobile devices disrupt parent-child interactions, the majority of these studies have focused on just asking whether parents feel devices interfere with their interactions with their children (McDaniel & Radesky, 2018). However, these studies have not explored whether specific activities with the device are differentially related to parents' feelings of technoference or if using a device, regardless of activity type, is universally related to parents perceiving the device as an interruption to interactions with children. Thus, future studies should ask parents explore when and what type of mobile device use might be associated with parents' perceived interference with parenting.

Child Behavior Management

Consistent with past research (Radesky et al., 2016; Wartella et al., 2014), a theme emerged clustered around parents' descriptions of finding mobile devices useful to manage their children's behavior, particularly during difficult situations. This theme was spread across socioeconomically diverse mothers and fathers. However, most parents stressed that they commonly used diverse tools to manage their children's behavior. These responses are in-line with the views of parents from a recent national survey conducted by Wartella and colleagues (2014). Hence, it appears that mobile devices are not the only "go to" tool for parents to manage their children's behavior; however, mobile devices are perceived as being the most effective during difficult situations for diverse parents (Kostyrka-Allchorne et al., 2016).

Although the majority of parents found devices useful in helping to manage their children's behavior, half of these parents also felt like the devices sometimes contributed to their children's misbehavior (e.g., tantrums, child pestering for the device). These reports are consistent with findings from a previous study done among a majority of middle-high SES,

White parents of young children (Hiniker, Suh, Cao, & Kientz, 2016). Specifically, this study found that parents often talked about the pain they experienced in attempting to transition their children away from the screen because children often threw tantrums, complained, or resisted (Hiniker et al., 2016). This could be due to children's young age and possible perception of mobile devices as just another toy that could be used at any time and do not understand why their parent takes it away, hence, resulting in tantrums or pestering the parent for the device. Efforts should be made towards providing diverse parents with resources to deal with their children's behavior during difficult situations. Additionally, advice should be given to parents on how to remove the device from a young child while preventing or reducing the likelihood of the child from becoming upset.

Parental Psychological Effects

Across the board, parents described ways in which mobile devices had contributed to their positive emotions. However, subtle differences in the specific type of positive emotions experienced were found. Specifically, while most parents reported using their device to de-stress and escape boredom, more educated parents also reported feeling a sense of relief and validation for being able to access information and social support online. A previous study by Radesky and colleagues (2016) also found that parents often used mobile devices to temporarily release some of the stress and also to combat boredom. Using the device for this purpose might be beneficial for both parents and children, especially for parents who live with high stress. Mobile screen devices might help them to calm down and be better able to deal with their children or life, in general, after taking a few minutes to de-stress. This is important since extensive research has found that parental stress is related to a host of negative outcomes, including harsher parenting practices, more negative interactions with children, and less involvement in parenting roles

(Belsky et al., 1996b; Crnic & Low, 2002; Crnic, Gaze, & Hoffman, 2005; Deater-Deckard & Scarr, 1996). However, it is still important to understand whether using mobile devices to cope with stress and boredom is negatively influencing the quality of interactions between parents and children, or the amount of time parents and children spend interacting with each other. Because parents perceive the device as a tool to deal with stress and be entertained, researchers could use this medium as a tool to create health interventions that target parents' mental wellbeing. Additionally, more resources should be provided to parents that give them additional ways of dealing with daily stress.

Although most parents described the psychological benefits of using mobile devices, almost half also talked about experiences when devices had contributed to negative emotions. Interestingly, these negative emotions were more prevalent among middle-to-high income parents, and guilt in particular, was most present among these affluent mothers. These mothers often expressed feeling guilty about giving the device to entertain their child while they worked at home or for using the device in front of their child. These findings are consistent with findings from a limited amount of past studies, primarily done among mothers, which have also found that mothers express feeling guilty about using their phones around their children or using their device for a long period of time around their children (Harmon & Mazmanian, 2013; Hiniker et al., 2015). However, because the samples in these studies consisted of primarily mothers and were also socioeconomically homogeneous, it is likely that the researchers could not make socioeconomic or gender comparisons. The finding in our study that more middle-to-high income parents, particularly mothers, felt guilty about their device use could be because these more affluent parents are more likely to have jobs that involve their mobile devices and thus get interrupted often. Therefore, it is possible that the perceived lack of control and

boundaries between the home and work life contribute to their negative feelings towards the device. This theme suggests that it might be important to provide parents who rely on their device for their job, advice on better boundaries between home and work or ways to juggle competing responsibilities with less stress or guilt.

Limitations and Future Directions

In discussing the findings of this study, it is important to mention some of its limitations. First, although we obtained an equal number of monolingual Spanish-speaking mothers (n = 3) and fathers (n = 3), the sample was too small relative to the sample of English-speaking parents (n = 34). Hence, we might not have been able to capture the same range of experiences for Spanish-speaking parents as we did for English-speaking parents. Furthermore, the majority of the Spanish-speaking parents (n = 4) also had the lowest levels of formal education in the sample. Therefore, language and SES were confounded for the small sample of Spanish-speaking parents making it difficult to discern whether some of the findings were attributable to their language, which is often used as a proxy for acculturation (Cabrera, West, Shannon, & Brooks-Gunn, 2006) or their education level. Moreover, the only monolingual Spanish-speaking mother with a bachelor's degree in the entire sample had a low income and was also a first-time mother to a 1-month-old child. Therefore, we were not able to compare her experiences to the English-speaking mothers, because the only English-speaking mother with a child close to her child's age (i.e. 3 months) was of middle-to-high income, all other mothers with her level of education had older children. Future studies should place more effort towards obtaining a more socioeconomically diverse sample of Spanish-speaking parents.

Secondly, a large portion of the low-income fathers (40%) and mothers (60%) in our sample were born in Mexico and Peru compared to the majority of middle-to-high income

mothers (90%) and fathers (90%) who were born in the U.S. Given that research in other topics about parenting beliefs has found that foreign-born Latina mothers sometimes conceptualize parenting topics differently from US-born, Latina mothers (Zepeda & Espinosa, 1988), it is possible that we did not fully capture the experiences of low-income, US-born Latina mothers. Nevertheless, most of our findings appeared to be driven by education level and gender upon closer inspection.

Thirdly, the majority of parents were married or living with their partner. Hence, our findings might not be generalizable to single parents. Additionally, most of the parents in our sample were unexpectedly parents to boys. Thus, patterns might look different for parents of girls. Future studies should explore the role of mobile devices on the parenting experiences of single parents and also purposefully sample equal number of parents of boys and girls.

Lastly, although all parents were asked the same questions that answered the main research question of this study, the interview was iterative, and we included a few additional questions or prompts (e.g., can you describe what happens when you and your child co-use the device?) after the first few interviews. Nevertheless, not many new questions were added after the first five interviews, and these parents had sometimes covered the questions that were later added organically throughout their interview. Moreover, the first five parents that were interviewed were mothers (n = 3) and fathers (n = 2) who were also low-income (n = 3) and/or middle-to-high income mothers and fathers (n = 2). Hence, not one specific group of parents was disproportionately disadvantaged with less questions.

Conclusion

This study was the first to explore how socioeconomically and linguistically diverse Latino mothers and fathers of young children believe mobile devices positively or negatively

contributes to their parenting experiences. Overall, our results showed that some themes were equally spread across parents from diverse income, gender, and linguistic groups. However, subtle and sometimes important differences were found in parent descriptions most commonly driven by education rather than income. Hence, using income alone to speculate on a parents' education level might not always be a reliable marker for low-income Latino parents. Findings from this study underscore the heterogeneity of Latino parents, and highlight the importance of investigating media use and beliefs among diverse Latino parents. Mobile screen technologies are ubiquitous in the lives of young children and this study shed light on the various ways diverse families are benefitting from them as well as the way these devices are challenging their parenting experiences.

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Table 2.1. Characteristics for low-income mothers

Parent Pseudonym	Parent Type	Poverty Index	Parental Education	Parental Age	Parental Place of Birth	Years in the U.S.	Language(s) Spoken by Parent	Marital Status	Number of Children	Target Children's Age	Target Children's Gender
Chayo	Mother	0.85	Completed Elementary	29	Mexico	11	Spanish	Married	3	48 months 24 months	Girl Boy
Ivonne	Mother	0.29	Some College	22	U.S.	All	Bilingual	Living as Married	1	36 months	Boy
Cristina	Mother	0.76	Bachelor's	27	Mexico	3.5	Spanish	Married	1	1 month	Boy
Lorena	Mother	1	Completed High School	33	Mexico	31	Bilingual	Married	2	16 months	Boy
Esperanza	Mother	0.27	Completed Elementary	32	Mexico	12	Spanish	Married	5	11 months	Boy
Daisy	Mother	0.51	Completed High School	23	U.S.	All Life	Bilingual	Living as Married	1	36 months	Boy
Lupe	Mother	1.53	Some College	36	Ecuador	18	Bilingual	Married	3	5 months 60 months	Boy Girl
Yesenia	Mother	1.45	Bachelor's	27	U.S.	All life	Bilingual	Married	1	16 months	Boy
Karina	Mother	1.36	Completed High School	24	U.S.	All life	Bilingual	Single	1	36 months	Girl
Olga	Mother	1.20	Completed High School	35	Mexico	15	Bilingual	Married	3	24 months 7 months 7 months	Boy Boy Boy

Table 2.2 Characteristics for low-fathers

Parent Pseudonym	Parent Type	Poverty Index	Parental Education	Parental Age	Parental Place of Birth	Years in the U.S.	Language(s) Spoken by Parent	Marital Status	Number of Children	Target Children's Age	Children's Gender
Daniel	Father	1.41	2-year Certificate	27	U.S.	All Life	Bilingual	Married	2	36 months	Boy
Martin	Father	1.20	Some High School	33	Mexico	16	Spanish	Married	3	36 months 7 months 7 months	Boy Boy Boy
Bryan	Father	0.83	Some College	25	U.S.	All Life	Bilingual	Single	1	24 months	Girl
Gerardo	Father	0.81	2-year Certificate	28	U.S.	All Life	Bilingual	Married	2	36 months 24 months	Girl Girl
Pablo	Father	1.0	2-year Certificate	36	U.S.	All Life	Bilingual	Married	2	12 months	Boy
Anthony	Father	1.76	Some College	26	U.S.	All Life	Bilingual	Married	1	36 months	Boy
Alvaro	Father	0.76	Completed High School	28	Mexico	11	Bilingual	Married	1	1 month	Boy
Gabriel	Father	1.45	Bachelor's	30	U.S.	20	Bilingual	Married	3	48 months 24 months	Girl Boy
Aniceto	Father	0.85	Completed Elementary	37	Mexico	All life	Spanish	Single	1	36 months	Girl
Joaquin	Father	0.40	Some Middle School	45	Oaxaca	18	Bilingual- Spanish & Zapoteco	Married	3	11 months	Boy

Table 2.3. Demographics characteristics for middle-high income mothers.

