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**Parents' use of mobile computing devices,
caregiving, and the social and emotional
development of children: A systematic review and
exploratory study of expert opinion.**

Dr Nicola Jane Beamish

**Jean Hailes Research Unit and School of Public Health & Preventive Medicine,
Monash University, Melbourne, Australia**

Bachelor of Medical Science, Bachelor of Medicine, Bachelor of Surgery, Fellow of the Royal Australian and New Zealand College of Psychiatrists, Certificate in Child Adolescent Psychiatry, Graduate Diploma in Family Therapy, Advanced Training in Infant and Parent Mental Health.

Abstract

Background

Mobile computing device use is a rapidly growing, socially acceptable interactional habit. There is considerable interest in—and some concern about—how mobile device use is interacting with social aspects of families with older children; however, little is known about parents' use of mobile computing devices while with their infants and young children. The aims of this research were to establish what is known about parents' mobile device use, and to identify potential harms or benefits of this use to parental caregiving, the parent–infant relationship, and the social and emotional development of young children.

Methods

Two studies using separate methods, were conducted. Study One was a systematic review of the available evidence. Seven medical and social sciences databases were searched using keywords and subject headings for mobile computing devices, parents, and young children. PRISMA guidelines were used to identify, screen, establish eligibility, and synthesise evidence. Scientific and reporting quality were assessed using a standard checklist. Study Two used a qualitative method, semi-structured interviews with experts in the field of infant mental health, early childhood, or in the interface between human behaviour and information technology. Interviews were audio-recorded and transcribed, and the data were analysed thematically.

Results

In Study One, the systematic review, 5298 non-duplicate citations were identified, and 11 studies met inclusion criteria. The review revealed a small but emerging body of research of diverse methodological type and quality. The limited evidence relating to young children suggested an association between parents' increased mobile device use and behavioural problems in children, that parents' attention to devices may be affecting the quality of the caregiving relationship, and that device use may interrupt parents during child-focused activities. There was some evidence that parents' use of mobile devices while engaged in caregiving activities was not frequent or prolonged, however, during use, awareness of a child's activities and parenting responses were compromised.

In Study Two, 17 participants from diverse disciplinary backgrounds participated in interviews and focus groups. It was found that parents' use of mobile devices while with their infants was widespread and device use was central to family life. The major themes identified were: the benefits and disadvantages for parental caregiving with parents' use of devices for managing day-to-day life, self-soothing and social connection; the interaction between parents' device use and attention and distraction; aspects of conversations between parents and infant, including potential changes in attention, gaze, responsivity, conversations, body language as well as modelling of socially defined behaviours; psychosocial, mental health, and unique infant and parent factors. Sub-themes were: potentially harmful doses of parents' screen use; and infants' capacity to compete, especially if vulnerable infants. There were divergent opinions related to the risk for infants and infant-parent relationships. Participants used well-developed theories of infant psychology and attachment literature to consider the mechanisms of effects.

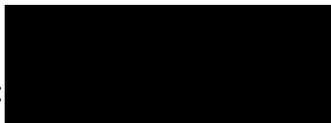
Conclusion

Potential mechanisms by which parents' mobile device use may interact with parental caregiving and young children were developed by combining the findings of this research with two significant bodies of established theory—online-mediated relationships and infant psychology. The evidence to date suggests that perturbations and other changes in the quality of the relationship may be associated with alterations in moment-to-moment interactions between parent and child. The developmental stage and needs of a young child and the extent and timing of parents' mobile device use may alter these interactions. Given the rapidly changing technology and use, this evidence suggests that further observational and experimental research into its potential effects on parent-infant relationships is needed.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signature:



Dr Nicola Beamish

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CHAPTER 1

Smartphones, caregiving and young children



I observe a familiar scene one afternoon as I cross the road outside my place of work, a tiny snapshot of a family's life as they wait for a bus: a mother, father, and baby sit together. They have been shopping, bags hang off the pram. The toddler is in the pram facing out towards the road. The mother and father are sitting behind the pram out of the young child's gaze.

But something is new to this scene of a family waiting together: like many people in recent years, as they wait, both parents are on their phones: heads down, gaze to the phone, still faces, thumbs moving rapidly. Their attention does not seem to be on the space around them or face-to-face with each other, but on their devices. The toddler is still, staring out, a toy held loosely in his hand. I feel sad for the infant but I am not sure why. I wonder that he does not seem to need anything from his parents, but they also seem so unavailable. I recall thinking, if he had called out for them, would they have turned their attention to him? Then, as I walk on, they are out of my sight and I am left wondering, never to find out what happens next.

The scene turns over in my mind as I try to work out how I feel about this and other situations I observe, of parents using devices while with their children. I consider life before mobile devices and whether the scene would have been any different. I wonder about an infant's experience in the world when 'heads are down' looking at screens, whether screens are the same or different to other distractions that have always taken parents' attention

away from children. I begin to reflect on how screen use is increasingly prevalent in an ever-widening context—how, in the context of this change in social rules of device use, screens have become an acceptable part of even clinical consultations. I recall how this first seemed to happen with teenagers’ use of a device as distraction from boredom as parents talk, or as a strategy to avoid or calm down when faced with an inquiring clinician, or to share something with me from their online world. I wonder about how this next generation of parents will use their devices as they raise children. I go online to explore others’ opinions. I find lots of interest and some confusion about whether our current habits of mobile device use are helpful or harmful, important or unimportant to family life and young children.

This thesis originated from these questions. It endeavours to explore and understand mobile device use as a ubiquitous part of our world but in the context of parental caregiving and considering an infant or young child’s experience. During this process, I have been challenged to re-examine the ideas that led to my emotional response to the bus stop scene, and to think in detail about the matter beyond this response.

As with many other technological advances, mobile technology has resulted in a rapid change in habits across much of the population. The availability of easy to access, relatively cheap, portable multifunctional handheld or mobile devices has driven widespread and rapid uptake. It has also resulted in the rapid growth of the use of mobile devices as an acceptable part of social interactions, managing day-to-day life and the home/work interface. Widespread use has preceded an understanding of the advantages and hazards for society. Anecdotally, there is considerable interest in—and some concern about—how use is affecting social interactions in families of older children. However, little is known

about parents' use of mobile computing devices while with their infants and young children and how it may interact with caregiving as well as the experiences of young children.

1.1 The history of screen use

Over the past 10-15 years, the use of mobile devices such as smartphones and tablets has moved rapidly from an emerging cutting-edge technology, to ubiquitous day-to-day use by most people across the world (Smith 2011, 2013, 2015). Rapid changes in technology have driven behavioural change, opening up the potential for people to access information, relationships, and experiences mediated not by face-to-face interactions, but via mobile devices (Turkle 2011a, 2011b).

This is not a new phenomenon. Ever since the first printed words, attention and thought has been directed to other things beyond the reach of a person's immediate surroundings (Gergen 2002). Gergen (2002) described the state of being physically present but psychologically absent and named it "absent presence". Prior to the twenty-first century, people may have been absent psychologically, but were together in shared content, as many technological developments promoted shared use, such as radio, film, and later television. Recently this has changed with the development of mobile devices, especially small screen personal devices such as smartphones. Personalised use has been encouraged by the size, on the person use, and by device hardware and software design (Turkle 2011a; Page 2013).

Access to technology to fill leisure time is also not new. In the 1950s and 1960s, concern was raised about the educational, behavioural and social effects of up to two hours a day of television watching, including by very young children (Comstock et al. 1978; Wartella, Richert, & Robb 2010; Jennings & Wartella 2013). Watching television has been a primary

form of leisure since then, taking up two-thirds of leisure time (Australian Bureau of Statistics 1995).

Viewing time on television peaked at about two and a half hours a day in the 1980s to 1990s (Australian Bureau of Statistics 1995; Shields & Tremblay 2008). Since then, time spent in front of the television has plateaued and then fallen as internet use—first on desktop computers and now on mobile devices—has replaced television viewing time. A conservative estimate is that the average North American adult's leisure time device use has now reached four to five hours per day (Nielsen Company 2009), with young adults preferring personal device use to television (Newman, Levy, & Nielsen 2015). Some studies find that children (8-18 years old) are spending up to seven hours leisure time a day on screens, and nearly 12 hours when allowing for use of more than one screen at a time (Rideout, Foehr, & Roberts 2010). A North American media consumption survey in 2009, found a 350% increase in media consumption during out-of-work hours over the past 30 years, with more than 90% of media consumption being taken up by online content (Bohn & Short 2009).

As with many technological developments, consideration of the benefits and risks of the emerging technology follows, rather than precedes, widespread use in society. Over a 50-year period, research into television viewing and its association with poor social and health outcomes has been investigated (Comstock et al. 1978). There has been particular interest in investigating outcomes for children and adolescents (Kirkorian, Wartella, & Anderson 2008; Wartella, Richert, & Robb 2010; Jennings & Wartella 2013).

There has been experimental and observational research investigating the benefits, especially for older children, in assisting learning and modelling pro-social behaviour (Bar-on

2000; Wartella, Richert, & Robb 2010; Fisch 2014). However, the American Academy of Pediatrics has published more than 25 policy statements and research papers since 1984 about television viewing, and more recently about using other screens, including smartphones. These document their concerns about behavioural, mental health, and other developmental consequences on the basis of experimental and observational studies and expert opinions. These include concerns such as associations between television viewing and increasing rates of early substance use and sexual activity, exposure to sexualised content, obesity, poor body image, and decreased school performance (Bar-on et al. 2001; Kirkorian, Wartella, & Anderson 2008; Wartella, Richert, & Robb 2010).

Some of the effects on children and adolescents have been proposed to relate directly to exposure to screen time (Tomopoulos et al. 2010), or to inappropriate content (Strasburger 2010; Strasburger, Jordan, & Donnerstein 2010), while other mechanisms proposed relate to the displacement of other activities, such as conversations in families (Christakis et al. 2009), shared reading or playing time (Tomopoulos et al. 2007), or to quality of parenting or parenting styles (Kirkorian et al. 2009; Jago et al. 2013). Whether the effects are indirect and relate to time in front of television or relate to confounding or compounding factors, such as lower socioeconomic status and exposure to less optimal childhood environments, is not clear (Tomopoulos et al. 2010).

The concerns have been especially evident for young children. In the zero to two-year-old age group, expert consensus from the American Academy of Pediatrics has advised in many policy documents and research papers that viewing should be limited to very brief periods due to the concern about the negative effects on development, social function, and learning (Brown 2011).

By 1998, 40% of U.S. (Kraut et al. 1998) and 44% of Australian households (Australian Bureau of Statistics 2009) owned a personal computer. Access to the internet followed. The internet is defined as “a global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocols” (Stevenson 2010). The proportion of Australian households with internet access has grown from 24% in 1996 to 44% in 1998, and 74% by 2007. Access continues to grow (Australian Bureau of Statistics 2009).

Gergen (2002) described this as the beginning of the “progressive privatization” of technology. Gergen proposed that this privatisation was accompanied by a move from the “monologic technologies” (p. 229) of television, radio, and video that do not allow a conversation between the technology and the user, to a dialogic state where there is an active interaction with the interface—a capacity to respond to communication and alter the direction of the interaction, and to access other relationships.

As well as the progressive privatisation of use, Fortunati (2002) and Turkle (2011a, c) examine how the pathway of technological development prepares users to accept, and even prioritise, connection to “things” rather than people. Fortunati described “acclimatisation” to the effects of technologically mediated interactions, which interrupt those that occur face-to-face. She described first how television viewing caused a shift of attention away from uninterrupted “natural communication”, to family members accepting that a mobile phone may interrupt their communication (Fortunati 2002 p.519). This then progressed to a replacement of face-to-face conversations by screen-mediated interactions.

Turkle noted the progression from accepting to embracing a connection to a robotic toy or a simulated online persona, even with the knowledge that that persona was not alive or real.

She argued that as this begins not to matter to people, we become ready to utilise virtual worlds, embracing alternative virtual lives and other selves, but without consideration of what it may “disrupt or diminish” (Turkle 2011a, p. 280).

1.2 Mobile computing devices

Mobile computing devices are defined as “portable computers capable of wireless networking” (Forman & Zahorjan 1994) and thus include mobile phones, smartphones, and tablets with touch screens, as all have internet access, and typing and computing capabilities. It has been the combination of mobile computing and telephony within smartphones that has revolutionised the use of mobile devices (Freihold, Lippert, & Ericson 2011) and rapidly changed patterns of use (Smith 2015). This change has been supported by changing hardware as well as greater internet access.

Prior to the late 1990s, mobile phones were used to make phone calls (Page 2013). But this is now relatively less common, with data use and communication by text messaging accounting for most use (Page 2013; Smith 2013; Groupe Speciale Mobile Association Intelligence 2014; Smith 2015). The affordability of mobile computing devices—combined with increasing functionality of smartphones, broader access to wireless networks and cost-effective data download—has allowed mobile technology to penetrate all continents of the world, including low- and middle-income countries (Groupe Speciale Mobile Association Intelligence 2014). In low-income countries, mobile devices have bypassed desktop computing, becoming the primary information technology interface (Aker & Mbiti 2010; Bilbao-Osorio, Dutta, & Lanvin 2014; Groupe Speciale Mobile Association Intelligence 2014).

In a survey of 2188 participants by the Pew Research Centre in 2015, 75% of all North America’s surveyed owned a smartphone. Young people in the survey had higher

smartphone ownership (85%) (Smith 2015). This was an increase of nearly 20% from 2013 (Smith 2013). In 2014, the Groupe Speciale Mobile Association estimated that just under half the world's population (3.6 billion) had a subscription to a mobile service and found a ten-fold increase in broadband connections from 2008 to 2013 (Groupe Speciale Mobile Association Intelligence 2014). While this agency predicts that growth will slow, broadband connections are expected to double by 2020.