Parent Pseudonym	Parent Type	Poverty Index	Parental Education	Parental Age	Parental Place of Birth	Years in the U.S.	Language(s) Spoken by Parent	Marital Status	Number of Children	Target Children's Age	Children's Gender
Mariela	Mother	5.32	Some College	23	U.S.	All Life	Bilingual	Living as Married	1	16 months	Boy
Mia	Mother	2.52	Master's	33	U.S.	All Life	Bilingual	Single	1	48 months	Boy
Ashley	Mother	4.0	Bachelor's	34	Peru	10	Bilingual	Married	2	6 months 25 months	Boy Boy
Cindy	Mother	5.0	Master's	30	U.S.	All Life	Bilingual	Married	1	3 months	Girl
Monica	Mother	3.3	PhD	37	U.S.	All Life	Bilingual	Single	1	24 months	Boy
Angela	Mother	3.42	Bachelor's	32	U.S.	All Life	Bilingual	Married	2	36 months 6 months	Boy Girl
Leslie	Mother	4.81	Master's	31	U.S.	All Life	Bilingual	Married	1	48 months	Boy
Jennifer	Mother	2.28	Some College	23	U.S.	All Life	Bilingual	Living as Married	1	36 months	Girl
Yaritza	Mother	3.29	Master's	28	U.S.	All Life	Bilingual	In a Relationship	1	30 months	Girl
Carmen	Mother	4.81	PhD	35	U.S.	All Life	Bilingual	Married	1	18 months	Boy

Table 2. 4. Characteristics for middle-high income fathers.

Parent Pseudonym	Parent Type	Poverty Index	Parental Education	Parental Age	Parental Place of Birth	Years in the U.S.	Language(s) Spoken by Parent	Marital Status	Number of Children	Target Children's Age	Children's Gender
Marcos	Father	3.17	2-year Certificate	30	U.S.	All Life	Bilingual	In a Relationship	1	36 months	Boy
Oscar	Father	5.32	Some College	35	Mexico	20	Bilingual	Married	1	42 months	Boy
Eric	Father	2.74	Some College	28	U.S.	All Life	Bilingual	Living as Married	4	2 yrs.	Girl
Ricardo	Father	4.0	PhD	38	U.S.	All Life	Bilingual	Married	2	36 months 60 months	Boy Girl
Alex	Father	4.0	2-year Certificate	40	U.S.	All Life	Bilingual	Married	2	6 months 25 months	Boy Boy
Luis	Father	3.80	Master's	41	U.S.	All Life	Bilingual	Married	2	42 months	Boy
Joshua	Father	5.0	2-year Certificate	31	U.S.	All Life	English	Married	1	3 months	Girl
Joseph	Father	3.42	Master's	37	U.S.	All Life	Bilingual	Married	3	18 months	Boy
Jorge	Father	2.28	Some College	23	U.S.	All Life	Bilingual	Living as Married	1	36 months	Girl

Table 2.5. Coding scheme for the examination of parent beliefs about the role of mobile devices on their parenting experiences

Themes	Codes	Description	Example
Information Access	Specific Topics searched: *Parenting advice,* *Child health,* *Child development,* *Homework questions,* *Pregnancy information,* *Child activities,* *Information distrust,* *Doctor recommendations,* *Child products,* *Family events*	The specific topics or type of information parents reported searching online.	*"Sometimes I'll look up like, development stages, just to see you know, is this where he should be at?"*
	Source used for Information searching: *Google* *Youtube* *Medical website* *Research articles* *Facebook parenting groups* *Parenting blogs/forums*		*"so I'm not really reading um... you know, your .coms or, or stuff like that… my first go to is if there's something that I wanna read about, you know… how is it being defined in the research?"*
	Parent presented information to doctor	Parents descriptions about presenting the information they obtained online to their children's doctor.	*"Then I read more about control treatment and I wanted to be as proactive as I could with the doctor and tell him, you know? It's not working. I read about this proactive new control thing, what do you think about it?"*
	Distrust of online information	Parents express distrust or fear about the information they access online.	*"I'm afraid to give my kids things. Since I've never used it [mobile device] for that [look up information], sometimes I notice that they say, look this is for hair loss. And sometimes I tell myself that I'm going to do it but then I say no, what if I end up doing something to my children"*
	Helpfulness to new parents	Parents mentioning how helpful or useful it was to have access to online information on their device as a new parent.	*"it's been pretty helpful because um… since I'm a young parent, I, I don't know a lot, but you know, it's hard for me cuz sometimes I don't like asking for help from my mother-in-law, my mom. So, I rather do my searching."*
Social Support	Source of social support: *Family* *Facebook parenting groups*	The parents described their family as being their primary source of social support.	*"I usually just… if I need any advice like that, I would just go to my parents I guess. I don't really trust the Internet. Just cuz like, same*

			thing, you know, I'm seeing them in person. They're experienced."
	Social media to access social support online	The parent talked about using their device to access support from their social media networking sites.	*"Like, I remember he was younger and he got constipated and my mom wasn't here at the time. She was on vacation in Mexico. I had to post it and everyone was telling me like "oh, dale jugo, give him like beans molidos." So like he would get the fiber him. So I just got like a whole bunch of like feedback from them."*
	Access online social support because of unique experience	The parent talked about looking for online social support because they were going through a unique experience.	*"some people around me put me down a little bit… and um… sometimes I would read stuff that people would post about breastfeeding that like, was like oh ok. That's good. That's how I feel and that's how a lot of people feel, and so it made me feel more reinforced in what I was doing and like better about what I was doing."*
Parent-Child Bonding	Enjoy co-engagement activity with child, Enjoy co-engagement experience because parent learns about child's interests	The parent described co-using the device with their children AND enjoying this experience for various reasons.	"*I feel like, I connect with her in what she likes and I could just, I could just see more of what she enjoys, like she loves My Little Pony.*"
Teaching	Teaching child English, Teaching child Spanish, Teaching child concept Teaching child behavior	The parent talked about using the device to teach or foster a desired outcome for their children.	"*my son right now is into like dinosaurs so … I find videos on Youtube and I show it to him… there's this one guy called Brave Wilderness and right now it's like a series he's going through dinosaur things and I've been showing him… names of dinosaurs [laughs].*
Disrupts Parent-Child Interactions	Disrupts parent-child interactions	Parents talks about how the device has disrupted interactions with their children.	"*I think it's a... how do I put it? we're not really engaging with our daughter the right way when we have our phones in front of us. Like when we're playing um... like play pretend, like it's not the same.*"

Child Behavior Management	Entertains child, Parent gets a break, Parent works from home, Parent does chores, Device to punish child, Device to reward child	Parents talks about using the device to manage some aspect of their child's behavior.	"*for the baby, when he's behaving bad… if we're out though! Not at home. Like if we are out and about…* Interviewer: Why more outside? Lorena: *Than inside the house? Cuz at home I could control him and outside he screams or people look at you and the first reaction is, oh here's my phone so you could be quiet.*"
	Using device to occupy child while parent works	Parent talks about using the device to entertain their child when they have to work from home.	*"but mostly when I'm at home and I gotta get my chores or homework done and he's not around, and I let her use my phone"*
	Device contributed to child's misbehavior	Parent talks about how the device contributed to their child's misbehavior in some way.	*"the thing is, we don't let him use it [tablet] as much because whenever we do take it away from him, he throws the biggest fit."*
Parental Psychological Positive Effects	Parent gets a break Parent entertainment Parent relax Parent de-stress Parent escapes boredom Parent feels validated	Parents talks about the positive ways mobile devices has contributed to their emotions and mental wellbeing.	"*it lets us know we're not alone in how we feel, as much as we don't wanna be frustrated or stressed out, it still happens, you know?"*
Parental Psychological Negative Effects	Guilt, Stress	Parents descriptions about the ways mobile devices had contributed to their negative emotions.	"*my worries are on the phone. You know, like tasks that you have to get done and stuff like that. You know, like events are coming up or your loads schedules or you know."*

Table 2.6. Similarities and differences in main themes by parent gender, income, language and education level in parents' beliefs about the role of mobile devices on their parenting experiences

Parent gender	Income	Language	Education	No differences
1) Low income fathers searched less topics about parenting online. 2) Mothers were more likely to access social support online. 3) Middle-high income mothers reported the most feelings of guilt associated with mobile device use.	1)Low income fathers searched less topics about parenting online. 2)Middle-high income mothers reported the most feelings of guilt associated with mobile device use.	1) Spanish-speaking parents with less than a middle school education did not use device to access parenting or child related information specifically about their young children. 2) Spanish-speaking parents did not seek online social support. 3) Bilingual parents used device to foster their children's Spanish language	1) Spanish-speaking parents with less than a middle school education did not use device to access parenting or child related information specifically about their young children. 2) Parents with a high school degree or more used more sources when searching for parenting or child-related information. 3) Parents with a high school degree or more felt empowered to use the information they found online to present it to their children's doctor. 4) Parents with a high school degree or more talked about the ways the device had disrupted interactions with their children. 5) More educated parents used devices to entertain their child while they worked or studied from home. 6) Parents with a high school degree or more reported feeling validated by access to online information. 7) Parents with a middle school education or more described ways in which mobile devices had negatively contributed to their emotions.	1)Used Device to access parenting or child-related information 2)Helpfulness of accessing online information on the device for new parents. 3)Family was the primary source of social support for all parents. 4)Parents experiencing unique situations sought additional social support from online parenting groups. 5)Enjoying the experience of co-using the mobile device with their children to bond. 6)Using the device to facilitate teaching. 7)Using device to entertain child 8)Parents used mobile device to reward and punish their children 9)Parents talked about ways devices had contributed to their child's misbehavior. 10)Parents thought mobile devices had positively contributed to their emotions.

Appendix 2.1

Parent and Child Demographics

1) Are you a:

Mother……1
Father……..2
Other…….…..3
Specify: _____

2) How many children do you have? _____

3) What are the ages and the gender of your child(ren)?

1) _____months/ yrs O BoyO Girl
2) _____months/yrs O BoyO Girl
3)_____months/_yrs O BoyO Girl
4) _____months/yrs O BoyO Girl
5) _____months/yrs O BoyO Girl
6) _____months/yrs O BoyO Girl
7) _____months/yrs O BoyO Girl
8) _____months/yrs O BoyO Girl

4) What is your age? ___ ___ years

5) What race/ethnicity do you identify with (check all that apply)?

Chicano/Latino……..1
Caucasian/White……..2
Asian/Asian-American …….3
Black/African-American……4
Native-American……5
Middle Eastern……6
Native Hawaiian or Pacific Islander..7
Other specify _____

6) In what country were you born? _____

7) How many years have you lived in the U.S.? _____

8) Including yourself, how many people live in your household? _____

Number of adults? _____
Number of children (under the age of 18)? _____

11) What language(s) do you speak? (Mark all that apply)

Spanish……1

English……..2
Other…….3
Specify_____

12) What language(s) is spoken the most in your household? (Mark all that apply)

Spanish…….1
English……..2
Other…….3
Specify:_____

13) What is your current marital status?

Married……1
Living as married/engaged…….2
In a relationship…….3
Single…….4
Divorced……..5
Widowed…….6
Other…….7
Specify:_____

14) What is your highest level of education?

Some elementary……1
Completed elementary……..2
Some middle school…….3
Completed middle school……4
Some high school……..5
Completed high school……..6
Some college……7
2 year certificate…….8
4 year degree …….9
Graduate/Master's.....…….10
Doctorate.....11

15) Which of the options below best describes your <u>total household</u> income for the last year?

Less than 20,000……1
$21 to $30K……2
$31 to $40K……3
$41 to $50K……4
$51 to $60K……...5
$61 to 70K……..6
$71 to 80K……..7
$81 to 90K……..8
$91 to 100K……9
$More than 100K……..10
I don't know……..11

Appendix 2.2

Semi-Structured Interview

Section 1:

1) As a parent, how has having a Smartphone and/or Tablet helped you? (That is, what do you think are the benefits of having a Smartphone or a Tablet as parent?).

- How is it different from

2) As a parent, how has having a smartphone or tablet NOT helpful or useful (i.e. disadvantages)?

3) Do you ever use a tablet or smartphone to get parenting tips or information about your child?
    - What kind of information did you get?
    - From what website?
    - How helpful was the information you got?
    - How is this different from getting this information like on your computer or inperson?

4) Do you have a Facebook/Instagram/Twitter/snapchat?

5) What do you typically use your Facebook for?

6) My mom used to babysit a baby, and I remember that her mom would always tell my mom how much parenting support she was obtaining from her relatives back in Mexico throughout the day because she had her phone with her. For example, when her baby was teething, she posted a question on Facebook about it and within a few minutes several of her relatives provided her with advice. Have you had any experiences similar to this where you obtain parenting/emotional support from relatives or friends online?
    - Was this support provided to you through Facebook?
    - What kind of support did you get?
    - How helpful was the advice you obtained?
    - How did you feel before and after you obtained this support?
    - What about in person?

7) I was looking around Facebook and saw a bunch of Facebook Parenting groups. My sister-in-law who is currently pregnant is a big fan of them. For example, she joined a group for pregnant women and she reads tips everyday about what to eat and what to expect during every phase of her pregnancy. Are you on any Facebook parenting group?
    - [**If they say YES**] What group(s)? What do you like and dislike about them?
    - [**If they say NO**] Why not?

- Do you communicate with other parents through social media to receive support or parenting tips? Can you give me an example?

8) Sometimes when I'm on Facebook, I run into random posts or articles like "The 7 things every parent should do to raise smart children!" and I catch myself clicking on it and reading it. Have you ever run into parenting information on Facebook or your other social networking site, even when you didn't look for it?

- What kind of information?
- Did you read it?
- Did you find it useful?
- How often would you say you run into information like that and actually read it?

9) Do you think smartphones or tablets could benefit your child's learning? What are things you think they could learn?

- If not at this age, at what age?
- Do you think smartphones and tablets can help your children learn another language?
- Do you think your children need to learn to use technology to be successful in life?
- What things is your child able to do with the phone?

10) Do you think [smartphone or tablet] can be bad for your child's learning? In what ways?

11) I babysit for a family with a 5 and a 2-year-old, and their parents often tell me to let both of them use their tablet for half an hour as a reward if they behave good. Have you ever used a smartphone or tablet when your child is behaving well or when they aren't?

- Have you ever had a situation where your children wasn't behaving well so you didn't let them play with the smartphone or tablet? Why did you use this strategy?
- I've heard from many parents that there are times when they really need to get something done, like chores, so they let their children use their smartphone or tablet to get entertained for a bit. Have you ever used your smartphone or tablet to distract your child or for similar reasons?
- Another common thing I hear is that sometimes when children are being really fuzzy or bored in trips, parents like to give them a phone or tablet. Have you had similar experiences?
- A parent of two children recently told me that one of their children is super calm and can stay focused for a long time and that the other always has a lot of energy and can't really stay still, so they're more likely to give their child with a lot of energy their phone. Have you had similar experiences?

- In your opinion, how is using smartphones and tablets to deal with your child's behavior different from using other toys like a doll or a car?
- Sometimes we are really tired at the end of a long day and we just want a bit of time for ourselves. There are times when I've gotten home really late and tired and I don't have the energy to play with my little sister so I just give her my phone and let her play. Have you ever had similar experiences?

12) Does your partner, parents, or someone else who might help you with the kids have rules or opinions about using technology like smartphones and tablets for your children?

- I've interviewed a few couples now, and it's not uncommon for one of the parents to be more strict about letting their children use technology than the other parent. Do you have a similar situation?
    - What are some ways in which you and your partner or other caregiver differ in your opinions about your children's use of technology?
    - What are some ways in which you and your partner or other caregiver agree in your opinions about your children's use of technology?
        - Have you and your partner always agreed or is this something you talked about?

13) Some parents have told me that they try to set rules for themselves; for example, not using their smartphones when they are eating. Do you have certain rules or limits for using technology like smartphones and tablets for YOURSELF?

- Are there specific times when you choose to or not to use your tablet or smartphone around your child(ren)? Why?
- Does your partner or anyone else who helps you care for your child have rules for her/himself around using smartphones and tablets?
- Some parents have said that using their phone or tablet helps them relax because they forget about their worries when they are using it. Have you ever had a similar situation?
- Do you let your children use the phone or tablet more when you go out than when you are at home? Why?
- What about you?
    - How do you use it? Or what do you typically do when outside and inside?

14) A few parents have told me that they let their children use the tablet or phones to look at videos or look at pictures of family members. Have your child(ren) ever used a phone or a tablet to do look at videos or pictures?

- Do they ever use the smartphone or tablet to play games or do other things? What kind of things?
- Do you download apps or games just for your children? What kind of apps or games?
    - [If they say YES and have multiple kids] can you tell me what kind of apps or games you have for each of your children?
- Do your children ever use a smartphone or tablet by themselves? Why or why not? What do they typically do?
    - [If they have multiple kids] *The little ones also know how to use the phone and tablet by themselves? What do they usually do?*
    -
- [If they have multiple kids] *Do your children ever use the tablet or smartphone together? What do they usually do?*
- [If they have multiple kids] *Do you have different rules for the things your children can do with the tablet or smartphones depending on their age? Can you explain?*

- Do you think there is a certain age when children should use technology like smartphones and tablets? What age would that be and why?
- [If they have multiple kids] Do your children teach each other how to use the smartphone and tablet? Who typically teaches who?
- Does your child like using smartphones and tablets with other people or kids?

15) As I mentioned before, some parents have told me that they like looking at pictures of family members on their phone with their children and talking about them or looking at YouTube videos together. Have you ever used a tablet or smartphone TOGETHER with your child(ren)? What do you typically do? Why?

- What do you like about using a smartphone or tablet together with your child?
- What do you think is difficult about using a smartphone or tablet together with your child?
  - [If they have multiple kids] *do you do different things with the older and younger children?*
  - Do you think you and your partner or anyone else who helps you care for your child use these devices differently with your child(ren)? In what ways?

16) A few of the parents I've talked to have mentioned that smartphones and tablets are becoming so advanced, that they fear they will someday not be able to help their kids use technology. Have you ever experienced similar feelings?

17) Do you ever worry that your child will know more about technology than you?

- What do you think are some of the advantages of children knowing how to use smartphones and tablets better than their parents?
- What do you think are some of the disadvantages of children knowing how to use smartphones and tablets better than their parents?

18) Do you set limits on how much time your child is using the smartphone or the tablet?

- What kind of limits (e.g. hours/minutes or activities) do you use?
- Are there specific times when you let your children use smartphones and tablets?
- Are there specific times when you do not let your children use smartphones and tablets?
- What about your partner or a caregiver who helps you care for him/her?

19) I've had some parents tell me that they use their phone to translate the directions of their children's homework assignments into Spanish so that they can help them. Have you ever used your smartphone or tablet to translate words or to understand something in another language?

20) Is there a specific place or person whom you get information about with regards to technology use for your child?

21) I would like to know from who or what has influenced the way you think about smartphones and tablets. For example, some parents have told me that their doctor has influenced the way they think about it, and others have attributed to the way they grew up. Do you think anything or anyone has influenced the way you think about these devices?

22) Has your child's pediatrician or doctor ever talked to you about healthy habits for using technology for young children or given you information about it? For example, have they ever made recommendations about at what age children should begin watching TV and using other devices like smartphones and tablets? And how much time they should spend using these devices?

23) Are there any specific things you wished you knew more about or that more information was provided to you with regards to technology use for you and your children?

24) Lastly, I've heard a few parents express that they feel guilty about letting their children play with their smartphones and tablets. Have you ever felt embarrassed or guilty about letting your children use smartphones and/or tablets?