In the last five years, desktop and fixed place technology have been replaced by more mobile technology, and new technological advances have pushed the emergence of wearable and embedded technology. Wearable technology is defined as a style of interface between human and machine which is seamless and allows "head up, wearable displays" (Starner 2001, p. 44). It is hands free, can run continuously, even when not active, and can sense the user's context or physiology. It extends to embedded implants which will allow a "man- machine system" in which "human brains and computing machines will be coupled together very tightly and the resulting partnership will think as no human brain has ever thought and process data in a way not approached by the information handling machines we know today" in which technology augments human function (Starner 2001, p. 45).

1.2.1 Current knowledge base regarding mobile device use in society.

The use of mobile computing devices is growing due to a combination of technological advances, consumer demand and marketing (Groupe Speciale Mobile Association Intelligence 2014, Page 2013) and has mostly occurred without consideration of the effects of device use on users (Turkle 2015; Aiken 2016). Since the relatively recent arrival of commonly used mobile devices, there has been rapid change in the acceptability of their day-to-day use and social norms of use (Smith 2015). As is often the case with emerging

technologies, this has occurred most rapidly among young people (Australian Bureau of Statistics 2011; Smith 2015).

There is emerging research about mobile device use, some related to children and parents. Studies that initially examined the effects of children's own television use now consider screens throughout households, and increasingly recognise handheld and mobile devices (Rideout, Foehr, & Roberts 2010). Observational studies have now begun to investigate the associations between children's use of multiple screens, including mobile devices, and the negative impacts this may have on learning, attention, sleep, exercise, obesity, and other health indicators (Kirkorian, Wartella, & Anderson 2008; Hoyos Cillero & Jago 2010; Jolin & Weller 2011; Lemola et al. 2015). As well, these studies have considered excessive screen use in young people (Greenfeld & Sutker 1999); how screen use might affect relationships with friends and parents in either positive or negative ways (Moreno & Gannon 2013; Subrahmanyam & Greenfield 2008; Ribak 2009); and parental mediation of children and adolescents' use of screens (Osit 2008; Jago et al. 2013; Liebeskind et al. 2014; Lauricella et al. 2016). This research, which considers broad societal effects related to the complex interaction between mobile devices, personal use and relationships, has important insights into the benefits as well as disruptions of device use. As new emerging technologies of wearable and embedded devices have societal uptake, it can be expected that research will again lag behind. At present, experimental studies regarding wearable technology relate only to monitoring and tracking physical activity related to weight loss and fitness, and have not included children or young people (Coughlin & Stewart 2016).

1.2.1i Benefits of mobile device use

The use of mobile technology to connect people and manage day-to-day life has many positive aspects. Research suggests that both the marketing and use of mobile phones is directed towards recreational use that allows social connection (Forman & Zahorjan 1994; Przybylski & Weinstein 2013; Smith 2015). The versatility of these devices allows people to use smartphones in a wide array of situations (Hiniker & Kientz 2015) and on a day-to-day basis for recreation, work, and establishing and maintaining relationships (Smith 2015). Devices can play a role in managing people's lives, accessing information and relationships, and assisting people to regulate difficult emotions or situations (McDaniel, Coyne, & Holmes 2012; Hiniker & Kientz 2015; Aiken 2016).

Mobile applications are also being explored as a way to deliver a wide range of health and wellbeing interventions to individuals and communities, especially hard-to-reach communities. Programs include pregnancy (Labrique et al. 2011) and parenting interventions, vaccination reminders, targeted care programs (Bigelow, Carta, & Lefever 2008; Gazmararian et al. 2012; Ashelby & Bahl 2013; Haga et al. 2013; Abogunrin & Martin 2013) and mental health interventions (Donker et al. 2013). Mental health interventions have focused on psycho-education, symptom tracking and treatment.

1.2.1ii Disruption of mobile device use

However, over the last ten years particularly, there has been more consideration of the detrimental aspects of people's attachment and attention to devices.

Multitasking and split attention

Turkle's qualitative research (Turkle 2011a) with individuals and small groups in the university computer science community in the 1990s took a snapshot of young people's

excitement as they embraced internet-connected computers small enough to wear. She described students strapping small computing devices to their bodies to allow them mobile access to the internet, and the excitement that surrounded the opportunity this offered students to increase productivity and memory by helping the human brain. A capacity for multitasking and for split attention was seen to be a new adaptive trait that the next generation would develop to assist them in maximising these gains. However, those who tried the technology tired of it quickly. She noted that they described becoming distracted. They found it interrupted not just interaction with others, but also affected their sense of self as the interface with the device demanded their attention, interrupted face-to-face communication and appeared to make the users feel isolated from others.

Other research in the 2000s confirmed Turkle's concerns regarding these potential negative associations on attention, memory, and social interactions. Researchers from many fields began to investigate the effects on cognitive function that could be caused by the multitasking and split attention required by communication technologies. In a paper on the effects of smartphones on cognition, Misra et al. (2016) summarised the findings of more than 30 studies using both experimental and observational methods. Negative effects were found across multiple and broad domains of function from working memory; distractedness; and information acquisition and retention; to judgment; understanding; and an ability to think deeply, critically, and to be imaginative. The effects of multitasking were found to be least when participants in studies were able to practise multitasking, and when performing familiar and automatic activities that required less cognitive effort. The effects were greatest when testing cognitive function that required more attention and were less automatic. Interestingly, research that compared distraction by phones to other forms of

distraction found that mobile phones were associated with far worse outcomes in simulated driving tests and pedestrian behaviour, suggesting that the use of mobile devices requires a high level of cognitive effort, and their use can affect even routine tasks. Mobile phone users were also far more likely to show “inattentive blindness” (Simons 2000), a term used to describe failure to notice something that is salient but unexpected.

Psychological dependence and addiction

There has been consideration in the literature of the features of mobile devices, especially smartphones, that suggest that there is a potential for psychological dependence (Drouin, Kaiser, & Miller 2012; Aiken 2016). This relates to both the type and meaning of use as well as the features of phones.

People carry their mobile devices with them, often at all times, and even when the devices are not in use (Aiken 2016; Misra et al. 2016). They check them regularly, even while in others’ company, and even if this negatively impacts on others (Geser 2004; Misra et al. 2016). They can imagine a ring or alert when it is not there (Drouin, Kaiser, & Miller 2012; Misra et al. 2016). As well, people can feel significant separation anxiety when they are without their device or if they do not receive a notification, text message or call (Aiken 2016).

Researchers have noted the role that smartphones play in people’s sense of self and their connection to others. A smartphone can be seen as symbolic evidence of relational ties (Gergen 2002; Przybylski & Weinstein 2013; Misra et al. 2016). Thus, a phone’s physical absence or silence can be seen as symbolic of separation, being forgotten or dismissed.

Mobile devices have become personal hardware. Mobile devices are carried with the owner most of the time, checked regularly and used often. Both the exterior and functionality of a phone is personalised.

The combination of people's familiarity with connection to a technological device and the capacity for this personalisation has resulted in some commentators seeing the mobile phones as an extension of the self (Fortunati 2002; Srivastava 2005; Palen & Hughes 2007; Turkle 2011a, 2015; Aiken 2016).

Some research describes addictive use of mobile devices, with seeing or hearing the device (or applications on the device) triggering a need to use and feelings of withdrawal if not able to use; of some users feeling out of control, with negative consequences for work and relationships (Billieux 2012; McNicol & Thorsteinsson 2017; van Koningsbruggen et al. 2017). Some authors suggest that mobile devices, like other behavioural habits such as shopping or eating, can release endogenous hormones into the brain's reward centre pathways that resemble those generated by the chemical highs of drug addiction, or the financial reward of gambling (Aiken 2016; Ko et al. 2013). The American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders V* has recently included internet gaming disorders as a condition warranting further study (American Psychiatric Association 2013).

Other social and cultural effects

Fortunati (2002) explores the broader sociocultural changes associated with mobile device users' connection to time and space when moving through the real world while accessing a virtual one. She argues that people can remain connected to relationships of their choosing, and increase productivity with mobile device use in transitional and often increasingly

crowded real-world public spaces. However, this comes at a personal cost, as well as a cost to the meaning and use of public spaces, which are “kept in the background of an itinerant cellular intimacy” (Fortunati 2002, p. 516). She argues that what people stand to lose is what living face-to-face and in a “real space” without technologically mediated interactions means.

Other social and cultural implications of mobile device use have also been considered. The concept of “absent presence”—being physically present but psychologically absent (Gergen 2002)—has already been introduced. Gergen argues there has been a progression towards societal tolerance and acceptance of this state of being, but not without negative consequences. Bystanders to another’s mobile device use are noted to be perturbed by the user’s “absence”, both in laboratory and naturalistic settings (Gergen 2002; Turkle 2011a; Przybylski & Weinstein 2013; Misra & Genevieve 2013; McDaniel & Coyne 2016a; Misra et al. 2016). Turkle describes children and partners feeling alone, “put on hold”, and alienated (Turkle 2011a). Given the universal “quick fix” that connection via devices which are “always on and always on us” can allow, Turkle considers the natural sequela for children and partners when feeling rejected may well be to retreat into their own screen use. This can create a cycle of “expecting less from each other” and turning to screens for comfort and connection (Turkle 2011a).

There has also been consideration of how “absent presence” may impact on transactional patterns in interactions. In a qualitative review of how college students’ technology use affects intimate and peer friendships, Aagaard (2016) utilises the concepts of Daniel Stern’s “vitality affect” (1995). A vitality affect is an emotional communication that is rooted in the body and in movement. Stern describes it as containing “elusive qualities (which) are better

captured by dynamic, kinetic terms” (Stern 1995, p. 54). These are linked to physiological functions such as breathing or sleeping. They are often described as a movement; such as rushing, crescendo, slowing, stilling. Stern uses vitality affects to describe the moment-to-moment changes in a connection between a parent and infant, and describes a qualitative change in this affect if a parent is depressed, the outcome being a loss of shared joy and energy but also mismatched intensity of affects and misattunement between a parent and infant. He describes vitality affects, and the regulation that a parent offers to a baby in these affective states, as the building blocks of an infant’s experience of self and other (Stern 2010).

Aagaard compares this to the unintentional disruption of attunement when a person is using a mobile device and “the smooth flow of ordinary interaction” is affected. The phone use “signals indifference to what is being said”, even if the user of the phone is not indifferent, they may appear to be so because of the “unintentional misattunement” (Aagaard 2016, p. 223). This dampening down of interactions between conversational partners—when others feel shut out, slowed down, or joyless—fits well with the misattunement and mismatched vitality affect that Stern describes. The use of this concept is of particular relevance to this research topic given that it links a concept used to understand a parent-infant interaction with the quality of a communication that involves a mobile device outside of a parent-young child relationship.

McDaniel and Coyne coined the term “technoference” (McDaniel & Coyne 2016a), which is used to describe the negative effects that technology can create in couple or family interaction through interruptions or disconnections in communication.

Gaze—looking with steady attention (Stevenson 2010)—is considered by many authors to be a central component of “absent presence” and the means by which attention is interrupted (Aagaard 2016; McDaniel & Coyne 2016a; Turkle 2011a). Studies on social interactions have shown that gaze holds a special place in attentional cueing, and is considered a primary social cue (Argyle & Cook 1976; Baron-Cohen 1997). As Birmingham describes, we “are very interested in where people are directing their attention, and we use their eyes to infer where, and to what, they are attending” (Birmingham & Kingstone 2009). It is gaze that directs the social aspects of communication by modulating turn-taking, and providing cues to social signalling (Birmingham & Kingstone 2009).

Following another’s gaze, or watching them indicate their interest, for example by pointing, is prioritised in both laboratory-based and naturalistic studies of gaze (Birmingham & Kingstone 2009). By pointing, an infant shows their understanding of gaze and of directing the gaze of another to their own wants and needs. Gaze allows someone to read intention and beliefs in another’s “unobservable mental states” (Baron-Cohen 1997, p. xviii). It also allows the establishment of joint attention, in which two people share a focus. This is seen as central to understanding the development of *theory of mind* in children. Theory of mind (Premack & Woodruff 1978) is the ability to understand another’s intentions, beliefs, and motivations; to put oneself in another’s shoes. An inability to do this is seen as central to developmental disorders of children, including autism. Along with having functional use of language (Korkmaz 2011), theory of mind allows the development of empathy.

Gaze, social language, and empathy are all entwined in discussions about the social consequences of mobile device use. In Turkle’s most recent publication, *Reclaiming Conversation* (2015), she turns her mind to the effects of technologically mediated

communication on conversation. She considers the pruning of conversation, prioritising superficial and transient connections to adapt to fast and high-volume exchanges that can happen via text-mediated conversations. She notes that young people describe turning to their screens when there is a lull in conversation, and thus indicate with their shift of gaze and attention that they consider their attention best placed elsewhere.

Turkle describes the lengths to which the young people she interviewed would go to keep conversations “light” and moving on when they noticed that others were turning to their screens. She also describes young people beginning to set up social rules to deal with conversational interruptions by devices. Some young people described a “rule of three”, where it was OK to look down to a screen if at least three others were “heads up” and listening to the conversation. She also describes young people learning the skill of texting while maintaining eye contact.

In addition to the concerns Turkle raises about split or absent attention on others, she found in qualitative interviews that there was a link between a lack of in-depth and reflective conversations, and feelings of being understood by others. This is consistent with the findings of other investigators. A meta-analysis by Konrath, O’Brien and Hsing (2010) found that a reduction of 40% in measures of empathy among young people had occurred over the past 30 years. The authors hypothesised that this could be due to cultural and personality changes over time that may be accelerated by technologically mediated interactions affecting people’s ability to engage deeply and listen to others. Findings of experimental and observational studies have also shown that the presence of a phone, or phone use, can reduce a person’s sense of being understood, thereby altering perceptions of others’ empathy (Aagaard 2016, McDaniel & Coyne 2016, Misra et al. 2016).