Chapter 4: Study 3

Exploring Diverse Latino Mothers and Fathers' Beliefs About the Role of Mobile Devices in their Children's Learning

Across ethnic and socioeconomic groups in the United States, mobile screen technologies, such as smartphones and tablets, have permeated the everyday lives of most families with young children (Common Sense Media, 2017; Kabali, Irigoyen, Ninez-Davis, Budacki, Mohanty, Leister, & Bonner, 2015; Pew Research Center, 2017). As of 2017, 98% of families with children under the age of eight years own at least one smartphone and 78% own at least one tablet device (Common Sense Media, 2017). Moreover, recent reports have shown that young children are increasingly spending more time using mobile screen technologies (Common Sense Media, 2017; Kabali et al., 2015), especially children from low income homes and with less educated parents (Common Sense Media, 2017). For example, a survey done with predominantly low-income, African American parents of children under four years old revealed that 96% of children used a mobile device to play games and watch videos on a daily basis, with many of these children being as young as six months old (Kabali et al., 2015). These same patterns were also found in a recent national survey of US parents with children eight years old and younger (Rideout et al., 2017). The increase in the time that young children are spending viewing or using mobile screen technologies is of particular interest because past research on TV has linked longer duration of time spent in front of the screen with negative language outcomes, especially when the content is oriented towards the adult (Mendelsohn et al., 2010)

Despite the upward trend in young children's use of mobile screen technologies (Common Sense Media, 2017), however, very few studies have focused on understanding the factors that might be associated with children's use of mobile devices. Two highly important

factors identified by research on TV include maternal beliefs about the influence of screens on children's learning and parental socioeconomic status (SES) (Rideout, 2014; Certain & Kahn, 2002; Njoroge, Elenbaas, & Garrison, 2013). However, limited studies have explored parents' beliefs in the context of newer mobile screen technologies (Common Sense Media, 2017; McCloskey et al., 2018; Sergi, Gatewood, Elder, & Xu, 2017; Radesky et al., 2016; Wartella, Rideout, Lauricella, & Connell, 2014).

From the few studies that do exist, the vast majority have consisted of survey studies. While valuable, these studies have not allowed us to obtain an in-depth and complete understanding about how and why parents' might believe mobile screen technologies benefit or detract from their children's learning. Additionally, although a handful of these studies have included socioeconomically and ethnically diverse parents in their samples (Common Sense Media, 2017; McCloskey et al., 2018; Radesky et al., 2016; Wartella et al., 2014), the majority of ethnic minority parents have been disproportionately low-income, only a small portion of the entire sample, or the socioeconomic status of ethnic minority parents has not been stated (Common Sense Media, 2017; McCloskey et al., 2018; Rideout, 2014; Wartella et al., 2014). This has made it difficult to discern whether the SES or ethnic differences found in parent beliefs are associated to SES or ethnicity for the ethnic minority parents (Cabrera & the SRCD Ethnic and Racial Issues Committee, 2013). Thus, we have virtually no in-depth understanding about the role of SES on parents' beliefs about their young children's use of mobile screen technologies within ethnic minority parents.

A particular ethnic group who has been largely excluded from research on screen media are Latino parents, even though they are the largest ethnic minority in the U.S. (Pew Research Center, 2017), and are also among the ethnic groups who rely the most heavily on smartphones

for access to information (Pew Research Center, 2017). Further, within Latino parents, fathers and Spanish-speaking parents have been especially underrepresented in screen media research. Not including fathers in media research among Latinos is limiting because two out of three Latino children live in a two-parent household (Pew Research Center Social and Demographic Trends, 2015) and research has shown that fathers make unique and important contributions to their children's development (Cabrera, Fitzgerald, Bradley, & Roggman, 2007). Furthermore, it is important to include linguistically diverse Latino parents because research in various areas of parenting has shown that English- and Spanish-speaking parents sometimes differ in their ideas about parenting practices and child development (Keels, 2009). Therefore, to address some of the gaps in the literature, this study focused on obtaining a deeper understanding of socioeconomically and linguistically diverse Latino mothers and fathers' beliefs about the ways in which mobile screen technologies positively and/or negatively influenced their children's learning. Importantly, this study focused on parents with children ages 0-4 years old, because this is the age when screens (e.g., TV) have been found to have a large impact on children's developmental outcomes (Mendelsohn et al., 2010; Rice, Huston, Truglio, & Wright, 1990).

Parent Beliefs about the Role of Mobile Screen Technologies on Children's Learning

To date, research exploring parents' beliefs about the role of mobile screen technologies on learning is still limited. However, the bulk of the existing research has shown that most parents believe mobile screen technologies could both support and detract from their children's learning (Common Sense Media, 2017; McCloskey et al., 2018; Radesky et al., 2016; Sergi et al., 2017; Wartella et al., 2014). For example, a recent national survey conducted by Wartella and colleagues (2014) among a socioeconomically diverse sample of predominantly White (56%), Black (9%) and Latino (23%) parents of children eight years old and younger found that

37% of the parents believed mobile screen technologies had a positive effect on their children's math skills and creativity. However, 46% of these parents also believed that mobile devices negatively affected their children's attention span (Wartella et al., 2014). Similar results were found in a qualitative study among five highly educated, racially diverse parents of children ages 4-7 years old. Specifically, many of these parents thought that mobile screen technologies had helped their children improve their math and language skills (Sergi et al., 2017). Nevertheless, most parents also expressed concerns about their children's excessive use of mobile devices, the random pop-up advertisements, unlimited access to entertainment apps, and the possibility that their children would become socially isolated due to the device (Sergi et al., 2017). These concerns were also voiced by US parents in a recent national survey study (Common Sense Media, 2017).

Although only a handful of studies have made SES and ethnic comparisons of parents' beliefs about the role of mobile screen technologies on their children's learning, interesting differences have been found. For instance, through the use of semi-structured interviews among a majority of socioeconomically diverse White (57%) and Black (29%) mothers (74%) of children between the ages of 0 and 8 years old, Radesky and colleagues (2016) found that more low-income parents than middle-to-high income parents reported feeling good about exposing their children to mobile screen devices, because they believed it would give their child an advantage later on in life. Similarly, a national survey study done among a socioeconomically diverse sample of Latino (43%), Black (18%) and White (39%) parents of children ages 2-10 years old found that low-income parents tended to attribute more educational benefits to mobile devices than middle-to-high income parents (Rideout, 2014). Within this study, the author also

found that Latino and African American parents were more likely than White parents to consider mobile screen devices to be an important source of learning for their children (Rideout, 2014).

In contrast to the aforementioned findings, a more recent national survey among a socioeconomically diverse sample of primarily White (56%), Latino (22%), and Black (10%) parents of children eight years old and younger found that Latino parents tended to express more concerns about the effects of mobile screen technologies on their children than White and Black parents (Common Sense Media, 2017). Moreover, Latino parents were actually more likely than parents from other ethnic groups to agree with the statement that the less time children spent with media the better (Common Sense Media, 2017). These latter findings align with those found in a recent survey study among a low-income sample of primarily Latino (78%) parents of children in Head Start Centers (age 4 years) (McCloskey et al., 2018). Findings from this study showed that Latino parents were less likely than parents from other ethnic groups to say that their children used mobile screen technologies to learn. In sum, it is unclear whether Latino parents hold more positive, negative, or neutral views about the role of mobile screen technologies on their children's learning. Moreover, we have almost no in-depth understanding on how SES and language might influence the beliefs of Latino mothers, and especially fathers, of young children because most studies have consisted of surveys. Therefore, the aim of this study was to understand how a sample (n = 40) of socioeconomically and linguistically diverse Latino mothers and fathers of children four years old and younger believe mobile screen technologies support and/or hinder their children's learning through the use of semi-structured interviews.

Method

Participants

To explore how parents conceptualize the role of mobile devices in their young children's learning, the same sample of mothers and fathers described in the last chapter were used. To recap, a total of 40 Latino mothers (n = 20) and fathers (n = 20), distributed equally across low income (n = 20) and middle-to-high income (n = 20) groups, were interviewed. These parents had an education attainment that ranged from elementary school to a doctorate. Please refer to Tables 2.1-2.4 from Chapter 4 for more details.

Procedures

Parents were interviewed in Spanish and English using a semi-structured, in-depth interview procedure with open-ended questions that were created for this study (See Appendix 2.2). Parents were asked questions about 1) how they felt mobile devices and social media supported and/or hindered their parenting experiences, 2) their beliefs and attitudes about the ways in which mobile devices have supported and/or hindered their children's learning. It is important to note that we did not define the term "children's learning" for parents because we did not want to impose our definition on them. Instead, we used the vague term "children's learning" and let them describe what they viewed as learning for their children, 3) the types of device limits they set for their children, and 4) their children's typical uses of mobile devices.

Analytic Strategy

Coding of the interviews focused explicitly on the ways in which parents described how mobile devices have supported and/or hindered their conceptualizations of "children's learning." Thus, we coded for this construct when we specifically asked them questions about their children's learning or when they mentioned "learning" at any other time during the interview.

The transcribed interviews were coded in their original language both inductively and deductively using a combination of Descriptive (i.e., summarize the main idea in a word or phrase) and Process (i.e., captures action) codes (Miles & Huberman, 1994; Saldaña, 2003; Wolcott, 1994) using MAXQDA qualitative software. The deductive codes were derived from the limited but existing literature exploring parents' beliefs about the role of mobile devices on their children's learning. The same multi-cycle coding and trustworthiness assessments were done (Bryman & Burgess, 1994; Morse, 1991; Thorne, 2000) as described in the previous chapter. A 2:1 ratio was used to determine whether there were differences in themes depending on income, parent gender, and language. Please see Table 3.1 for the specific coding scheme used to code parents' beliefs about the ways mobile screen devices had supported and/or hindered their children's learning.

Results

Descriptive analyses indicated that the majority of parents across income and gender had access to the Internet and also owned about the same number of mobile screen technologies (see Table 3.2). Specifically, households across income (M = 2.95 low, M = 2.53 middle-to-high income, $p$ns) and gender (M = 2.68 mothers, M = 2.79 fathers, $p$ns) groups had access to two smartphones per household on average. Similarly, no differences were found in the average number of tablets owned per household across income (M = 0.95 low, M = 1.10 middle-high income, $p$ns) or gender (M = 0.95 mothers, M = 1.10 fathers, $p$ns) groups. Unexpectedly, a slightly higher percentage of target children (ages 0-4) from low-income households (37%) owned a personal tablet device than children from middle-to-high income households (16%). Additionally, most households across income (70% low, 80% middle-to-high income) and

gender (70% mothers, 80% fathers) groups had access to both home Wi-Fi and data through their smartphones (Income: 85% low, 95% middle-high; Parent gender: 95% mothers, 85% fathers).

In exploring parents' beliefs about the influence of mobile screen technologies on their children's learning, four themes emerged that centered around their beliefs about the ways these devices benefitted their children's learning (i.e. learning concepts, learning language) and what specific activities their child should do on the device that contributed to learning (i.e. viewing videos, using apps). Furthermore, three themes also emerged that revolved around parents' beliefs about the ways mobile screen devices could hinder their children's learning (i.e. lack of social interactions, dependence, and accessing inappropriate content). However, in addition to the specific benefits and hindrances parents associated with mobile screen technologies, one major theme emerged across parents from all groups that centered on how parents regulated children's use, which we refer to as *mediation practices*. This included such sub-themes as ensuring the content and/or game used was appropriate for the child, the amount of time that was permitted for the child to use the device, constantly monitoring their children while they used the device to ensure they did not deviate into inappropriate content, and co-using the device with their children to scaffold their learning. That is, across income, gender, and linguistic groups, most parents believed that mobile screen technologies could both support and hinder children's learning depending on the types of mediation practices parents implemented. Hence, parental mediation practices, as a theme, focused on parents' opinions about the specific types of mediation practices (each practice as a sub-theme) they believed contributed to mobile devices being beneficial or detrimental towards children's learning. Table 3.3. shows how themes are distributed by parent gender, income, language, and education.