Many authors also consider the effects on sense of self when devices are “coupled to our sense of our bodies and increasingly feel like extensions of our minds” (Turkle 2007, no page). Gergen considers how the variable constructs of self that people create within transient online communities may erode a “recognizable self” (Gergen 2002, p. 232) and hold people less accountable to others’ view of them and their “moral bearings” (p. 244). Aagaard considers mobile devices’ potential to affect a sense of self via vitality affect: body-based experiences, such as the shape, movement, and matched emotional intensity of communications that are the building blocks of an embodied self (Aagaard 2016).

1.3 Optimal early childhood development

There is substantial evidence about the roles that caregiving and the social environment play in healthy early childhood development. Early childhood development is considered by the World Health Organisation to include the perinatal period to eight years old—the stage of life most important in terms of the social determinants of health over a lifetime (Irwin, Siddiqi, & Hertzman 2007), and defined broadly to include “the physical, social/emotional, and language/cognitive domains of development” (Irwin, Siddiqi & Hertzman 2007, p. 7). Optimal development requires physical needs for food, shelter, and protection from physical hazards to be met, but also for care that attends to social and emotional needs (Sved Williams & Cowling 2004).

There is clear evidence that from the time of birth, infant psychological processes are ready for connection to others (Bowlby 1969; Murray, Andrews, & Parish 2005). Babies show preferences for faces (Kleiner 1987; Morton, Johnson, & Maurer 1990) and they can establish gaze and a social smile in the first months of life (Bowlby 1969, Murray, Andrews & Parish 2005). This capacity is a survival instinct that makes up attachment behaviour, which

draws a caregiver to the baby and encourages them to protect and care for the baby (Bowlby 1969). The baby's psychological readiness for social connection requires an available and close relationship with a caregiver to meet the baby's physical and psychological needs (Trevarthen & Aitken 2001). Babies are completely dependent on this care in the first months (Bowlby 1969). Sensitive, well-attuned care allows babies to develop behavioural patterns for attention, emotions, and social relationships from birth (Winnicott 1964; Murray 1989; Fonagy & Target 1997; Shonkoff & Phillips 2000; Trevarthen & Aitken 2001).

In the 1960s, Bowlby (1969) described styles of attachment behaviour of infants, and the concept of "secure" and "insecure" attachment, which are determined by the type of caregiver response to a baby. In brief, a securely attached baby will have had consistent care giving that results in the baby accepting that a trusted other will assist them to manage strong emotions, so the infant and child can explore the world secure in this knowledge. An insecurely attached baby will be uncertain about whether assistance to manage strong feelings will be available, and not be able to trust that this will happen always, or ever. This baby will be less likely to go out to explore the world, safe in the knowledge that they have someone who will assist them to manage if needed. This can result either in less exploration, or anxious separation, or separating but not knowing how to get emotional support if they cannot manage alone and need it. A number of robust experimental tests have been designed to determine attachment security, the best known of which is the 'strange situation procedure' (Ainsworth 1979). In this experiment, a young child is separated briefly from their primary carer. The child's response to the parent's return is predictive of an attachment style that is likely to persist. This research has assisted those

working in infant mental health to consider the developmental implications of attachment security throughout the life course. There is also strong evidence that attachment styles in parents predict attachment security in their offspring, thus that attachment styles can be transmitted down generations (Van Ijzendoorn 1995).

In 1952, Donald Winnicott (1952) described the idea of a “good-enough mother”. He considered being a good-enough mother as a natural, unconscious process that came from a mother being well enough cared for herself in early life. This allowed her to know intuitively what her baby needed, especially how to handle and play with her baby. He considered that the repeated interactions between a baby and mother who provided sensitive and loving holding and day-to-day care of the baby, was evidence of good-enough care. It requires the mother to protect her baby from unpredictable experiences, to show her baby warmth and love, and to remain calm when the baby is distressed. This allows the baby to develop a sense of themselves and others.

Winnicott also noted that in the first weeks of a baby’s life, it was important that a mother had a heightened sensitivity to the baby, and that this began in the late stages of pregnancy. This is associated with less investment in activities and interests outside of the baby’s world. He called this the “primary maternal preoccupation” (Winnicott 1952). Over time, a good-enough mother will assist the infant in a gradual way in being able to wait and tolerate the frustration of not being attended to immediately (Winnicott 1953), allowing the baby an experience of separation and loss, but within a supportive loosening of maternal holding. This allows the baby to experience an emerging sense of independence rather than feeling overwhelmed. Winnicott considered that independence is never absolute and that we

remain dependent on company and belonging throughout life and that, if isolated, people feel lonely.

Daniel Stern, a more contemporary leader in the field of infant development and psychology, has introduced to these principles the notion of vitality affects. He has provided detailed observation and theories of infant development and psychology using a psychodynamic framework. As part of understanding the development of an infant's experience of self, he has found that this development is dependent on a mother's focus, devotion, and attunement, where the moment-to-moment interactions between mother and baby and the rhythm, cadence, and movement of these experiences can have long-term significance on healthy early childhood development (Stern 1985).

There are several components of both attachment styles and good-enough mothering that are important. The responsiveness of a parent to a young child is known to be important for social, emotional, and cognitive development (Ainsworth 1979; Bornstein et al. 1992; Bornstein & Tamis-LeMonda 1997; Tamis-LeMonda, Bornstein, & Baumwell 2001).

Responsivity is defined as a parent's prompt, contingent and appropriate behaviours (Bornstein & Tamis-LeMonda 1989).

Over the last three decades, 'perturbation studies' (Reddy et al. 1997) have investigated the effect that interruptions in face-to-face communication have on an infant's arousal levels and expression of emotions (Brazelton et al. 1975; Tronick et al. 1979; Murray & Trevarthen 1985; Cohn & Tronick 1989; Fivaz-Depeursinge & Corboz-Warnery 1999; Nadel et al. 1999; Trevarthen & Aitken 2001). All perturbation studies considered a variety of situations in which parent/s remove themselves from an interaction. These experiments have been undertaken with very young babies (1–12 weeks old), and all demonstrate that from a very

young age an infant needs a responsive parent and is adversely affected when a parent ceases to be responsive. The best known of these studies is the “still-face” experiment (Brazelton et al. 1975, Tronick et al. 1979), during which a parent is asked to first interact naturally with their infants and then stop, presenting to the baby a still face. At first, the baby works hard to regain their parent’s attention, then becomes very disorganised in their bids for attention, making increasingly frantic attempts to reach the parent, after which the baby becomes upset or angry, and often withdraws and gives up. How a baby recovers once a parent returns to being responsive depends on attachment security; in a securely attached parent-infant dyad, the baby recovers quickly, yet in an insecurely attached parent-infant dyad, the baby takes a longer time to recover, remaining distressed, withdrawn, or angry.

In a study by Murray and Trevarthen (1985) the experimental setting included the still-face and a “double-video” experiment. The double-video experiment looked at the effects of non-contingent responses on infants by connecting a baby and parent via a video screen and allowing the connection to either happen in real time, or by replaying the parent’s first interaction to the baby. The interaction first occurred “live” with a parent and baby interacting with each other in real time. In this situation, the communication was synchronous and the baby remained engaged and emotionally contained. After a break, the baby viewed a replay of their first interaction with their parent. When the video of the parent is replayed to the baby, while the mother’s communication is identical to the first interaction, it is not either timely or contingent to the baby’s responses. In this setting, babies became confused, distressed, or disorganised in their responses but, unlike the still-face experiment, did not try to re-engage the parent, and puzzlement and detachment were more prominent.

While the nuances of responses are different in different experimental settings, Murray and Trevarthen noted that all perturbation studies “attest to the fine sensitivity in very young infants to the immediate affective quality of maternal behaviour; its form and its relationship in time to the infant’s own acts are both important” (Murray & Trevarthen 1985, p. 191).

Understanding how a very young infant notices another’s emotion, experiences that emotion, and communicates their own emotions remains an emergent area of enquiry in relational and developmental psychology of infants (Reddy et al. 1997). However, what is clear is that the infant has an active role in these communications from an early age. Reddy notes that arbitrary criteria are used to consider the intention in an infant’s communication. These include the establishment of mutual gaze, repairing failed messages by increasing the intensity of the communication behaviour, and the use of gestures that come to have a symbolic function.

Despite this uncertainty, the bodies of work related to attachment and responsivity demonstrate the combined importance of the “here and now” responsive and contingent interaction with a parent, as well as the longer-term patterns of interactions that set up attachment templates in a parent-infant dyad.

Despite the biological need for stability and social connectedness, babies and young children are flexible (Winnicott 1964; Murray, Andrews, & Parish 2005), and fit into a wide variety of family and cultural environments (Ginott 1956; Bornstein et al. 1992; Richman, Miller, & LeVine 1992; Gottman, Katz, & Hooven 1996). Parents’ use of mobile technology is just one of those highly variable conditions.

1.4 Relevance of mobile device use in caregiving and infant development

As with all new information technology advances, the uptake of mobile devices has been particularly rapid among young adults (Smith 2015). Today's young adults are raising—or soon will be raising—children who will be immersed in an increasingly mobile and IT-connected world, that will continue to change rapidly.

Parents' mobile device ownership is comparable to that of other adults and young people (Morris 2014; McDaniel & Coyne 2016b). An observational study (survey) found that mothers spend around 3 hours a day online (McDaniel, Coyne, & Holmes 2012), which was 1 hour more than spent on other recreational activities, such as listening to music or television. This is comparable to usage by other adults, as is the finding that it is the entertainment mode of choice over other alternatives (Nielsen Company 2009). A recent study suggested higher usage. A survey of parents of 8-18-year-old children in the U.S.A. found that parents were engaged in activities with screen media for more than nine hours a day, with most time (78%) spent on personal rather than work media (Lauricella 2016). This figure included concurrent multimedia use, and use during other activities.

Online social commentary reveals a high level of community interest in how parents' mobile device use might affect their young children. Some commentary considers the risk of smartphone addiction in parents, and that parents' overuse will damage children in a manner akin to the damage caused by child abuse and neglect (Bingham 2012). Others raise concerns about increased parental distractedness leading to accidental injury, or children feeling deserted (Glatter 2012; Owen 2013). Some raise concerns about how screen use by parents interrupts face-to-face interactions with infants (Owen 2013), reducing parental

availability to the cues that young children give their parents, and adversely affects relationships (Turkle 2011a; Glatter 2012; Scott 2014; Sinnerton 2014). Others suggest that parents of young children, like the rest of the community, should be free to use smartphones and internet connectivity to interact with the world, unfettered by the judgments of others (Tuteur 2013), and that the issue is just a result of perennial fears about how the next generation will be damaged by the effects of technological advance (McFarland 2014). Others consider the separate question of the risk of children's own use to their developing brains (Greenfield 2015).

Some of the online commentary presents polarised views and angry and condemning responses to the opinions of others (Tuteur 2013). Much of the commentary lacks a firm evidence base (Glatter 2012, Scott 2014, Sinnerton 2014), suggesting that while there is much community interest, and views are passionately held and strongly argued, there is a lack of balanced evidence on which to base well-informed opinions.

Knowledge gaps of this kind are most effectively addressed by evidence syntheses coupled with expert theorising—in this situation, to synthesise what is already known about the effects that mobile device use have on relationships and social behaviour with what is known about optimal early childhood development, and how mobile device use by parents may be affecting caregiving, parent-infant relationships, and the social and emotional development of young children.

1.5 Summary

In summary, mobile devices are a part of life in the twenty-first century. The use of devices is likely to grow and to be driven by market forces, increased accessibility, affordability, and functionality, and by consumer demand. This growing use has occurred

prior to careful consideration of the potential effects on relationships, but there is considerable interest and knowledge among experts about how mobile device use may have a complex interface with social interactions in families, intimate relationships, and peer friendships. While there is acknowledgement in the literature of the positive associations of mobile device use in broad psychological, social, and cultural ways, there is also a good deal of concern. In addition to changes in cultural and social norms about conversation and how people utilise public spaces, there is consideration not just of how mobile device use might change transactional styles among users, but also among bystanders. There is growing evidence that device use may be associated with negative effects on the quality of relationships, and some emerging evidence of how this may occur, but many questions remain unanswered in terms of factors that may confound or contribute to the associations.

There are already well-established theories of understanding the development and psychology of infants and young children that consider in detail what young children need from their parents for optimal early childhood development. As yet, there has been little consideration of how these frameworks may apply to parents' mobile device use and how this use might interact with caregiving, the parent-child relationship and early childhood development.

1.6 The research goal

The goal of this research was to describe the state of knowledge about the effects on parental caregiving and on young children of parents' use of mobile devices. While the effects of mobile device use on parents is closely related to caregiving behaviour, it was not the explicit focus of the research.

1.7 The research strategy

The research was conducted in four phases. The first involved informal review of the literature and exploration of appropriate research methods. The second phase was a systematic review to allow further research inquiry and understand gaps in knowledge. The third phase was exploratory qualitative research with the focus on hypothesis building rather than testing. The fourth phase was review of the existing literature and synthesis of findings.

1.8 Two studies

The research project comprises two studies undertaken together: Study One, a systematic review, and Study Two, a qualitative investigation. The studies were undertaken simultaneously so that the findings of one could inform the other.

This research has considered only the effects of parents' use of mobile devices on bystanders—their young children—and on caregiving from parents. It does not consider the use of mobile devices by young children themselves, as research into this area of investigation is already well developed. Adolescents were also not the focus of the research.

As an example of the interrelated nature of the studies undertaken, the systematic review was initially run early in the research project and identified some emerging findings about the research topic, with some findings related to parents and their experiences with mobile device use in families, but little consideration of very young children or concepts that might explain how parents' mobile device use may interact with caregiving. This then allowed further research consideration of methods and research questions. A qualitative study with experts was considered as a way to investigate hypotheses, especially about caregiving to infants in the context of parents' mobile device use. After completing the qualitative

research, it was clear that there were contemporary studies rapidly emerging that were focusing on the research topic, thus the systematic review was run again at the end of the study period, yielding twice as many studies as the first, with far greater relevance to the research topic. The studies in this review informed the synthesis of the qualitative data.