Benefits of Mobile Screen Technologies on Children's Learning

Virtually all parents (n = 39) believed that mobile screen technologies could benefit some aspect of their children's learning. Although we left the term "children's learning" vague during our questioning, parents generally described learning from a device as learning some type of concept (e.g., colors, numbers, shapes, animals, letters) and/or language skill (e.g., learn to speak, learn English/Spanish). Additionally, although the majority of parents thought children learned from viewing videos on the device, a little less than half of the sample also thought young children could learn from apps. The next few sections describe these themes in more detail.

Learning Concepts. In total, 67% of parents across income (n = 16 low, n = 11 middle-to-high income), gender (n = 14 mothers, n = 16 fathers), linguistic groups (n = 6 Spanish-speaking, n = 21 English-speaking: 20 = Bilingual, 1 = monolingual), and education levels (elementary school to Ph.D.) thought their children could learn concepts through the use of a mobile screen device. For example, Esperanza, a low-income mother with an elementary school education, described the concepts (i.e., numbers and colors) her child had learned, "*ella si aprendio... que los numeros, los colores, porque en veces la* oía. *Decia, blue, yellow, red decia. Y una vez le dijo mi niño, dice a la chiquita, ya te sabes unos colores en Ingles? Y yo me quede asi, le digo porque? Dice, porque blue es azul, dice y yellow es amarillo. Y por eso en veces le presto el telefono.*" [English translation: "*She did learn… the numbers, the colors, because sometimes I would hear her. She would say, blue, yellow, red. And once, my other child said, he told the little one, you already know your colors in English? And I stayed like this, and I asked, why? He said, because azul is blue, he said amarillo is yellow. And that's why I sometimes let her borrow the phone.*"

Learning Language Skills. In addition to learning concepts, 87% of parents across income (n = 17 low, n = 18 middle-high income), gender (n = 15 mothers, n = 20 fathers), linguistic groups (n = 6 Spanish-speaking, n = 29 English-speaking: 28 = Bilingual, 1 = monolingual), and education levels (elementary school to Ph.D.) also thought children could learn language skills from mobile screen devices. As Karina, a low-income mother with a high school degree explained, "*Yeah it has [benefitted child]. She learned how to speak English from there. Cuz I wasn't speaking English to her at all, so she's learning and now she speaks English and Spanish to me. She says the colors in English and Spanish to me.*"

Viewing Videos to Learn. Most parents (77%) said their children could learn concepts and/or language skills by viewing videos on the device, and virtually no differences existed by income (n = 16 low, n = 15 middle-high income), gender (n = 15 mothers, n = 16 fathers), linguistic groups (n = 5 Spanish-speaking, n = 26 English-speaking: 25 = Bilingual, 1 = monolingual), or education level (elementary school to Ph.D.). Additionally, many parents of children ages 3 months to 4 years thought their children's learning could benefit from videos on the device. For example, Cindy, a middle-to-high income mother with a Master's degree, said, "*They could learn a new language. Um... one of the things I want her to do is I want her to learn English and Spanish, so like I talk to her in Spanish and I try to put like, when I have the phone, nursery rhymes in Spanish… So I go on Youtube and that's mainly how I've used it. I would say I use it every day*." Table 3.4 contains a list of the specific type of videos parents across income and parent gender groups said their children viewed.

Using Apps to Learn. Almost half of parents (40%) thought their children could learn concepts and/or language skills from using apps. These parents were distributed across income (n = 5 low, n = 5 middle-high), parent gender (n = 6 mothers, n = 10 fathers), linguistic groups (n =

3 Spanish-speaking, n = 13 English-speaking: 12 = Bilingual, 1 = monolingual) and education levels (elementary school to Ph.D.). For example, Ricardo, a middle-high income father with a PhD, expressed his opinion on whether mobile screen technologies could benefit his children's learning, "*I think definitely with um…there's a lot of good apps that um… teach kids um…how to recognize letters, you know? And how to sound out words with the letters. Um…I think there's a lot of good educational apps for kids*." Furthermore, while neither of the two couples who had infants thought their children could learn from apps at that age, many parents of children ages 1.5 - 4 years thought their children could learn from using apps. Table 3.5 contains a list of the specific type of apps parents across income and parent gender groups said their children viewed.

Detriments of Mobile Screen Technologies on Children's Learning

In addition to thinking that mobile screen technologies could benefit children's learning, almost all parents (92%) also thought that these devices could be detrimental for children's learning. However, parents' descriptions of "learning" when discussing detriments associated with mobile screen technologies encompassed such things as lack of social interactions for the child, children's dependence on or addiction to the device, and encountering inappropriate content. Although all of the aforementioned concerns were mentioned, some arose more frequently than others, and one concern was more prevalent among middle-to-high income parents than low-income parents. The next few sections will discuss the themes related to hindrances in greater detail.

Lack of Social Interactions. In total, 35% of parents expressed concerns about the detriments that mobile screen technologies could have on their children's social interactions. For example, Yaritza, a middle-high income mothers with a Master's degree, said, "*I still feel like, yes the technology and everything is great in her age but I feel like it does... it can interfere with*

it in terms of social interactions or them wanting to go out and be social and wanting them to go out and play." Noticeably however, slightly more middle-to-high income parents (n = 5 mothers, n = 5 fathers) than low-income parents (n = 2 mothers, n = 2 fathers) expressed concerns about the negative effects mobile screen technologies could have on their children. Furthermore, none of the Spanish-speaking parents expressed this concern, but the only two out of the six Spanish-speaking parents with a high school degree or more had a 1-month-old infant, and might not have experience with this issue yet. However, it might also suggest differences by language. Overall however, it appears that education of a high school degree or higher was associated with worrying about mobile screen technologies interfering with children's social interactions.

Dependence/Addiction on the Device. A large percentage of parents (45%) also worried about the possibility of their children becoming dependent on, or addicted to, the mobile device. For instance, Yvonne, a low-income mother who completed some college, described, "*when he wants to go to sleep, he will just grab my phone and demand that I put something for him. That's the downside. It's… I don't want him to like get addicted to it. And I don't know he just sees it as, as something that he has to be on all the time now*." This concern was spread across income (n = 7 low, n = 11 middle-high income) and gender (n = 9 mothers, n = 9 fathers) groups, but not linguistic groups. That is, none of the six monolingual Spanish-speaking parents expressed the concern of their child becoming dependent or addicted to the mobile device. This suggests that this concern might be more prevalent among parents with a high school degree or more than parents with lower levels of education or could reflect access to information about technology dependence differences based on language.

Accessing Inappropriate Content. In addition to expressing concerns about children's lack of social interactions and dependence on the device, a little over a quarter of the parents

(30%) also talked about being concerned that their child would come across inappropriate content while using the device. This concern was dispersed across income (n = 6 low, n = 6 middle-high income), gender (n = 6 mothers, n = 6), linguistic groups (n = 2 Spanish-speaking, n = 10 English-speaking: 9 = Bilingual, 1 = monolingual), and education levels (middle school to Master's degree). For example, Gerardo, a low-income father who completed a two-year certificate, captured the anxiety of many parents, "*like advertisements or there's this one program. I don't know if it's still there anymore. I know there was a lot of complaints from parents, cuz I saw it on the news as well, that it was on some show where it's like Spider Man and um… the thing… Anna from Frozen and um… they did some things that are not like meant for children*." Most of the parents who expressed concerns about their children coming across inappropriate content stressed that they monitored their children's use of a device. However, these parents felt that they had little control over the random ads that suddenly appeared when their child was viewing a video, or that their children would click on a random video while they turned their attention away. It should be noted that a few of the parents who had at least a high school degree (n = 6) had content restrictions on the device and five of these parents did not express having this concern.

Importance of Parental Mediation Practices

Although most parents believed that mobile screen devices benefited and hindered their children's learning, the vast majority of parents (85%) across income (n = 17 low, n = 17 middle-to-high income), gender (n = 18 mothers, n = 16 fathers), linguistic groups (n = 6 Spanish-speaking, n = 28 English-speaking: 27 = Bilingual, 1 = monolingual), and education levels (elementary school to Ph.D.) also discussed their important role, as parents, in determining the extent to which mobile screen technologies could benefit and/or hinder their child's learning. As

Luis, a middle-high income father with a Master's degree explained, "*It's gotta be a, it's gotta be hand in hand with um... what the parent is doing.*" Parents' descriptions of mediation strategies included the importance of appropriate content or apps, setting time limits, monitoring children's activities with the device, and assisting or helping the child understand the content when they used the device (i.e. active mediation). However, although all of the aforementioned mediation strategies were cited, some were mentioned more frequently than others.

Quality Considerations of Content of Video or App. Across income (n = 12 low, n = 15 middle-high income), gender (n = 14 mothers, n = 13 fathers), linguistic groups (n = 5 Spanish-speaking, n = 22 English-speaking: 21 = Bilingual, 1 = monolingual), and education levels (elementary school to Ph.D.) most parents talked about the importance of ensuring children were viewing "educational" content in videos and/or apps (67%). When prompted, most parents described "educational" content as videos or apps that taught children specific concepts, such as numbers, colors, shapes, or language, such as letter sounds or Spanish/English. For instance, Carlos, a middle-high income father with a Master's degree, described it as, "*I think, because of the... specific content, so like I said there's nursery rhymes on there, there's this... there's these vid... I don't know, to me they're weird but, like... a lot of what he watches is educational. So... they'll have like all the marvel characters, all these super heroes and... and then, the super heroes are like... sometimes they teach him how to count, or they teach them about colors.*"

Setting Time Limits. The second most frequently mentioned mediation strategy by parents across income (n = 8 low, n = 8 middle-high income), gender (n = 9 mothers, n = 7 fathers), linguistic groups (n = 5 Spanish-speaking, n = 11 English-speaking: 10 = Bilingual, 1 = monolingual), and education levels (elementary school to PhD) was setting time limits for

children when they used mobile screen technologies (40%). Parents saw setting time limits as a way to maximize the benefits of the device on their children's learning while minimizing its detriments. For example, Chayo, a low-income mother with an elementary school education, gave the following response when asked if she thought mobile devices could benefit her children's learning "*Creo que… les ayudaría un poco pero no tanto. Creo que cierta…media hora… um… pero no demasiado tiempo. Si les serviría un poco.*" [English translation: "*I think that…it would help them a little bit but not a lot. I think that certain…half an hour…um… but not too much time. It would help them a little bit*"].