1.9 Thesis structure

Chapter 1 has presented information about how the use of devices is likely to grow and to be driven by market forces, increased accessibility, affordability, and functionality, and by consumer demand; that this growth in use has occurred prior to careful consideration of the potential effects on relationships; and that there is considerable interest and knowledge among experts about how mobile device use may have a complex interface with social interactions in families, intimate relationships, and peer friendships. While there is acknowledgement in the literature of the positive benefits of mobile device use in broad psychological, social, and cultural terms, there is also a good deal of concern. In addition to changes in cultural and social norms about conversations and how people utilise public spaces, there is consideration not just of how mobile device use might change transactional styles among users, but also among bystanders. There is growing evidence that device use may be associated with negative effects on the quality of relationships, and some emerging evidence of how this may occur, but many questions remain unanswered in terms of factors that may confound or contribute to the associations.

There are already well-established theories for understanding the development and psychology of infants and young children that consider in detail what young children need from their parents for optimal early childhood development. As yet, there has been little consideration of how these frameworks may apply to parents' mobile device use, and how

this use might interact with caregiving, the parent-child relationship and early childhood development.

In Chapters 2 and 3, the methodology and findings of a systematic review are presented. Chapter 4 outlines the methodology of the qualitative study. Chapters 5 to 8 present the findings related to the research questions and the themes that emerged from the qualitative study's findings. Chapter 9 presents a discussion of the findings related to parents and caregiving. Chapter 10 considers the findings related to parent-infant interactions and infant development along with emerging theory. Chapter 11 presents recommendations for future research and a conclusion.

CHAPTER 2

Study One: Methodology

Parents' use of mobile computing devices, parental caregiving, and the social and emotional development of children: a systematic review of the evidence.



2.1 Rationale for method.

A survey of the literature and of PROSPERO: an international prospective register of systematic reviews, found no previously undertaken or registered systematic reviews relevant to the research topic. Given this, undertaking a systematic review was considered the first step in establishing the existing evidence base about mobile device use by parents and its effects on parental caregiving of infants and young children, or on parent-child relationships.

2.2 Aim

Study One's aim was to establish the extent and quality of current knowledge about parents' use of mobile computing devices, and the potential effects on caregiving and healthy early childhood social and emotional development (0-10-years-old).

2.3 Protocol and Registration

A systematic review of relevant literature was conducted to assess current knowledge about parents' mobile device use and potential effects on healthy early childhood and caregiving. The review protocol was registered with PROSPERO (Beamish N, Fisher J, & Rowe H 2014).

Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines were used to identify, screen, consider eligibility, and synthesise results (Moher et al. 2009).

2.4 Eligibility Criteria

The inclusion criteria for the review were empirical research, published in English in peer-reviewed journals, as well as theses and peer-reviewed conference abstracts published from January 2007 (the year smartphones were first released) to October 2016. Non-English language papers with English abstracts were also included. Study setting and design had no restrictions. The study population was parents or carers who use mobile computing devices. Eligible outcomes were investigation of parents' mobile device use on parental caregiving, family relationships (including the parent-child relationship), or effects on the social and emotional development of young children (birth to 10-years-old). Exclusion criteria were non-empirical data, non-peer-reviewed publications, and papers studying only adolescents' or children's own use of mobile devices, as well as papers studying only the effects of mobile device use on parents when this did not include caregiving or outcomes in young children.

2.5 Information Sources and Search

Seven medical and social sciences databases (CINAHL, MEDLINE, MEDLINE in process, PsycINFO, EBM reviews, Web of Science and EMBASE) were first searched on 7 October 2016 using text words and subject headings relevant to three domains: *mobile computing devices*, *parents*, and *children*. Search terms were developed by undertaking a preliminary review of the literature and generating text words for these concepts that appeared in the literature, and synonyms for these words (Table 1). Search terms for outcomes were not

included on the advice of a librarian experienced in protocols of systematic reviews, given the risk of excluding relevant literature.

TABLE 1. Search Terms

| Domain 1: Information technology | Domain 2: Parent user | Domain 3: Affected person |
|--|---|---|
| | Adjacent to domain 1 (5 words) | Combined with |
| electronic device* or iphone* or handheld device* or hand held device* or ipad* or digital device* or smart phone* or smartphone* or mobile device* or cell* phone* or mobile phone* or tablet* or electronic communication* or email* or internet or electronic media or social media or social network* or facebook or twitter or tweet or instagram or youtube or google or text* or messag* or online gam* or instant messag* or screen time or screen media or tumblr or bulletin board or mobile app or mobile apps or mobile applicat*) | parent* or carer* or father* or mother* or maternal* or paternal* or perinatal* | baby or babies or child* or toddler* or preschool child* or paediatric* or pediatric* or neonat* or newborn* |

Within databases, all fields (title, abstract, text tables, and references) were searched in order to ensure that all relevant papers were located.

2.6 Data Collection Process and Data Items

A data extraction table was developed based on the Cochrane Consumer and Communication Review Group’s table, and modified for mixed method studies (Higgins & Green 2011). Table content was tested using four randomly selected studies and then refined. One reviewer extracted the data; a second checked the data, and a consensus was

reached with a third reviewer where opinions differed. Data extracted for each study was: (1) Study type and characteristic, including author, year of publication, country, paper type if abstract only, conference proceeding or thesis, and population; (2) Sample size, sampling, recruitment (including population included in study), participant characteristics, inclusion and exclusion criteria, loss to follow-up numbers; (3) Aim; (4) Data collection and analytical method; (5) Relevant findings—including type of outcomes measured.

2.7 Appraisal of quality of original study

The quality of studies was appraised using the Critical Appraisal Skills Program (CASP) checklist for qualitative studies (Singh 2013)(Appendix 2). As the CASP did not have a checklist for direct observation and cross-sectional studies, the CASP was modified, informed by adaptations from Guyatt et al. (1993). These checklists assist in comparing the quality of studies from mixed methods, ensuring reliability when considering variables that introduce bias.

2.8 Appraisal of quality of reporting

A checklist (Kmet, Lee, & Cook 2004) for quality of reporting was used to compare papers reporting studies from diverse methodologies. This was completed independently by two reviewers. Studies with only English language abstracts available were excluded from this review.

2.9 Synthesis of Results

In order to address the risk of publication and English language bias across studies, theses, conference papers and non-English language peer review publications with English abstracts were included.

CHAPTER 3

Study One: Findings



The detailed data from each study is reported in Table 2.

TABLE 2. Characteristics of studies meeting inclusion criteria

| (n = 10) | | | | |
|---|---|--|---|---|
| <i>Author, Year of publication, Country, Study type, Paper type. *</i> | <i>Sample Size Sampling Recruitment</i> | <i>Aim</i> | <i>Data sources and procedures Analytical method.</i> | <i>Main Findings</i> |
| <i>Observational studies (n = 6)</i> | | | | |
| Hyun et al. (2011) - Korea - Survey - Abstract only available in English | (n = 241) Parents from five nursery schools in province in Korea. No further information on sampling strategy. No exclusion criteria stated. | How young children's parents perceive their use of mobile devices at home and whether there is a difference between Christian and non-Christian parents. | Questionnaire completed by parents. Data analysed with descriptive statistics, Pearson correlation, and one- way ANOVA. | All parents "are likely to use digital devices at home not considering enough young children's presence". Mostly show a "negative attitude towards the effect of mobile devices on family relationship" such as common topics to share, time spent together, the degree of intimacy. |
| Hyun & Park (2013) - Korea - Survey - Abstract only available in English | (n = 290) Mothers with 3-6-year-old child attending one of four urban child care centres in South Korea. | To examine "the relationship among mothers' smartphone addiction levels, maternal depression, and young children's problem behaviours". | Self-rated smartphone addiction tools for adults, Beck's depression inventory, and Korean child behaviour checklist for 1½ –5-year-olds completed by mothers. Both validated questionnaires. Data analysed by frequency analysis, chi-square test and one-way ANOVA. | 70% of mothers' infrequent users; 17.2% frequent general users; 12.8% "at risk of smartphone addiction". Greater phone use and greater multitasking were associated with increase of "at risk of phone addiction" scores. |

| | | | | |
|--|--|---|--|--|
| | No further information on sampling strategy. | | | The highest percentage of depression was found in the potential “at risk of smartphone addiction” group who spent most time on their phones and multitasked on phones. “Children of these mothers exhibited the most behavioural problems especially attention aggression problems”. No further data available in English. |
| Hyun & Cho (2013) - Korea - Survey - Abstract only available in English | (n=247) Mothers with 3-6-year-old child attending one of four urban child care centres in Seoul. No further information on sampling strategy. | To examine “the relationship among smartphone addiction levels, parenting efficacy, and parenting stress”. | Self-rated smartphone addiction tool for adults, the “echelle globale du sentiment de competence Parental”, and the Korean parenting stress index – short form. Both validated questionnaires. Data analysed by frequency analysis, chi-square test, and one-way ANOVA, correlation analysis, multiple regression analysis. | 61.5% of mothers infrequent users; 26.7% frequent general users; 11.7% “at risk of smartphone addiction”. More frequent smartphone use was associated with higher risk of smartphone addiction. “At risk of smartphone addiction” group rated most highly for parenting stress and lowest for parenting efficacy. The higher the tolerance for smartphone use; the lower parenting efficacy, the higher the mother’s connectivity with the virtual world, the higher the parenting stress. No further data available in English. |
| Radesky, Miller et al. (2015) - U.S.A. - Observational study | (n= 228) Cross-sectional study nested in a cohort study with opportunistic “secondary analysis” of pre-existing data from 6-year-old wave of data collection. Original study: longitudinal cohort study (n=340) recruited from low-income families at a federally funded preschool program. Eligible participants had a full-term baby, no significant perinatal complications, no significant developmental or | “Examine associations of maternal mobile device use with the frequency of mother-child interactions during a structured laboratory task.” | “Secondary analysis” of videotaped observation between mothers and 6-year-old children. Data gathered included observational structured eating task between mothers and 6-year-old children to examine maternal contributions to eating behaviour in children (protocol for interaction described, 4 food groups presented for 4 minutes each). No instruction about device use given. Coding scheme for mobile device use developed by watching subsets of videotapes. Three modes of use coded; no device present, negligible use (on table, checked quickly), active use (talked with receiving call, replied to text, swiping or typing). Inter-rater reliability measured (Cohen’s kappa = 0.97). | 72% non-Hispanic white ethnicity, mean age 31 years old. 67% no device present, 23% used a mobile device at least once, 10% quickly checked device. Significant association between mobile device use and fewer verbal interactions (11.1 versus 14.1, $p = 0.03$), fewer total encouragements (8.8. versus 12.3, $p = 0.03$) including with unfamiliar foods (5.0 versus 7.7, $p = 0.02$). Multivariate adjustment, strongest relationship when unfamiliar food presented with 26% (CI: 2%, 43%) fewer verbal interactions and 48% (CI: 4%, 72%) fewer non-verbal interactions. Association also occurred with all foods, 28% (CI 18%, 96%) fewer |

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| | <p>medical problems, English speaking, not college educated, child not in foster care.</p> <p>At 6-years-old, additional wave of data collection retained 79% of participants. Mothers who agreed to participate more likely to be older and single parents. Non-white or Hispanic participants more likely to be excluded.</p> | | <p>Previously coded mother-child interaction scheme for eating behaviour used (BATMAN) which included verbal and non-verbal interactions which were encouraging or discouraging. Inter-rater reliability and intra-class correlation coefficients high.</p> <p>Previously coded parenting scale (validated self-reported scores) for parenting style. Good internal reliability measure.</p> <p>Covariates: mother's age, race, education, marital status, number of children, child's sex, depression scale (CES-D), household chaos scale (CHAOS).</p> <p>Chi-squared tests and one-way ANOVA used to analyse bivariate relationship between maternal mobile device use and maternal, child and household characteristics.</p> <p>Multiple poisson regression to adjust for associations of maternal device use with number of maternal verbal, non-verbal, encouragement and discouragement interactions.</p> <p>Multivariate analysis of bivariate associations and all covariates with adjustment of predictors and outcomes using SAS software version 9.3</p> | <p>encouragements. Device use <u>not</u> associated with any change in the frequency of eating discouragements.</p> <p>Cohen's effect size for difference in the interaction between mother who used devices and did not was moderate (0.03–0.40)</p> <p>Maternal device use <u>not</u> associated with parenting style.</p> |
| <p>Ante-Contreras (2016)</p> <ul style="list-style-type: none"> - U.S. A - Survey - Thesis | <p>(<i>n</i>= 167)</p> <p>Recruitment: online parenting communities. Purposive sampling (parents recruited online were target population) and snowball sampling.</p> <p>223 respondents, of these 167 completed online surveys.</p> <p>No further information on sampling strategy.</p> | <p>"To understand whether excessive parental use of social media had an effect on parent-child attachment or parenting style".</p> <p>Hypothesis "that parents who use social media excessively may be more likely to be distracted in their everyday parenting and therefore less likely to have developed a strong attachment to their children. Increased distraction while caring for</p> | <p>Online questionnaire gathered:</p> <p>Demographics; age, race, marital status, income, occupation, hours worked/week, child's age, and child's gender gathered.</p> <p>Social media use; hours/day, device type used, use while in presence of your children (never, 1 to 2 times/day, 3 or more times a day, constantly), type of social media type use (name and frequency/day or week or month).</p> <p>Question about wish to change use (yes or no)</p> <p>Question about child being hurt when using (yes or no)</p> | <p>Survey respondents ethnically white (83%), Asian (11%), Hispanic (4%), African American (1%).</p> <p>On measures of income, working or at home, even distraction across sample.</p> <p>Age of children in participants; 1-2 year old (77%), 0-1 year old (14%), 2-3 year old (6%), 3-4 year old (2%)</p> <p>97% used mobile phone for social media use.</p> <p>92% used Facebook.</p> <p>60% used devices for social media access more than three times/day, 22% 1-2 times/day, 15% constantly, 2% never.</p> |

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| | | their child may also make the parent more likely to develop negative parenting traits.” | <p>Qualitative question: impression of impact of social media use.</p> <p>Provincial assessment of parenting style (validated, nil measures provided). Rates parents as authoritarian, permissive, or balanced.</p> <p>Parent-child attachment scale – Rochester youth development study (validated, nil measures provided).</p> <p>Statistical methods; chi-square and bivariate correlations tests but data analysis stated as not completed.</p> | <p>Distribution of hours/day of social media use not reported.</p> <p>Lower educational level associated with higher hours of media use/day (no figures given).</p> <p>10% stated their child had been hurt when unsupervised while a parent used social media.</p> <p>“Statistically significant” association between variables was between social media use (hrs/day, and authoritarian parenting score; $r = 0.157$, $p < 0.049$)</p> |
| <p>McDaniel & Coyne (2016)</p> <ul style="list-style-type: none"> - U.S.A. - Survey | <p>($n = 203$)</p> <p>Convenience sampling via emails and fliers at local community buildings.</p> <p>No further information on sampling strategy.</p> | <p>An exploratory study to examine “how often mothers perceived technology interference to occur within coparenting interactions”, in which parenting domains this occurs, and whether the technological interference affects the quality of coparenting or relationship satisfaction.</p> | <p>Demographics gathered by survey: age, marital status, income, number of children, mobile device, computer and television ownership.</p> <p>Survey questions; technology interference in parenting and coparenting scales, coparenting relationship scale, quality of marriage index, CES-D depression scale. All validated (no measures provided) except technology interference in parenting and coparenting scales.</p> <p>Six-point scale used for technology interference measures; never, rarely, sometimes, often, very often all the time.</p> <p>Data analysed by repeated measures ANOVA with Bonferroni-correction pairwise comparison.</p> <p>Linear regression analysis undertaken for first covariates (household income, education, age, child’s age, number of children), second relationship satisfaction and depressive symptoms, third technology interference.</p> | <p>94% owned smartphones, 91% computers, 60% tablets. 96% of mothers reported interference from technology when coparenting or with partner and child.</p> <p>Cell phones interrupted coparenting most often; 58% of mothers perceived interference sometimes, often, very often or all the time.</p> <p>“Sometimes” or “often” play time was perceived as most interrupted by technology 65% of the time; followed by conversations about parenting 36% of time; free time with child 53% of time; educational activities 31% of time; mealtime 26% of time; bedtime 26% of time; disciplining 22% of time.</p> <p>Significant association between mothers rating frequent technology interference in coparenting with lower perceived coparenting quality.</p> <p>Higher experience of technological interference occurred with older children and younger mothers.</p> |
| <p>McDaniel & Radesky (2016)</p> <ul style="list-style-type: none"> - U.S.A. - Survey | <p>($n = 170$ families included 168 mothers, 165 fathers)</p> <p>Baseline (cross-sectional) data from longitudinal study ($n = 360$ parents).</p> | <p>“To examine cross-sectional associations between problematic parent technology use, technology interference in</p> | <p>Demographics; age, region, number of children, average child’s age, ethnicity, household income, length of relationship with partner.</p> | <p>Compared to participants whose data were analysed: data not analysed due to exclusion or missing data participants; older ($t(360) = 2.18$, $p = 0.03$), in longer relationship $t(360) = 2.61$, $p = 0.009$, more children $t(360) = 3.63$, $p < 0.001$).</p> |

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| | <p>Community, online and pre-existing family research database recruitment.</p> <p>Eligible participants were > 18-years-old, parent of a child < 5-years-old, living with partner, partner willing to participate.</p> <p>In this study, parents with child < 1-year-old excluded as child too young to do child behavioural rating</p> <p><i>n</i> = 333 parents' data analysed. Not analysed, 22 parents excluded, 6 parents missing data, 5 failed to respond.</p> | <p>parent-child interactions and child behaviour"</p> | <p>Statistical method; chi-square and <i>t</i>-test to analysis demographic difference between those analysed and not.</p> <p>Measures; Parent self-reported problematic phones use (adapted from McDaniel and Coyne 2016, not recorded if measure validated); technoference in parent-child relationship (author used previously, not validated); child externalising and internalising behavioural problems (validated).</p> <p>Co-variables; age, education, marital status, ethnicity, family structure, income, child's age, gender, child's screen media use, coparenting quality, depression (CES-D) and parenting stress symptoms (PSI).</p> <p>Associations in study variables investigated by bivariate correlations in SPSS and modelling using APIM, SEM.</p> | <p>Average age mothers 32 years, fathers 33 years. 61% more than one child, average age of index child 3 years, median income \$69,500, average length of relationship 10.3 years.</p> <p>Confounders did not significantly change results.</p> <p>11% parents no technological interference in a typical day, 17% once a day, 24% twice a day, 48% three times a day.</p> <p>40% mother and 32% of fathers perceived their phone use problematic. Problematic phone use perceived as higher in mothers than fathers $t(162) = 3.15, p < 0.01$.</p> <p>Correlation between parent problematic phone use and technology interference.</p> <p>Father perceived phone use problems correlated with greater internalising behaviours in child, higher income, more child screen time, increase parenting stress. Mother perceived phone only associated with technological interference.</p> <p>Both mother and father greater technological interference in parent-child activities and worse perceptions of coparenting, depressive symptoms and parenting stress</p> <p>Mother and father problematic mobile phone use significant, predicted their perception of greater technology interactions while with child (mother $\beta = .35, p = .001$, father $\beta = .39, p = .001$)</p> <p>Greater technological interference in the mother-child relationship predicted greater externalising behaviour in the child as reported by mother and father (mother $\beta = .20, p < .001$, father at a trend level, $\beta = .12, p = .06$) and greater internalising behaviour as reported by mother and father.</p> <p>Greater technological interference in the father-child relationship did <u>not</u> predict greater externalising behaviour or internalising behaviour in the child (mother $\beta = .35, p < .01$, father $\beta = .14, p < .05$)</p> |
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| <i>Qualitative studies (n=3)</i> | | | | |
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| <p>Palen & Hughes (2007)</p> <ul style="list-style-type: none"> - U.S.A. - Qualitative study | <p>(n = 5 families)</p> <p>Differing socio-economic status, number of parents in the house, ages of children, gender of the primary caregiver, and the number activities outside the home.</p> <p>No control of any of these variables. Not intended to be representative of the greater population but reflect diversity of experience.</p> <p>Selection of families was varied to ensure inclusion of families with infants and preschool aged children.</p> | <p>“Studying the use of mobile phones by members of a household to reveal insights into the sociology of communication technology (ICT) communications in home-related matters, particularly with respect to parenting.”</p> | <p>8 days of observations.</p> <p>Day 0 - initial interview and instructions for the week data collection.</p> <p><u>Four forms of data collection</u></p> <p>Two in-depth interviews at the start and finish (1½ hours with all family members invited). Included information about family structure, background, activities, routines, and technology use.</p> <p>Voicemail diaries – primary carer asked to provide a brief description of the day including classifying how much of their day was work versus home related and how orientated to their phones they were that day.</p> <p>Paging of primary carer giver throughout the day to record location of phone (x9/day).</p> <p>Daily log of incoming and outgoing and missed mobile calls using phone logs, not memory.</p> <p><u>Data analysis</u></p> <p>Recording and transcription of in-depth interviews and voicemail diaries.</p> <p>No further information provided about how data were analysed.</p> | <p>Mobile phone kept closer when children are not with primary care giver.</p> <p>“Remote mothering”; parents described monitoring of phone to manage parenting responsibilities, be available if needed and alleviate worry about children.</p> <p>Phone allowed sense of doing “home” duties without being “bound to the house”.</p> <p>Tethering described as the potential for connection via mobile phones.</p> <p>When with children, all participants only put aside their phones when in the presence of their children; more participants likely to have phone off, leave it at home, not know its current status (on/off, charged, ringer on/off).</p> <p>Caregivers of young children used phone differently to older children; used to keep in touch with other adults. Concept of “housebound” and role of phone in alleviating this by allowing social connection.</p> <p>Effect of mobile phone on work patterns/attention on one participant; less time away from children, more flexibility of work hours (when children sleep) but less ability to attend to either children or work exclusively.</p> |
| <p>Christensen (2009)</p> <ul style="list-style-type: none"> - Denmark - Qualitative study | <p>(n = 9 families)</p> <p>Four nuclear, two single parents, three blended families. All employed except one parent.</p> <p>No further information on sampling or recruitment.</p> | <p>“To provide a detailed description of the practises related to intra-familial communication and how these are integrated into modern family life.”</p> <p>Communication investigated is technologically mediated, especially voice calls, SMS</p> | <p>Semi-structured interviews — 17 conducted lasting 1.5–2 hours each.</p> <p>Interviews transcribed and condensed into narratives.</p> <p>No further information on data analysis</p> | <p>Themes: That families stayed connected via technologically mediated interactions as they undertook separate activities; “connected presence”.</p> <p>That privatisation of media (personal devices and devices in personal spaces such as the bedroom) increased a sense of separation.</p> <p>That tension occurs between the potential for devices to bring family members together as well as increase separation, especially with children using personal devices.</p> |

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| | | <p>and landline versus mobile phone preferences.</p> <p>Hypothesis that technologically mediated connection creates closeness.</p> | | <p>Parents used phones to assist in creating “a good family life”.</p> <p>Mobile devices rapidly embedded themselves in personal communication resulting in technologically mediated and non-mediated interactions occurring.</p> <p>Two narrative accounts given. Each family member had their own mobile phone. Most common communication style was via text messages. Use was for family members to check in on each other (esp. younger children) and to make family plans. Both families’ parents used their phones more for conversations between parents and saw this offering emotional engagement/support.</p> |
| <p>Radesky, Kistin et al. (2014)</p> <ul style="list-style-type: none"> - U.S.A. - Qualitative study. | <p>(<i>n</i> = 55 observations of which 40 caregivers used their phones).</p> <p>Observation of families in fast food restaurant.</p> <p>15 neighbourhoods in metropolitan with range of income (\$45,000 to \$108,000 median), geographical location and urbanicity.</p> <p>Fast food outlets chosen as observation site as high percentage of American meals eaten outside the home and meal time provided a high number of face-to-face interactions.</p> | <p>“To describe naturalistic patterns of mobile device use by caregivers and children to generate hypotheses about its effect on caregiver-child interaction.”</p> | <p>Non-participant observational methods.</p> <p>Inclusion criteria any family with caregiver and child/ren judged to be 0-10-years-old. Decided on observation of age by height, general appearance and developmental status.</p> <p>Groups with adolescents excluded.</p> <p>Observation initiated when caregiver used mobile phone.</p> <p>Field notes taken by moving close to participants without being publicly observable.</p> <p>Grounded theory approach to develop themes related to mobile device patterns of use.</p> <p>Analysis of field notes generated salient themes using Dedoose software. Thematic saturation reached after 55 observations.</p> <p>Validity of data was achieved by using investigator and expert triangulation.</p> | <p>Theme–concept of absorption in device defined as “the extent to which the primary focus of the caregiver’s attention and engagement was with the device rather than the child”.</p> <p>Degree of absorption depended on frequency, duration, and modality of use, child’s bids for attention, caregivers’ responses and separate versus co-viewing.</p> <p>No absorption defined as device not out or no device on the table.</p> <p>Highest level of absorption was nearly continuous use throughout the meal, use while eating and talking or putting down device only briefly, nearly continuous use of the phone with typing or finger swiping and caregiver gaze directed at the device.</p> <p>Level of absorption considered lower in phone calls as caregiver maintenance of any contact during these times was noted.</p> <p>Child’s bids for attention varied from no obvious response to limit testing or provocative behaviour.</p> |

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| | | | | <p>Caregiver response varied from slower and briefer responses to ignoring to scolding.</p> <p>Higher levels of absorption in phone by caregiver were associated with less responsivity, a change in quality of response to child/ren and more harsh responses.</p> <p>Co-viewing of devices allowed more joint attention</p> |
| <i>Mixed methods study (n=1)</i> | | | | |
| <p>Hiniker et al. (2015)</p> <ul style="list-style-type: none"> - U.S.A - Mixed methods study | <p>Total (<i>n</i> = 466)</p> <p>Recruited participants; adult caregivers who appeared to have children less than 10-years-old in 7 city locations over a 3-month period.</p> <p><u>Participant numbers in different parts of the study:</u></p> <p>Observation of phone usage. Timed phone use of separate subjects via observation (<i>n</i> = 111)</p> <p>Covert non-participatory observations (<i>n</i> = 171)</p> <p>Semi-structured interviews of non-participatory observation subjects (<i>n</i> = 25)</p> <p>Survey data (<i>n</i> = 154). Survey participants recruited from local online or community parent groups.</p> | <p>“To understand how adult caregivers use their mobile phones at a playground” and to identify adults’ “perspectives on the appropriateness of phone use” in the context of having children in their care.</p> | <p>Demographics for gender, relationships with less than ten-year-old child, household income and ethnicity gathered in survey data.</p> <p>Observation of phone usage. Quantitative data; duration (seconds), number of times used.</p> <p>Non-participatory caregiver observation. Observer chose a location in the playground and began observing a caregiver within the playground from arrival to departure taking field data used later to develop ethnographic field notes.</p> <p>Semi-structured interviews. Observer approached and recruited participants who had been observed. Asked about beliefs and values about phone use including what strategies they used to “keep an eye on your child” while using a phone.</p> <p>Qualitative data coded iteratively using grounded theory from coded field notes, interview transcripts and open-ended survey data. Data were coded by each observer independently but using nine codes for observations: child caregiver interaction, child’s attempts to interrupt adult, caregiver position, supervision style, phone activities, non-phone activities, balance phone use with child needs, behaviour before and after phone use, children’s activity during phone use. Other codes for interviews such as: beliefs about times at the playground, concern about phone use while caring</p> | <p>Mobile phone use in playgrounds was not the norm; two-thirds of participants on phones for less than 5% of time; 41% did not use phones; short time use common, nearly 30% used for less than 10 seconds.</p> <p>Voice use on phone was only 5% of use.</p> <p>No significant effect of gender on use.</p> <p>Use for texting (48%), calling (48%), emailing (38%), photographing (38%), Facebook (21%).</p> <p>40% accessed phones when becoming bored.</p> <p>Consistency between interviews and survey was high but survey reports of frequency of use were higher.</p> <p>Goal of use varied; child-focused use (managing daily plans, checking time) twice as often as parent-focused tasks (socialising, working or entertainment).</p> <p>65% of adults chose times not to use phone due to concern about not being responsive to their child; 57% when they did not want to compromise safety; 52% because they did not want their child to copy their use.</p> <p>Overall observations: 32 times when a child attempted to interrupt or gain an adult’s attention while they used phones; 70 times when the phone was not in use. When phones were in use, 56% of the time the adult did not respond (no looking up, no speech). When phones were not in use, most bids for</p> |