Parental Monitoring. The third type of mediation strategy that was mentioned by 22% of parents across groups was parental monitoring of their children's use of mobile devices. Parental monitoring was often described as the importance of continually checking or knowing what children were doing on the mobile device without necessarily talking about co-using the device with children. For this category, slightly more low-income parents (education level: elementary school to bachelor's degree) (n = 6) than middle-to-high income parents (n = 3) talked about the importance of parental monitoring. Additionally, parental monitoring was mentioned by Spanish- and English-speaking parents (n = 1 Spanish-speaking, n = 8 English-speaking: 7 = Bilingual, 1 = monolingual). Olga, a low-income mother with a high school degree, illustrates the importance of monitoring what her 2-year-old child is doing in her response to the question about mobile screen technologies being bad for children's learning, "*Mm…no si tu estas al pendiente de, de lo que el esta mirando*." [English translation: "*Mm…not if you are on the lookout of, of what he is watching*"].

Co-Use. Finally, the fifth type of mediation strategy that was also only mentioned by a fifth of parents (20%) stressed the importance of co-using the mobile device with the child in

order to assist them or to help them understand the content they were viewing or playing. Although fewer parents mentioned this mediation strategy as being important in determining whether children learned or did not learn from mobile devices, the parents who did mention it were distributed more or less equally across income (n = 4 low, n = 5 middle-high income), gender (n = 5 mothers, n = 4 fathers), and linguistic groups (n = 2 Spanish-speaking, n = 7 English-speaking: 6 = Bilingual, 1 = monolingual). In contrast with patterns from previous mediation strategies, however, only parents with a high school degree or more discussed the importance of co-use for learning. For example, Luis, a middle-high income father with a Master's degree talked about an experience when his son asked him a question about the show he was viewing on his tablet, "*so my son is learning about the brain, so because I know that he's watching the Magic School Bus, I'll say, yes son. You go in through the nose and did you see that they went and they got, and they learned about the brain's connections, and that the brain has all these connections, right? And that the brain has all these capacities, right? So he is learning, right? But that learning is not happening if I'm not closing those gaps, right?*"

Combination of Mediation Strategies. In addition to most parents talking about the importance of using some form of mediation strategy to ensure children benefitted from mobile screen technologies, slightly more than half of the parents (52%) also believed that it was important to use multiple types of these mediation strategies. Notably, these parents were spread across income (n = 9 low, n = 12 middle-high income), gender (n = 12 mothers, n = 9 fathers), and linguistic groups (n = 4 Spanish-speaking, n = 17 English-speaking: 16 = Bilingual, 1 = monolingual), as well as education levels (elementary school to Ph.D.). Nevertheless, it should be noted that more middle-to-high income mothers (n = 8) thought it was important to use a combination of mediation strategies than middle-to-high income fathers (n = 4) and low-income

parents (n = 4 mothers, n = 5 fathers). In the following excerpt, Jennifer, a mother who has completed some college, talked about the importance of using several types of mediation strategies (i.e. appropriate content, time limits) with her daughter, "*it just depends how the parents um... how long they let their child use it and what they're doing with it.*"

In sum, most parents (85%) across income, gender, linguistic groups, and education levels viewed parental mediation strategies as the key factor in determining whether mobile screen technologies benefitted or hindered their children's learning.

Discussion

This study investigated diverse Latino parents' beliefs and attitudes about the ways mobile screen technologies supported and/or hindered their young children's learning and development (ages 0-4). For the most part, our findings showed that parents across socioeconomic, parent gender, linguistic groups, and education levels thought that they, as parents, played a key role in determining the extent to which mobile screen technologies supported and/or hindered their children's learning and only minor differences were noted across groups.

In general, parents thought that by using mediation strategies, such as ensuring their children viewed appropriate content, setting time limits for their children's use of devices, and continuously monitoring their children while they used a device, parents could ensure that their children primarily benefitted from using mobile devices. Although research exploring parental mediation strategies in the context of mobile screen technologies is still limited, the forms of mediation practices parents in our study described engaging in are consistent with those found in the limited amount of research on mobile screen technologies (Beyens & Beullens, 2017; Neuman, 2015), and those found in the extensive research on TV, which have been primarily

conducted among a majority of middle-class, White parents (Collier et al., 2016; Nathanson, 2001; Nathanson, 1999; Piotrowski, 2017; Warren, 2003). Furthermore, finding that diverse Latino parents are cognizant of the important role they play in mediating their children's use of mobile screen devices is particularly encouraging because extensive research in the context of TV has found that the types of mediation strategies parents engage in are related to children's learning (Livingstone, Mascheroni, Dreier, Chaudron, & Lagae, 2015; Nathanson, 1999). Specifically, viewing age-appropriate and educational content has been associated with children's letter recognition, numeric skills, vocabulary, behavior, and cognitive scores (Linebarger & Walker, 2005; Manganello & Yurdakok, 2002; Tomopoulos et al., 2010).

However, despite finding that most mediation strategies were spread across groups, we did note two differences. First, almost a quarter of the parents with a high school degree or more also underscored the importance of actively co-using the device with their children to ensure their child knew how to use the device and also understood the content. Second, more educationally diverse, low-income parents than middle-high income parents mentioned the importance of continuously monitoring their children's use of devices so that they did not come across inappropriate content. These findings are consistent with the mediation literature on TV, which finds that middle-high income parents are more likely to endorse active co-use of the screen than low income parents (Warren, 2005), and that low income parents are more likely to endorse restrictive forms of mediation than middle-high income parents (Warren, 2005). These differences are meaningful because past research on TV has shown that viewing appropriate content and active co-use of devices are two of the most effective mediation strategies in ensuring that children learn from screen. Specifically, co-viewing TV and co-using mobile screen devices have been consistently found to be effective mediation strategies in promoting

child learning, especially among young children (Herodotou, 2017; Sheehan, Pila, Lauricella, Wartella, 2019; Walker, 2005; Zack & Barr, 2016). This is because parents can use this time to help their child better navigate the device and/or understand the concepts they are viewing or reading through the use of relevant and appropriate scaffolds, such as explaining or elaborating in a way the child can understand (Neumann & Neumann, 2017; Zack & Barr, 2016). In fact, research among toddlers has shown that children can transfer learning from screen devices to real life when their parents engage in high quality interactions while co-using the device together (Zack & Barr, 2016).

Nevertheless, because we found that it was primarily the parents with a high school education or higher who described purposefully engaging in the strategy of actively co-using the device to ensure their children learned, efforts might need to be made to reach parents with lower levels of education and provide them with information about the benefits of actively co-using mobile devices with their children (Zack & Barr, 2010). In providing this information, researchers should also stress the importance of actively co-using the device (i.e. engaging with the child while they use the device) as opposed to just passively co-using it (i.e. just sitting next to the child but not engaging in discussions or conversations).

In addition to expressing the importance of implementing mediation strategies, all parents in our sample believed that mobile devices could benefit their children by helping them learn concepts or develop their language skills. The lack of differences in this belief between low-income and middle-high income parents is in contrast with most of the existing literature, which finds that low-income parents are more likely than middle-high income parents to attribute learning benefits to mobile screen technologies (Rideout, 2014). Furthermore, when asked about the ways mobile screen technologies negatively affected their children's learning, a large portion

of parents across income, education levels, gender, and language groups talked about the risk of coming across inappropriate content. Interestingly, none of the parents in our sample talked about purchasing apps or subscriptions to reduce the pop-up ads their children were exposed to while viewing Youtube videos or using apps. Furthermore, only six parents, with a high school degree or more, mentioned having restrictions on the device to control the content to which their children were exposed. This suggests that diverse families, particularly parents with low levels of education, might benefit from receiving additional information about the benefits of purchasing apps (less ads) and on setting content restrictions on mobile devices for their children. However, parents with fewer financial means might not be able to purchase apps or purchase subscriptions to reduce the amount of ads their child sees. Thus, more efforts should be made towards making apps and videos targeted towards young children ad-free.

Parents also talked about the negative effect mobile devices could have on their children's social interactions and also about the danger of becoming dependent on the device. Although these concerns are similar to the views expressed by parents in survey studies and the few interview studies on mobile screen technologies (Common Sense Media, 2017; McCloskey et al., 2018; Sergi, Gatewood, Elder, & Xu, 2017; Radesky et al., 2016; Wartella, Rideout, Lauricella, & Connell, 2014). It is important to note that parents conceptualized social interactions and dependency on the device as part of their children's learning. This finding is not surprising, given that previous research has found Latino parents to perceive cognitive and social skills as equally valuable skills that are part of their children's education (Okagaki & Sternberg, 1993; Ryan, Casa, Kelley-Vance, & Ryalls, 2010). Thus, it is it likely that parents in our sample also view social skills as part of their children's education.

Despite parents expressing a few concerns about the influence of mobile devices on their children's learning, we found that they also felt like they had some control through the use of mediation practices. This is promising because future media studies could focus on building on parents' existing views about mediation practices and suggest more ways of coping with the detriments associated with mobile screen technologies. In other words, parents are already aware that they play a vital role in determining whether mobile screen technologies have a positive or negative effect on their children's learning. Therefore, interventions could capitalize on this notion and focus on increasing parents' knowledge about effective mediation strategies, particularly co-use of mobile devices.

Limitation

There are a few limitations worth mentioning. First, although we obtained an equal number of monolingual Spanish-speaking mothers (n = 3) and fathers (n = 3), the sample was too small relative to the sample of English-speaking parents (n = 36). Hence, we might not have been able to capture the same range of experiences for Spanish-speaking parents as we did for English-speaking parents. Furthermore, the majority of the Spanish-speaking parents (n = 4) also had the lowest levels of formal education in the sample. Hence, because language and SES were confounded for the small sample of Spanish-speaking parents, it was difficult to discern whether some of the findings were attributable to their language, which is often used as a proxy for acculturation (Cabrera, West, Shannon, & Brooks-Gunn, 2006) or their education level. Moreover, the only monolingual Spanish-speaking mother with a bachelor's degree in the sample had a low income and was also a first-time mother to a 1-month-old child. Therefore, we were not able to compare her experiences to the English-speaking mothers, because the only English-speaking mother with a child close to her child's age (i.e. 3 months) was of middle-to-

high income, all other mothers with her level of education had older children. Future studies should place more efforts towards obtaining a more socioeconomically diverse sample of Spanish-speaking parents.

Secondly, a large portion of the low-income fathers (40%) and mothers (60%) in our sample were born in Mexico and Peru compared to the majority of middle-to-high income mothers (90%) and fathers (90%) who were born in the U.S. Given that research in other topics about parenting beliefs has found that foreign-born Latina mothers sometimes conceptualize parenting topics differently from US-born, Latina mothers (Zepeda & Espinosa, 1988), it is possible that we did not fully capture the experiences of low-income, US-born Latina mothers. Nevertheless, most of our findings appeared to be driven by education level and gender upon closer inspection.

Furthermore, our sample was unexpectedly primarily composed of parents who were married or living with their partner. Hence, our findings might not generalize to single parents. Future studies should purposefully sample more single parents. Additionally, the majority of our parents happened to have sons. Thus, it is possible that patterns might be different for parents of daughters. Future studies should aim to obtain a more equitable number of parents to boys and girls. It is also important to mention that we only examined parent beliefs about the role of mobile devices on their children's learning and not actual practices. Therefore, it is possible that beliefs do not describe actual practices for some parents. This underscores the need for future work to examine whether parents' beliefs about their role as parents in mediating their children's experiences with mobile devices are related to their actual mediating practices.

Lastly, although all parents were asked the same questions that answered the main research question of this study, the interview was iterative, and conversations evolved overtime.

As part of that, we included a few additional questions or prompts to later interviews (e.g., can you describe what happens when you and your child co-use the device?). Nevertheless, not many new questions were added after the first five interviews, and these parents had sometimes covered the questions, which is why they were added to the protocol. Moreover, the first five parents that were interviewed were mothers (n = 3) and fathers (n = 2) who were also low-income (n = 3) and/or middle-to-high income mothers and fathers (n = 2). Hence, no one specific group of parents was disproportionately disadvantaged with fewer questions.

Conclusion

This study addressed an important gap in the literature by investigating how socioeconomically and linguistically diverse Latino mothers and fathers believed mobile screen technologies benefit and/or hinder their children's learning. Our findings suggest that mothers and fathers with diverse levels of education and linguistic abilities are well aware of the important role they play in mediating their children's use of mobile devices to benefit their learning and protect against potential harms. These findings should inform future work that seeks to promote optimal media habits among diverse Latino families.

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Table 3.1. Coding scheme for the examination of parent beliefs about the role of mobile devices on their children's learning

Themes	Codes	Description	Example
Benefits: Learning concepts	Colors, Shapes, Animals, Letters, Numbers,	Specific concepts parents mentioned their children learned from using mobile devices.	"*She did learn… the numbers, the colors, because sometimes I would hear her. She would say, blue, yellow, red. And once, my other child said, he told the little one, you already know your colors in English? And I stayed like this, and I asked, why? He said, because azul is blue, he said amarillo is yellow. And that's why I sometimes let her borrow the phone.*"
Benefits: Learning Language	Learn to speak Learn English Learn Spanish	Specific language skills parents mentioned their children learned or could develop from using mobile screen devices.	"*Yeah it has [benefitted child]. She learned how to speak English from there. Cuz I wasn't speaking English to her at all, so she's learning and now she speaks English and Spanish to me. She says the colors in English and Spanish to me.*"
Benefits: Viewing Videos	Youtube videos Programs Cartoons	Parents described that children learned by viewing videos, and often specificed the type of video.	"*They could learn a new language. Um… one of the things I want her to do is I want her to learn English and Spanish, so like I talk to her in Spanish and I try to put like, when I have the phone, nursery rhymes in Spanish… So I go on Youtube and that's mainly how I've used it. I would say I use it every day.*"
Benefits: Using Apps	Games, Apps	Parents described that children learned by using or playing with apps.	"*I think definitely with um…there's a lot of good apps that um… teach kids um…how to recognize letters, you know? And how to sound out words with the letters. Um…I think there's a lot of good educational apps for kids.*"
Hindrance: Lack of Social Interactions	Lack of social interactions, Child not interested in playing with other children	Parents expressed concern about the negative effect mobile devices could have on their children's social interactions.	*I still feel like, yes the technology and everything is great in her age but I feel like it does… it can interfere with it in terms of social interactions or them wanting to go out and be social and wanting them to go out and play.*"
Hindrance: Dependence	Child dependence, Child addiction	Parents talked about their concern for children becoming addicted or too dependent on mobile devices	"*when he wants to go to sleep, he will just grab my phone and demand that I put something for him. That's the downside. It's… I don't want him to like get addicted to it. And I don't know he just sees it as, as something that he has to be on all the time now.*"
Hindrance: Accessing Inappropriate Content	Bad content, Adult content,	Parents described the negative role running into inappropriate content would have on their children's learning.	"*like advertisements or there's this one program. I don't know if it's still there anymore. I know there was a lot of complaints from parents, cuz I saw it on the news as well, that it was on some show where it's like Spider Man and um… the thing… Anna from Frozen and um… they did some things that are not like meant for children.*"
Parental Mediation Practices	Content, Time limits, Constant monitoring, Co-use	Parents specified the specific strategies they used and thought were important to ensure that their child learned from devices and also helped minimize the negative influence of devices on children's learning.	"*so my son is learning about the brain, so because I know that he's watching the Magic School Bus, I'll say, yes son. You go in through the nose and did you see that they went and they got, and they learned about the brain's connections, and that the brain has all these connections, right? And that the brain has all these capacities, right? So he is learning, right? But that learning is not happening if I'm not closing those gaps, right?*"

Table 3.2. Ownership of mobile screen devices for low income and middle-high income mothers and fathers

	Low-Income				Middle-High Income				
	Mothers (n = 9)		Fathers (n = 10)		Mothers (n = 10)		Fathers (n = 9)		Statistic
	M (*SD*)	Range	*M* (*SD*)	Range	*M* (*SD*)	Range	*M* (*SD*)	Range	
Number of smartphones in household	2.77 (1.56)	1-5	3.10 (2.08)	1-8	2.60 (1.71)	1-7	2.44 (1.01)	1-4	$F = .28$, pns
Number of tablets in household	0.66 (0.70)	0-2	1.20 (0.92)	0-2	1.20 (0.79)	0-3	1.00 (0.50)	0-2	$F = 1.05$, pns
Number of eReaders in household	0.11 (0.33)	0-1	0.00 (0.00)	0-0	0.40 (0.70)	0-2	0.55 (0.88)	0-2	$F = 1.82$, pns
	%		%		%		%		
Target Child(ren) owns a tablet	33		20		10		22		$X^2=3.23$, pns
Household has access to Wifi	60		80		80		80		$X^2=1.60$, pns
Parent has access to a data plan	90		90		100		90		$X^2=2.22$, pns

* Two parents did not fill out media questionnaire survey. But we do know about their access to Internet and wifi on their device from the screening process.

Table 3.3. Similarities and differences in main themes by parent gender, income, language and education level in parents' beliefs about the role of mobile devices on their children's learning

Parent gender	Income	Language	Education	No differences
	1) More low-income parents talked about the importance of using the mediation strategy of constantly monitoring their children while they used a mobile device.	1)None of the Spanish-speaking parents expressed concerns about the negative role of mobile devices on their children's social interactions. 2)None of the Spanish-speaking parents expressed concerns about their child becoming dependent on the device.	1) Only parents with a high school degree or higher expressed concerns about the negative effect of mobile devices on their children's social interactions. 2) Only parents with a high school degree or more talked about the importance of using the mediation strategy of co-using the device with their children.	1)Parents across groups thought their children could learn concepts from using mobile devices (e.g., numbers, shapes). 2)Parents across groups thought their children could learn or develop their language skills (e.g., learn English). 3)Parents across groups thought children could learn concepts and language skills by viewing videos. 4) Parents across groups thought their children could learn concepts and develop language skills by using apps. 5) Parents across groups said that inappropriate content could be detrimental for their children's learning. 6)Parents across groups stressed the importance of implementing mediation strategies to ensure mobile devices benefitted their children's learning, and also to minimize the negative effects of technology on their children's learning. 7) Parents across groups talked about the importance of using the mediation strategy of ensuring their children viewed quality content on the device. 8) Parents across groups talked about the importance of using the mediation strategy of setting time limits for their children's use of devices.

Table 3.4 Specific videos parents said their children viewed.

Content of Videos	Low-Income Mothers	Low-Income Fathers	Middle-High Income Mothers	Middle-High Income Fathers	Totals
Cartoons	4	3	2	2	11
Teen Titans		1			1
The Magic School Bus				1	1
Sesame Street/Elmo	1		1	2	4
Colors			1		1
Numbers			1	1	2
Shapes			1	1	2
Spanish songs/lullabies	3	1	3	1	8
ABCs			2	1	3
Animals	1	1		1	3
Potty-training			1		1
Fitness	1				1
Children's toy reviews		1		3	4
Making slime	1				1
Playing with playdough	1		1	1	3
Other children playing			2		2
Family videos	3	2	3	3	11
Lullabies	3		4	5	12
Netflix	1	1			2
Total	29	10	21	20	

Table 3.5 Specific apps parents said their children used.

App Type/Name for the Child	Low-Income Mothers	Low-Income Fathers	Middle-High Income Mothers	Middle-High Income Fathers	Totals
Patterns					
Puzzles	1	1	1		3
Maps			1		1
Coloring			2		2
Colors		2	1		3
Animals		2		1	3
Words			1		1
ABC or ABC Mouse	1	1	4	2	8
Spanish		1	1		2
Art	1	1	1		3
Sketching			1		1
Music		1	1	2	4
Numbers	1	1	2	1	5
Shapes		2	1	1	4
Entertainment game (e.g., cars)	2	1	1	3	6
Unsure		1			1
Total	6	14	18	10	

Chapter 5: Discussion

Mobile screen technologies are widespread among diverse families with young children (Common Sense Media, 2017). However, limited research has explored the positive and negative influence these devices might be having on family life, such as the quality of parent-child interactions, parents' daily parenting experiences, and children's learning. To address these gaps in the literature, Study 1 of this dissertation examined the influence of mobile screen technologies on the quality of parent-child interactions in public settings using a systematic, binary coding scheme. Furthermore, using a semi-structured interview among a sample of socioeconomically and linguistically diverse Latino mothers and fathers of young children (ages 0-4), Study 2 explored parents' beliefs about the ways mobile screen technologies had supported and/or hindered their parenting experiences, and Study 3 investigated parents' beliefs about the ways mobile screen technologies had supported and/or hindered their children's learning.