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| | | | <p>for child, benefits of phone use. Group consensus to develop higher-order themes used.</p> <p>Survey data: Gathered qualitative and quantitative data about their phone use in playgrounds, strategies for using phones while child caring, and beliefs about appropriate phone use in playgrounds. Qualitative data integrated with observational and interview data. Quantitative information gathered use to produce summary data.</p> | <p>attention were quickly responded to (only 11% no response). Interrupted attention was an uncommon occurrence (averaged once every 20 mins).</p> <p>88% of adults interviewed and 80% surveyed noted that when using phones, they paid less attention to their environment and children. Most were confident they would notice child if needed. This differed to observational findings.</p> <p>Three groups in relation to how participants saw their phone use: confident in their use, no need to change (28%); would like to decrease use (48%); confident in non-use (24%). Caregivers who were confident users felt significantly less guilty ($p < 0.5$) than those who wanted to decrease use and those who were confident non-users.</p> <p>Despite high numbers of adults who wanted to change their use, few (26% of those who wanted to reduce use and 16% of all surveyed) were interested in a tool to reduce use. Reasons for this: they were satisfied with their behaviour (41%); valued self-monitoring (21%); did not see the value in using technology to fix a problem with technology (17%).</p> <p>Five strategies that adults used to integrate phone use: use of phones in short burst (40% use was less than 30 secs); glancing back and forth; use when child safe and occupied; reinitiate engagement after phone use (often adult-initiated); put phones away (inaccessible while in playground).</p> |
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*Peer review unless otherwise stated; ANOVA – Analysis of Variance; CES- D – Centre for Epidemiological Studies Depression Scale Revised; CI – confidence interval at 95% unless otherwise stated; BATMAN – Bob and Tom’s Method of Assessing Nutrition; SAS – Statistical Analysis System; cf – compared to; PSI – Parenting Stress Index; APIM – Actor Partner Interdependence Modelling; SEM – Structural Equation Model; r – Pearson’s correlation coefficient; SMS – short message service.

3.1 Quality of original study

The three studies from Korea (Hyun et al. 2011; Hyun, Cho, et al. 2013; Hyun, Park, et al. 2013) were available with only the abstract in English, thus there was insufficient information to comment formally on quality. However, with the assistance of a bilingual Korean-speaking librarian, a structured discussion of the methods and results of the study was undertaken and it appeared that the studies were well-designed with a clear statement of aim, appropriate methodology to address the research question, adequate information about recruitment and sample demographics, and results with detailed subgroup analysis and confidence intervals.

Table 3 shows the checklist for quantitative studies

TABLE 3. METHODOLOGICAL QUALITY ASSESSMENT OF QUANTITATIVE STUDIES



2=yes, 1= can't tell, 0=no/not mentioned, NA=Not Applicable. Total score= 18

| Study | 1 | 2 | Is it worth Continuing? | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10* | Total |
|---------------------------|---|---|-------------------------|---|---|---|---|---|---|---|-----|-------|
| Radesky et al. (2015) | 2 | 2 | Yes | 2 | 2 | 1 | 2 | 2 | 2 | 2 | * | 17 |
| Ante-Contreras (2016) | 1 | 1 | Yes | 0 | 1 | 2 | 1 | 2 | 1 | 2 | * | 11 |
| McDaniel & Coyne. (2016) | 2 | 2 | Yes | 1 | 2 | 2 | 2 | 2 | 2 | 2 | * | 17 |
| McDaniel & Radesky (2016) | 2 | 2 | Yes | 2 | 2 | 2 | 2 | 2 | 2 | 2 | * | 18 |

1. Did the study address a clearly focused issue?
2. Was the methodology appropriate?
3. Was the recruitment strategy appropriate to the aims of the research?
4. Were the measures accurately appraised to reduce bias?
5. Was the data collected in a way that addressed the research issue?
6. How precise are the results?
7. Have the ethical issues been taken into consideration?
8. Was the data analysis sufficiently rigorous?
9. Is there a clear statement of findings?
10. How valuable is the research?

* Question not scored

Hyun et al (2011), Hyun & Park (2013), Hyun & Cho (2013) not included

The studies by McDaniel, Radesky and colleagues (Radesky et al. 2015; McDaniel & Coyne 2016b; McDaniel & Radesky 2017) were of high quality scoring 17, 17 and 18 out of 18 respectively. The study by McDaniel and Coyne (2016b) lacked only detailed information about recruitment, meaning it was not possible to determine if the recruiting strategy was appropriate. The study by Radesky et al. (2015) had access to videotaped data collected for a cross-sectional study nested within a cohort study. The primary purpose of the study had been to investigate the association between children’s eating behaviour and maternal encouragement. Secondary analysis of this pre-existing videotaped data of mother-child dyads was an appropriate method, however, the data had not been collected for the purpose of the research question. The study by McDaniel and Radesky (2017) only lacked information about consideration of ethics.

The study by Ante-Contreras (2016)—a Master’s thesis in social work—was found in a hand-search of the literature, and was unpublished. It was a lower quality study with a less clear statement of aims and less rigorous methodology than other studies. Specifically, the study’s aims were diffuse and it was not clear that the study methodology was appropriate for the aims. The recruitment strategy and data collection were adequate, using a convenience sample recruited via social media participants who completed an online survey. The scale used for the parenting style assessment (Biletski, Macintosh, & McIsaac 2013) and the parent-child attachment scale (Dahlberg et al. 2005) were validated, however, the parent-child attachment scale was designed for youth with no information about the validity of the scale for parents of young children. Statistical analysis was incomplete at the time the author’s thesis was completed, and findings were poorly supported by the data presented. There appeared to be participation bias in that there was no variation in parenting styles that could reflect the sampling strategy or the data source and participants had to be active social media users with an interest in parenting and social media. The analysis appeared not to be as rigorous as possible. The author suggested that finding a uniform response from survey participants resulted in most being grouped in a “balanced” parenting style, lessening the likelihood that any strong correlations could be found between parenting style and media use. It seemed likely that methodological problems (such as power and inappropriate parenting scale used) may have been the cause or, alternatively, it is possible that the results may have reflected a null finding.

Table 4 is a summary of the quality of the qualitative studies and the qualitative component of the one mixed methods paper.

TABLE 4. Methodological quality assessment of qualitative studies

| <i>2 = yes, 1 = can't tell, 0 = no/not mentioned, NA = Not Applicable. Total score = 18</i> | | | | | | | | | | | | |
|---|----------|----------|--------------------------------|----------|----------|----------|----------|----------|----------|----------|------------|--------------|
| <i>Study</i> | <i>1</i> | <i>2</i> | <i>Is it worth Continuing?</i> | <i>3</i> | <i>4</i> | <i>5</i> | <i>6</i> | <i>7</i> | <i>8</i> | <i>9</i> | <i>10*</i> | <i>Total</i> |
| Palen & Hughes (2007) | 2 | 2 | Yes | 2 | 2 | 2 | 1 | 1 | 1 | 1 | * | 10 |
| Christensen (2009) | 2 | 2 | Yes | 2 | 1 | 1 | 1 | 1 | 0 | 0 | * | 10 |
| Radesky, Kistin et al. (2014) | 2 | 2 | Yes | 2 | 2 | 2 | 2 | 2 | 2 | 2 | * | 17 |
| Hiniker et al. (2015) | 2 | 2 | Yes | 2 | 2 | 2 | 1 | 2 | 2 | 2 | * | 17 |

1. Was there a clear statement of aims of the research?
2. Is a qualitative methodology appropriate?
3. Was the research design appropriate to address the aims of the research?
4. Was the recruitment strategy appropriate to the aims of the research?
5. Was the data collected in a way that addressed the research issue?
6. Has the relationship between researcher and participants been adequately considered?
7. Have the ethical issues been taken into consideration?
8. Was the data analysis sufficiently rigorous?
9. Is there a clear statement of findings?
10. How valuable is the research?

* Question not scored

The studies by Palen & Hughes (2007) and Christensen (2009) both lacked information on the type of analysis of data, verification procedures, and reflexivity of their work.

Christensen provided little information about recruitment strategy, data collection or data analysis, meaning that it was hard to assess the credibility or transferability of the study.

However, both studies were important in terms of the timing of the research, which occurred at the cusp of rapid uptake of mobile phones.

The studies by Radesky, Kistin et al. (2014) and Hiniker et al. (2015) were of high quality and of high importance for the field of investigation. Hiniker et al., which lacked only consideration of reflexivity, was a mixed methods study and scored highly on CASP for the

qualitative component. Data from non-participant observations and semi-structured interviews informed survey questions. Integration of qualitative data from observations, interviews, and qualitative survey data used data source, methods, and researcher triangulation, which increased the credibility of the qualitative findings. The addition of quantitative data (length of caregivers' phone use in a playground setting) and a survey summary data (about reasons for phone use and length of time phones were used as a percentage of time observed) added to the qualitative results. This increased the dataset size and increased the value of the research.

3.2 Risk of bias across studies

The major risk of bias in the review was of excluding non-English language studies and the potential non-publication of negative findings. Because of heterogeneity of the outcomes of included studies, meta-analysis could not be undertaken; therefore, estimates of the level of risk could not be calculated. Despite having only abstract information, the cross-sectional studies from Korea were kept in the review (but not subject to quality assessment) as they met inclusion criteria but also reduced the risk of an English-language bias.

3.3 Summary of findings of included papers

Of the eleven studies included, seven were observational, three qualitative, and one used mixed methods of data collection. Of the observational studies, five were cross-sectional surveys, and two observational. All were published in peer-reviewed journals except one, which was a thesis (Ante-Contreras 2016) and one publication under review, subsequently published (McDaniel & Radesky 2017).

Three were from Korea by the same group of investigators (Hyun, Cho, et al. 2013, Hyun et al. 2011, Hyun, Park, et al. 2013) ($n = 247, 241, \text{ and } 290$, respectively). They recruited

parents of four year-old children at community child care centres and investigated the potential association between smartphone use and “addiction”, depression, parenting efficacy and stress, and parents’ concerns about the effects on their children. These surveys also investigated parents’ habits of mobile device use as well as effects on parenting, and found that most parents (60–70%) were not using mobile devices frequently, but that many were concerned about the effects on family life. The studies found a correlation between parents who self-identified as “at risk of smartphone addiction” (12–13%) and higher parental anxiety, depression, negative self-assessment of parenting, and social isolation.

Two cross-sectional surveys from North America, by McDaniel and Coyne (McDaniel & Coyne 2016b) ($n = 203$), and McDaniel and Radesky (2017), ($n = 183$ couples), examined how parents’ perceived own use of technology affected interactions with children. McDaniel and Coyne (2016b) investigated how mothers perceived technological interference in coparenting activities and triadic interactions with children (i.e. while with both their partner and child). They also investigated whether this affected the quality of coparenting or relationship satisfaction.

Data were also gathered in this study about mobile device ownership and use. The findings were that almost all mothers were using social media on smartphones, and 96% felt that technology use affected the quality of coparenting or relationship satisfaction, mostly due to mobile phone use. When considering the frequency of use in different activities, play with children was most affected (58% of the time; sometimes or often), followed by parenting conversations, free time with children, and educational activities. Bed times and meal times were interrupted “sometimes or often” 26% of the time. Higher levels of “technoference” (McDaniel & Coyne 2016a) were found to be significantly associated with lower levels of

coparenting, relationship satisfaction, and maternal wellbeing. The authors considered child development when reflecting on the potential for distraction to make parents less available, and that it may impact on young children by affecting contingent and responsive parenting or attachment. They noted that if interference was higher during play and free time together, this was of concern given the emotional and social importance of these activities for young children. Given that the study was exploratory and cross-sectional, the authors noted the limitations: that causality could not be established, and that scales that rate technological interference needed to be validated. However, they also suggested the need to explore further parents' perceptions of their use and how their use affected young children, to consider whether when parents adapt to mobile device use as a social norm the perceived effects of this interruption will wane, and to consider when technology may benefit relationships versus when it may negatively affect them.

The second cross-sectional survey by McDaniel and Coyne (2016b) investigated the association between parents' perceived technology interference, problematic phone use, and child behaviour. It surveyed both parents about their phone use, and both parents also completed child behavioural checklists. It found that nearly half of parents felt that technology interrupted the parent-child relationship three times on an average day. One in ten parents considered technology never interrupted the interaction. A relatively high percentage of parents considered that their phone use was problematic (40% of mothers and 32% of fathers). Controlling for confounding, associations were found between fathers' perceived phone use problems and greater internalising behaviour in children. Children's externalising and internalising behaviour, as rated by both mothers and fathers, was

associated with greater maternal technological interference, but not associated with greater paternal technology interference (McDaniel & Coyne 2016b).

The thesis (Ante-Contreras 2016) ($n = 167$) was a cross-sectional online survey that investigated whether parental social media use affected parent-child attachment or parenting style. It was not clearly reported in terms of methodology and, thus, hard to interpret both the methodology and findings. However, it found that mobile device use was the most common interface that parents were using, and that accessing social media on a smartphone was a common activity. Nearly two-thirds of parents in the study had very young children (77% in the study had one-two year-old children), and they accessed social media at least three times a day. A finding that was not discussed in any detail in the paper was the answer to a yes/no question "Has your child ever fallen, gotten hurt, or otherwise been unsupervised while you were browsing social media?" (Ante-Contreras 2016). The question was answered in the affirmative by 10% of participants.

One of the observational studies from North America ($n = 228$) by Radesky et al. (2015) examined parents' mobile device use during a structured eating task with mothers and their six year-old children, and the effects this had on the frequency of interactions in the mother-child dyad. This study was a secondary analysis of data from a longitudinal cohort study that was investigating children's eating habits in relation to maternal behaviour. No instructions had been offered about the use of mobile devices at the time of the observation, and it appears that this was an opportunistic use of existing data. The video recordings of mothers with their six year-old children during the task were examined for maternal phone use. After being offered two types of food by a researcher who instructed the mother to allow her child to try or not try the food and then left the room, mothers

were left alone with their child for 4-minute periods. The mother's behaviour (verbal and non-verbal, encouraging or discouraging), as well as a parenting scale score that had been undertaken for the primary investigation, were used for the re-analysis. Video tapes were re-coded for maternal mobile device use. In 67% of observations, no device was present. In 23%, the mother used a mobile device at least once and, in 10%, the device was only checked after a message or call was received and then put aside. There was a significant association between mobile device use and fewer verbal interactions, as well as fewer total encouragements, especially with unfamiliar foods. But no association was seen with any change in the frequency of discouragements nor between maternal device use and parenting style. The association was most strong when the parent-child dyad was exposed to a novel food. The authors noted that while the setting was not naturalistic and thus could not be reliably generalised to usual parental device use, it did offer an opportunity to demonstrate that even in a structured setting when a task has been set, a considerable minority (33%) of mothers used their devices.

Of the four primarily qualitative papers, two were qualitative only—from North America (ethnographic non-participant observations) and Denmark (in-depth interviews)—and one was mixed methods, a North American study involving ethnographic non-participant observations, semi-structured interviews, and a cross-sectional survey. All investigated mobile phone use among parents in families and the effect on family interactions.

Two early qualitative studies examined patterns of and reasons for mobile phone use by parents and their children (Palen & Hughes 2007, Christensen 2009). These studies collected data between 2004-2006, at a time when mobile phones with computing and internet capacity were becoming established in home life, being used to manage home life from

work and vice versa, and when text messaging was newly available. Both these papers considered the extension of home, parenting, and social connectedness into the virtual or technologically mediated space, and describe the tethering of relationships to mobile devices. The studies both noted that phone use was changing behaviour in families, but how this unfolded was yet to be seen. Both studies considered concepts of separation and connection mediated by technology. Palen and Hughes (2007) described devices allowing remote parenting (keeping a connection when separate) via “tethering” of the connection through the mobile phone, which offered the availability of a potential connection whenever needed. When children were of pre-school age, phone use was seen as allowing parents at home to attend to household tasks without being housebound. Both studies noted that mobile phones allowed practical matters to be easily discussed or resolved between parents and children, and parenting decisions to be shared. Christensen (2009) described parent participants supporting each other via mobile phone interfaces of text and talk. Christensen considered that phones brought a “connected absence” to busy families, which allowed members to remain connected while apart; describing the increasingly “distributed” nature of family life (which was explained as family members dispersing to engage in activities that were specialised and geographically separate). However, while connected presence was experienced as a positive for the family members interviewed in Christensen’s study, there was also consideration of the negative effects that occurred when family members used personal devices, separately and alone, in private spaces in the house, such as bedrooms.

This differed from the Palen and Hughes study (2007), which described devices only being put aside when parents were with their children. The study by Christensen appears to have

had mostly older children as participants (the number of children of different ages was not reported but the study was included in the review because the age range was 10–17-years-old.) The Palen and Hughes study appears to have included a higher number of younger children (again, the details of numbers and ages were not noted), and thus is more relevant to this investigation.

Another qualitative study described caregivers' phone use during a meal (Radesky et al. 2014). This was an ethnographic style observational study that described and explored young children's behaviour during caregivers' use of mobile computing devices with the aim to describe contemporary patterns of phone use. Caregivers were observed at multiple fast food outlets by researchers who watched adults with children judged to be under 10-years-old for at least a 10-minute period, or until the family left the restaurant. They were observed whether or not they used a mobile device. Of the observations conducted, 27% did not bring out phones, 30% used their phones almost continually, and 16% used them occasionally but put them away between use. The paper explored themes of caregiver absorption in devices affecting caregiver availability. Increased degrees of absorption in the screens were identified among some caregivers. Caregiver responses at different levels of absorption in screens were observed. Highly absorbed caregivers were noted to be less responsive to and harsher towards their children. Children's bids for responses varied from none to testing parental limits, and endeavouring to provoke a response from caregivers. The study supported its statements well, including that the themes of distraction, levels of absorption in mobile devices, types of parent-child interaction around shared device use, and children's bids for attention "can be used to characterize device use for future studies examining associations between mobile device use and child or caregiver outcomes"

(Radesky, Kistin & Zuckerman 2014, p. e849). Radesky raised questions about how caregivers consider their own use of mobile computing devices in front of young children, whether mobile device use absorbs caregivers in a way that makes “staying present during interactions with children” more difficult than other distractions (Radesky, Kistin & Zuckerman 2014, p. e848), and how children react to caregivers using mobile computing devices. The authors considered the limitations in terms of generalisability of the study to naturalistic settings, and the inability to draw any causal conclusions. This study was highly relevant to the review as it investigated contemporary mobile device use and the mechanism of effects as it examined how adult caregivers’ absorption in devices can be understood in relation to distraction from children.

A mixed methods study considered parents’ mobile phone use (Hiniker et al. 2015). This North American study used a similar ethnographic observational method to the Radesky team’s 2014 paper, with observation of caregivers with their young children (adolescents again excluded) from the beginning to the end of a period of play. Like the Radesky study, the observation occurred irrespective of phone use, but in this study in a different context: the playground. The study combined quantitative data, qualitative observations, and semi-structured interviews to consider how caregivers’ attention to young children was interrupted by both devices and other factors. Quantitative data about caregivers’ length and frequency of phone use was gathered in separate observations. Observations were followed by a survey informed by themes identified from the qualitative data that allowed corroboration of findings in a larger population. Undertaken at the same time as the study by Radesky, Kistin and Zuckerman (2014), Hiniker et al. (2015) found that 41% of caregivers did not use phones at all. Two-thirds were on the phone for less than 5% of time observed,

and a short duration of use was common, with nearly 30% using their phones for less than 10 seconds. The study found that while other reasons for distraction were more common (occurring a little more than twice as often as those caused by device use), the degree of distraction appeared different with device use. When children made bids for attention while a caregiver was using a mobile device, more than half of the time the caregiver did not respond at all (neither by looking nor with voice). However, if the caregiver was not using a mobile device, the response was commonly timely (no response occurred only approximately 10% of the time). Hiniker et al. (2015) were also able to explore caregivers' perceptions of their use, finding that caregivers overestimated their availability while using mobile devices compared to impressions from observational field notes. Caregivers stated that they would always respond to a child if needed, but were unable to give detailed accounts of what a child was doing when they were on the device, and some participants became defensive about the question. The study also gathered data about caregivers' perceptions of how concerned they were about their use and whether they restrained use. The study found that most caregivers either wanted to use their devices less (48%) or felt that they restrained their use (24%). These caregivers felt guiltier about their use than did the minority of caregivers who identified as having no concerns about use in front of children (so-called "confident users", who represented 28% of those questioned). The study provided information about what caregivers used devices for, and found that use that focused on child-centred activities occurred twice as often as adult-focused use (and resulted in less guilt). Boredom was considered by 40% of caregivers to be the reason to turn to a device. There was a small amount of data based on qualitative observation presented about how caregivers re-engaged with a child after device use. After a period of disengagement, some caregivers initiated a connection with the child without the child

requiring or requesting this. Most caregivers reported that they considered phone use while caring for children. All subjects interviewed said that they had previously considered the matter and most were interested in talking about the topic. Five strategies for balancing parental caregiving with device use were presented. These were: the use of phones in short bursts (40% of use was less than 30 secs); glancing back and forth; use when a child was safe and occupied; reinitiating engagement after phone use (often adult-initiated); putting phones away (inaccessible while in playground). These findings support the authors' conclusions that most caregivers considered children's needs when using their devices and enjoyed the benefits that devices bring, including the child-focused benefits, but also considered the negative consequences, such as inattention and a lack of engagement with a child. There are some data gathered from caregivers that suggested that a sizable proportion felt guilty about their device use. Of interest is that even with nearly half of participants wanting to change their use, very few (26% of those who wanted to change their use) said they would consider using a tool to assist them in achieving this. This study represented both the most methodologically strong study with its mixed methods design, and also the beginning of research that is looking not just at whether parents are using mobile devices and how, but also at detailed information about how caregivers perceive their device use, how they balance the need to attend to children with device use, and whether mobile devices are the same or different to other distractions when caring for young children. The study was set in a middle-class area of the United States, and the authors acknowledged the limitations in generalisation of the findings of this study beyond playground-attending educated middle-class caregivers.

3.4 Quality of reporting

An assessment of the quality of reporting within the studies was undertaken using a checklist (Kmet, Lee & Cook 2004) that enables comparison of the quality of diverse study types. It allows a “systematic, reproducible and quantitative means of simultaneously assessing the quality of research encompassing a broad range of study designs” (Kmet, Lee & Cook 2004, p. 12) that is not available in other checklist or scoring manuals. See Appendix B for details of this checklist. Table 5 shows the results of the assessment; scores ranged between 0.42–0.92 (out of a possible score of 1.00) for quantitative studies, and between 0.50 and 0.86 for the qualitative studies and the mixed methods study.

TABLE 5. Quality of reporting of quantitative and qualitative studies

| <i>Maximum score 1</i> | |
|-------------------------------|--------------|
| Study | Score |
| Quantitative | |
| Radesky, Miller et al. (2015) | 0.92 |
| Ante-Contreras (2016) | 0.42 |
| McDaniel & Coyne (2016) | 0.86 |
| McDaniel & Radesky (2016) | 0.86 |
| Qualitative | |
| Palen & Hughes (2007) | 0.64 |
| Christensen (2009) | 0.50 |
| Radesky, Kistin et al. (2014) | 0.86 |
| Hiniker et al. (2015) | 0.86 |

Hyun et al. (2011, 2011, 2013) not scored as abstracts only.

3.5 Summary of methodology/ weight of evidence.

The systematic review is the first to investigate what is known about parents’ use of mobile devices, parental caregiving and child development. Despite emerging studies from a small

number of research groups in North America contributing knowledge in this field, relatively little is yet known about the implications of parents' use of mobile devices for caregiving, even less for the social and emotional development of children or the parent-child relationship, and nothing for the parent-infant relationship. The studies used cross-sectional designs, which limited the conclusions that could be drawn about causation. The comparison between studies was complicated due to the investigation of very different aspects of parenting, caregiving and the parent-child interaction in the studies. Because of the above, there was also no ability to systematically synthesise the research. All of the above meant that the weight of evidence was low overall.

CHAPTER 4

Study Two: Methodology

A qualitative investigation of expert opinions.



Study Two's aim was to explore expert clinicians' opinions on parents using mobile computing devices in the presence of infants and young children (zero to three years-old) and the potential effects that parents' mobile device use has on infants, young children and parental caregiving. There were three objectives, first to describe the concepts of infant psychology and development that clinicians drew on to understand how parents' mobile use might interact with young children, second clinician's consideration of the perspectives of the infant or young child in this interaction, and third what gaps in knowledge and theory clinicians identified.

4.1 Rationale for method

Levels of evidence for practice and policy have expert opinion as the lowest level of evidence, but an essential starting point in the field in which there is as yet little known (U.S. Department of Health and Human Services 2000). This method is an established clinical research paradigm.

The research aims were exploratory, with a focus on hypothesis building. Employing a qualitative research methodology allowed exploration of clinicians' understanding of parents' mobile device use in the context of child raising. The choice of expert clinicians as participants rather than parents or children was considered carefully. It was considered that clinicians would be able to offer information about theoretical constructs related to child

raising and young children's development, as well as describe what they observed about parent-infant interactions and how this might be affected by parent's mobile device use. Clinical experts also offered the potential to consider what an infant experience may be.

The consolidated criteria for reporting qualitative research (COREQ) 32-item checklist (Tong, Sainsbury, & Craig 2007) was used when preparing this method for the qualitative study.

The three domains in the checklist are the research team and reflexivity, study design, and analysis and findings. Subheadings within these domains are presented within each heading or as subheadings.

4.2 Study design

The study was conducted using semi-structured interviews. Interviewing is a recognised approach when investigating a research field with a limited evidence base (Cohen & Crabtree 2006). It allows rapport building with face-to-face conversation that assists in gathering the personal language that can explore meaning, perceptions, and values (Newton 2010). It was also considered a means of gathering data in a context that was familiar and acceptable to clinicians in mental health (Newton 2010). It is a commonly used technique in health-related and public health research (Hansen 2006).