Summary of Key Findings

Study 1

In study 1, we examined how the use of smartphones and tablets by parents and their young children (estimated ages 0-4 years) was associated with the quality of their interactions in diverse public settings (i.e. parks, fast food restaurants) that ranged from low-income to middle-high-income neighborhoods. A binary coding scheme was used to systematically code for parent and child behaviors in 10-20 second time intervals for a maximum of five minutes. Specifically, researchers systematically coded whether behaviors associated with high quality interactions (i.e. joint attention, caregiver initiates interaction, caregiver responsiveness to the child, caregiver and child talk, caregiver and child positive emotions) were present or absent when the caregiver and child used or did not use a mobile device. Our findings showed that caregivers' use of a mobile

device was negatively associated with most of the caregiver behaviors associated with high quality interactions. However, caregivers' device use was not significantly associated with children talking or displaying positive emotions. Instead, caregivers' expression of positive emotions and caregiver talk were significantly associated with children talking and displaying positive emotions. Furthermore, when caregivers used a mobile device, looking at the screen was associated with higher quality behaviors from the caregiver than swiping or texting for most of the components of quality interaction. However, once again, children's display of positive emotions and talk were associated with other variables, such as caregivers displaying positive emotions and context. Additionally, dyads in settings surrounded by lower income neighborhoods were more likely to engage in higher quality interactions than dyads in settings surrounded by higher income neighborhoods. Finally, a higher proportion of device use among caregivers and their children was associated with a lower proportion of most of the key components of high quality interactions, such as joint attention, caregiver responsiveness, caregiver talk, and caregiver expression of positive emotions, but not children talking or displaying positive emotions. As previously mentioned, caregivers' displays of positive emotions and context were associated with children talking and displaying positive emotions. These findings suggest that though caregiver mobile device use influences the behavior of the caregiver, the caregiver's behavior and context influences children's behavior in public settings. Thus, it might be important to raise awareness among caregivers about the influence their own device use and behavior might be having on the quality of their interactions with their children and on their children's behavior. Furthermore, future studies should continue to examine whether the way the device is used matters for the quality of interactions, and the factors that might be differentially associated with the quality of interactions.

Study 2

Using a semi-structured interview procedure, we investigated the beliefs of a socioeconomically and linguistically diverse, sample of Latina mothers and Latino fathers of young children. Specifically, we investigated their beliefs about the ways mobile screen technologies had supported and/or hindered their parenting experiences thus far. Findings indicated that parents had positive and negative views about the role of these devices on their parenting experiences. On the one hand, parents believed that these devices offered them the benefits of finding information, accessing social support, facilitating teaching, and encouraging parent-child bonding. On the other hand, half of the parents also thought that these devices detracted from their parenting experiences by disrupting their interactions with their children. Interestingly, parents described that these devices had both aided them in managing their children's behavior (e.g., serving as a distraction or reward when needed) but were also the instrument that contributed to the child's misbehavior (e.g., tantrums for not being allowed to use the device). Additionally, while mobile devices contributed to parents' positive emotions (e.g., de-stress, validation), they also contributed to their negative emotions (e.g., guilt). Moreover, these findings indicated that diverse Latino parents share many of the same views, and the majority of differences were primarily driven by education. These findings are meaningful because they highlight the utility of mobile devices for diverse Latino parents, while also shedding some light on the areas that specific groups of parents within Latinos might need additional support in to minimize some of the hindrances associated with these devices. Future studies could use these findings to tailor media guidelines for diverse families. Moreover, these findings provide insights as to the ways parents are already using these devices and can be used to develop recommendations that enhance parenting experiences.

Study 3

Using the same sample as in Study 2, Study 3 explored parents' beliefs about the ways mobile screen technologies had supported and/or hindered their children's learning. Findings showed that parents conceptualized learning in the context of mobile screen technologies as a mixture of both learning (e.g., learning the colors) and development (e.g., language development). Furthermore, across demographic groups, parents were cognizant of their important role as parents, in mediating their children's use of mobile devices and thus ensuring that their children reaped the benefits of using them while minimizing the risks they perceived were associated with mobile devices. Specifically, parents across groups thought that it was important for them to set limits for their children's use of devices, ensure their children viewed appropriate content, co-used the device with their child, and consistently monitored their children's use of these devices. By engaging in these mediation strategies, parents thought that their children could learn important academic concepts (e.g., math) and also develop their language skills (e.g., English or Spanish). Despite their efforts in mediating their children's use of mobile devices, most parents still expressed concerns, such as the effects mobile devices would have on their children's social interactions (e.g., displace them) and on their children potential dependency on the device. These findings align well with the extensive research on TV, which find that most parents also express some of the same concerns about their children's viewing of TV and apply similar mediation strategies to regulate their children's consumption of it (Collier et al., 2016; Nathanson, 2001; Nathanson, 1999; Piotrowski, 2017; Warren, 2003). These findings are optimistic because they show that diverse parents are aware of the potential negative and positive influences that mobile devices might have on their children's learning and development. Moreover, the majority of these parents believed that they should take an active

role in ensuring that their children primarily benefit from these devices by implementing mediation strategies that researchers have recommended on the use of TV and more recently mobile devices (Livingstone, Mascheroni, Dreier, Chaudron, & Lagae, 2015; Nathanson, 1999; Radesky et al., 2016). Future studies should examine whether parental beliefs about mediation strategies parallel actual mediating practices.

Contributions

Together, these three studies indicate that there are both benefits and detriments to using mobile screen technologies for diverse families with young children. That is, while the disproportionate majority of observational studies done in public settings show that mobile devices are more detrimental than beneficial on the quality of caregiver-child interactions, our findings underscore that there is more to the story than what we can simply see. For instance, Latino parents are benefitting from these technologies in a range of ways, from gaining access to resources online (e.g., parenting advice about activities to engage with their child, facilitating medical diagnoses) to finding additional social support from friends, families, and others with shared parenting experiences when needed. Additionally, parents report devices easing their stress (e.g., viewing online videos to de-stress) and burden of parenting at times (e.g., distracting a child when things need to be done) and enhancing their children's learning (e.g., Spanish videos). However, these benefits are not evident in observational or experimental studies. Hence, because parents are using mobile devices to access social support, take breaks, de-stress, access parenting advice, and bond with their children, the psychological benefits that come from these behaviors might enhance the overall quality of parent-child interactions, even if temporarily diminished while the device is being used. For instance, extensive research has shown that less stressed parents are more likely to engage in higher quality interactions with their children than

more stressed parents (Muller-Nix, Forcada-Guex, Pierrehumbert, Jaunin, Borghini, & Anserment, 2004). Additionally, having access to social support increases the wellbeing of parents and children (Oakley, 1992). In sum, families might be reaping a range of benefits from mobile screen technologies that we are not yet immediately capturing with our typical methods and the types of questions we ask on surveys. Our findings also suggest that how and why parents use mobile devices matter when investigating the negative and positive influence these devices are having on parent-child interactions, parenting experiences, and parents' beliefs about their influence on their children's learning. Hence, future studies should explore the specific ways families are using mobile devices and how these might be differentially related to positive and negative outcomes.

It is also important to note that parents report taking an active role in their children's media environment and are not just passively allowing them to use these devices. Instead, almost all parents are aware about the importance of mediating their children's use of mobile devices to maximize the potential benefits and minimize its detriments. The parental mediation strategies that were described to be important are similar to those that have been found in the context of TV and include: 1) restrictive mediation, with the majority of parents only allowing their children to view or play with appropriate content, and setting time limits that ranged from 30 minutes to two hours per day, or prohibiting mobile device use during specific times (e.g., mealtimes), and 3) co-use with scaffolded support (Collier et al., 2016; Nathanson, 2001; Nathanson, 1999; Piotrowski, 2017; Strouse, Newland, & Mourlam, 2019; Warren, 2003). These strategies have been shown to enhance the benefits of screens on children's learning and development while also minimizing the risks in the context of TV (Strouse et al., 2013). It is likely these patterns apply to mobile devices as well.

As professional groups, such as the American Academy of Pediatrics, establish recommendations for use (Council on Communications and Media, 2016), they should consider how these devices are used as supports for parenting and children's learning among diverse families, as well as the concerns parents have about their influence on children's development and their own parenting. By acknowledging and building on the beliefs and experiences parents have with mobile screen technologies, more sensitive and effective recommendations could be developed. This would likely increase families' receptivity to media guidelines. Findings such as these could be used in future research to design parenting interventions that can be targeted towards diverse Latino families. Moreover, because there were more commonalities than differences across language, gender, and income, such interventions could be relatively universal. However, additional supports might be needed for Latino families with very low levels of education, who might have additional challenges in accessing trustworthy information and maximizing the benefits of mobile screen technologies.

Future Studies

These findings are promising because they suggest that although mobile device use might be associated with lower quality interactions in public settings, most Latino families are taking advantage of many of the features (e.g., instant access to social media, educational activities) offered by mobile screen technologies to enhance their parenting and children's learning. Future studies should try and replicate our findings by surveying a larger sample of parents to determine how prevalent the themes we found are among a larger and more diverse sample of parents. Furthermore, although we found that parents have positive and negative views about the influence of mobile screen technologies on their parenting experiences and children's learning, it would also be worthwhile to examine whether beliefs are aligned with parent and child

outcomes. For example, studies could investigate the association between accessing information and social support online and parents' feelings of self-efficacy and stress. Further, qualitative and quantitative studies could also examine the quality of parent-child interactions when parents and children are viewing or playing a game they both enjoy on the device, because the quality of interactions and ways families use mobile screen technologies might be different inside and outside the home.

Given that we also found parents describe engaging in diverse mediation strategies to regulate their children's use of mobile screen technologies, future studies should assess the extent to which they use these strategies on a daily basis and whether engaging in mediation strategies is associated with children's learning in the context of mobile screen technologies. Finally, media research should put more efforts towards recruiting socioeconomically and linguistically diverse, ethnic minority parents to more accurately represent media use among this population. Currently, most of the narrative on media use among Latino families centers around parents' fears of devices and their children's under- or over- use of mobile devices compared to White families. Based on these findings, it is evident that while Latino families still express concerns about mobile device use, as most White families do too, the majority of them are also using them in ways that enhance their parenting experiences and children's learning. Capturing both sides of the coin is the key to ensuring that we develop appropriate guidelines that capitalize on their existing strengths to further enhance their experiences and children's learning.

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