A semi-structured interview guide was used as this allowed some standardisation of the questions asked, but with the flexibility to change questions and interview length to follow the direction of the participants (Hansen 2006). This method acknowledges that not everything can be known about questions relevant to the topic prior to conducting an interview, and that one interview may inform the next in terms of questions asked (Cohen & Crabtree 2006, Hansen 2006).

Focus groups were used to interview a broader range of participants than would be possible with individual interviews, as well as allowing participants to talk amongst themselves about the research topic, clarifying and expanding views (Rice & Ezzy 1999). Focus groups have been used widely in health-related research (Hansen 2006). As well as discussions between participants allowing an unfolding of ideas, focus groups can function as a “quality control effect where participants check each other’s statements” (Hansen 2006 p.123). This was important as, prior to undertaking the research, I noted that online views on the research topic could be very polarised.

4.2.1 Participant selection and setting

Participants were selected in order to ensure that the data gathered were rich, relevant, and included diverse opinions. The clinicians recruited were from different services within Australia, and from two geographically separate locations. Clinicians with different training backgrounds were actively sought. Although the participants were known to me, it was not a convenience sample, but was purposively sampled (Rice & Ezzy) for clinical and professional experience, after discussion with my supervisors. This selection was based on our judgment of their interest in and understanding of social and psychological phenomena related to child raising; as well as their theoretical understanding of infants, and the parent-infant relationship and parental caregiving.

4.2.2 Ethics Approval

The study was approved by the Monash University Human Research Ethics Committee on 19th January 2015, study number CF15/70 – 2015000040.

4.2.3 Materials

An interview guide was prepared in advance based on the existing literature, clinical and research experience and relevant theories about parents' mobile device use and its potential effects on infants and young children, or impact on caregiving.

A question guide is the most appropriate technique in an emergent field, as not all questions could be known about this matter prior to the interviews (Rice & Ezzy 1999). The guide was trialled with the first two interviews and slight adaptations made to interview questions for subsequent interviews and focus groups. Questions were open-ended, and followed up with prompts to seek further elaboration or specific illustrative examples.

(Appendix A)

4.2.4 Procedure

Participants were invited via email to participate, and provided with an explanatory statement and consent form. Consent allowed opting out at any point in the process.

Participants were advised that their privacy would be protected through the use of coded identifiers, and that any identifying information would be removed prior to publication.

Interviews and focus groups were conducted in person at a convenient time and place for participants, usually at participants' place of work (including for one focus group at a monthly multidisciplinary meeting). With the permission of participants, interviews were audio-recorded.

4.2.5 Reflexivity

All human perception is subjective, in that two people describing the same event can observe very different things and describe different attributional models on the basis of their own past experiences, values and sociocultural background (Patton 2002). This

research covers an area that is highly subjective—how to understand and interpret the interactions of parents with their young children and describe the infant experience. The data and its interpretation has been affected not only by the participants’ backgrounds and experiences, but also that of the researcher. My position in the research is best described as “insider research” (Dwyer & Buckle 2009; Kouritzin, Piquemal, & Norman 2009), where the researcher is known to participants. In this case, I knew the participants via peer connections and a shared professional background in mental health and infant development/psychology.

My interest in the research topic stemmed from observations in day-to-day life, and my clinical practice in perinatal, infant, and child psychiatry, of how information technology interfaces affect human interactions. Thus, I bring to the research topic a thorough evidence-based understanding about what infants and young children need from caregivers, what promotes optimal early childhood development, and what factors affect resilience versus vulnerability in early childhood (Shonkoff & Phillips 2000; Schore 2001). This is firmly embedded in attachment and relational frameworks. My assumptions are that infants are born ready to engage in relationships and that from the time of birth—and probably before birth—neural pathways are developing that determine behavioural patterns for attention, emotions, and social relationships (Winnicott 1964; Bowlby 1969; Schore 2001).

Given that I share with my participants an area of work—a focus on mental health and child development—my supervisors and I undertook the research being aware of a need to be reflexive of my bias, and ensure that I was true to the data that emerged. However, it is clear that as with many qualitative researchers I went into the research with ‘a hunch’ (Altheide & Johnson 2011).

4.2.6 Data management and analysis

Data were managed within Microsoft Word and Excel, programs commonly available and familiar to the primary researcher.

Data gathered for this study was analysed thematically using coding and an iterative approach to thematic development that is well-established in qualitative research (Braun & Clarke 2006).

A coding guide was prepared in the early stages of data analysis to assist with methodological rigour and to allow sharing the datasets and definitions of words and meanings within the research team, as well as to ensure that the research questions remained relevant to the research findings. The data were approached with an open mind and using inductive analysis, which meant that themes in the data were identified as they appeared, rather than having *a priori* content in mind.

Data analysis consisted of the interviewer first transcribing audio recordings of interviews. Initially, codes relating to the interview guide provided a framework, added to by original themes from the data. A process of reading and re-reading transcripts, as well as re-listening to audio files, allowed immersion in the data and higher-level reflection with the development of themes across datasets. Once the data were open coded with conceptual labels, they were grouped to cluster similar codes and remove redundant codes, moving to a manageable number of higher-order thematic codes.

Quotations identified as illustrative were linked to themes. Quotations were reported in the findings with the numbered informant or focus group identified, as well as the profession of

the participants (for individual interview informants) or the group composition (for focus group participants). Quotations from across all datasets were used.

The primary researcher conducted the coding. Supervisors undertook some review and confirmation of coding in transcripts.

CHAPTER 5

Expert opinions: characteristics, perspectives, and limits of knowledge base identified by participants



Analysis of the data from the qualitative study is presented in Chapters 5 to 8. These chapters correspond with the research questions, the themes and sub-themes that emerged from the data. The chapters contain some discussion of findings, but a higher level of synthesis, integration with extant literature and theory development is presented in Chapters 9 and 10.

5.1 Experts' characteristics

Five individual interviews and two focus groups were undertaken, with 17 clinician participants.

TABLE 6. Key Informant Characteristics

| |
|--|
| <ul style="list-style-type: none">○ Australian clinicians from<ul style="list-style-type: none">▪ Two geographically separate locations▪ Ten different services including private practise, university affiliates, mental health, child health, family support and disability service.○ Five interview informants— two males, three females○ Two focus groups — all female<ul style="list-style-type: none">▪ Focus Group 1 — multidisciplinary clinicians, seven participants▪ Focus Group 2 — inpatient nurses at mother/baby unit, five participants○ Two interview participants with a research interest in computer based health interventions.○ Aged 30- 60yo○ Professional Discipline<ul style="list-style-type: none">▪ Psychology — two informants and one in Focus Group 1▪ Psychiatry — two informants▪ Social work — one informant▪ Nursing — midwifery and mental health participants- three in Focus Group 1 and five in Focus Group 2▪ Osteopath — one participant in Focus Group 1▪ Speech therapy — one participant in Focus Group 1▪ Music therapy — one participant in Focus Group 1 |
|--|

Participants are all recruits in the study including in the focus group. Informants are participants who were interviewed individually.

Participants' ages ranged from the mid-30s to mid-60s, and 80% were aged between 35–55 years of age. While participants came from very diverse backgrounds and services, one focus group was composed entirely of nursing staff at an inpatient mother-baby unit. This is a unit that accepts admissions from general practitioners, paediatricians and psychiatrists. Admissions are for infant sleep and settling or feeding problems, mothercraft education and assistance, and perinatal mental illness. In this unit, staff had 24-hour contact with mothers and babies over a period of days to weeks. They were judged to have unique access to mothers and able to observe their mobile device behaviour, as well as the ability to observe the interactions between mothers and infants over different times of day, and during different activities.

Participants and interviewees were all Australian clinicians in the fields of perinatal or infant mental health, early childhood development, and/or with an interest in the interface between information technology and human behaviour. Participants were from diverse professional backgrounds with very different personal experiences of mobile devices. The study sample was mostly middle-aged adults with many years of professional experience. Many talked spontaneously about experiences with mobile devices in their own families.

All participants were interested in the question of how technology affected human relationships. Most had considered the matter of parents' mobile device use before. This included general observations of how they saw friends and family use devices, and what they observed in public situations. Some had been aware of parents' use of mobile devices in their clinical work. Only one informant (2–social worker) disclosed that they had not really considered the matter before.

Informants (those interviewed individually) and participants in focus groups, were interviewed for about 45 minutes. Over this time, they were engaged in discussion about the research topic in a structured and detailed way. Participants were confident in considering device use and parents, parental caregiving, and older children. Discussion about an infant's experience occurred less commonly than consideration of parents or older children's experiences, and participants tended to use theoretical frameworks, vignettes, and personal reflections (which included how they felt at an emotional level about the matter) to explain how they considered the infant experience.

Despite differences in professional and personal backgrounds, there was little polarisation in opinions. Participants considered the question of the potential effects of parents' use of mobile devices on caregiving, infants, and young children and the parent-infant relationship

in a balanced way, with a tendency to consider the middle ground. None argued for a specific right or wrong perspective, but rather they offered a careful consideration of the matter from different perspectives showing that they understood the complexity and bidirectional nature of parents' use of devices while caregiving.

Wanting to know more about the matter was a recurrent finding expressed by participants. Many gave clear impressions of what they knew, but also of what they were uncertain about. Participants wanted more empirical evidence so that they could offer parents recommendations about mobile device use while in the company of their infants and young children. A few noted that they had previously discussed mobile phone use with parents in their clinical practice, if they felt it was a problem for parental caregiving or the parent-infant relationship.

5.2 How personal and professional perspectives informed concern.

Participants' personal opinions and professional experiences revealed three conceptual areas that interacted with how concerned a participant was: technology as transformative or as disruptive; infants as vulnerable, fragile and dependent or capable, flexible and resilient; and whether participants worked closely with infants as well as parents.

These three concepts interacted to determine the level of concern an informant had about the research question.

5.2.1 Technology transformative and infants robust

Participants who regarded technology as transformative, had few reservations about mobile phone use, considered infants to be resourceful and resilient, and considered that the benefits of device use for parents were considerable, tended to have a low level of concern:

So I don't have a bogeyman sort of concern about these new technologies. I think they can be misused, but they can also create a new version of what may be closer to the evolutionary space . . . and they've [babies have] got their competition apparatus, crying and throwing tantrums, gooing and being obligingly smiley and so forth, they have this huge repertoire of things that locks the mother in. Informant 4 – psychiatrist

Those with this perspective considered the need for children to be able to adapt to the world as it is: *"this is the world that we live in."* (Informant 1 – psychologist)

5.2.2 Technology disruptive and infants vulnerable

An alternative view was that of informants who saw technology as disrupting child development and/or family relationships, and who considered infants vulnerable due to their age and stage and their need for closely attuned care. They tended to believe that the risk of mobile devices interrupting this caregiving was greater than the benefits for parents:

The sense of how acceptable it [mobile device use] is, is potentially not being questioned enough. People aren't questioning it and its impact, and yet its impact is evident when you can see how much it is changing the interface of human communication, particularly with infants, where that human communication is absolutely crucial to their development. Informant 2 – Psychologist

5.2.3 Participants' professional background and beliefs

Another feature that revealed how concerned participants were about the effects on infants was close day-to-day clinical work with infants. For example, the focus group that comprised nursing staff who worked in a mother and baby inpatient unit were consistently more concerned about infants' ability to cope or adapt.

Focus Group 2 – inpatient nursing staff:

The usage is wide, like it's not just to receive phone calls. They're using it all the time and that's a lot of interruptions when you're feeding. . . . It's even play time though too, it's not just the feeds. Play time you can obviously be distracted a lot of the time, and there's lots of interruptions. Participant 2.

I just think they're not in the moment. If you're on your mobile phone you're not in the moment. Participant 4.

You're missing a lot, aren't you? Participant 2.

You're missing the interaction with your baby, enjoyment, you're missing their cues, you're not living in the moment. Participant 4.

A unique perspective and exception to these perspectives was expressed by one informant who worked closely with infants but was not concerned. This informant was very clear early in the interview that they had not had reason to give the matter of mobile device use by parents much thought, nor had it been of significant consequence in their personal or clinical life: “Well, it’s interesting [pause, hesitation] maybe I’m just not noticing so much?” (Informant 3 – social worker)

Another informant who was unique was the last to be interviewed. This informant (a child and adolescent psychiatrist) was chosen for their experience and formal training in infant mental health. The informant was also an early adopter of mobile devices and mental health applications (i.e. saw the transformative effects of mobile devices), yet was concerned about the effects of parents’ mobile device use on infants:

I think it intrudes into the parent-infant space in terms of gaze and stuff like that, and kids will have to work hard to get and hold their mother's attention. Informant 5 – psychiatrist

5.3 Participants self-identified gaps in their knowledge base.

Among the problems that participants identified was how to know how concerned they should be about parents' use of devices in the absence of good information or recommendations. This was indicated by participants often beginning or finishing sentences with statements such as "I personally believe", "I don't know, but I assume", or "it's just a thought" or expressing opinions as an emotional or "gut" response to what they had observed. One informant noted that observations that "stuck" more in one's memory were often negative ones, "so, of course it is bad vignettes I remember!" (Informant 3 – social worker).

The interest in having more empirical data available was a recurrent theme amongst participants, who offered two reasons for this need. First, they wanted to know more about whether to be concerned:

It is around balance, the quantity of time spent in front of it [the device] and that the acceptability of use is changing . . . which is obviously why research like this is important. Informant 2 – psychologist

Second, information was wanted about what may cause any adverse effects:

If we're suddenly told you're damaging your baby [by exposure to electromagnetic radiation], you're going to put your phones over the other side of the room. It's not an intimate device anymore." Informant 5 – psychiatrist

There was also a need to understand more about what happens when devices are being used:

I would be SO wanting to look at the interaction [between parent and baby].

Informant 3 – social worker.

5.4 The challenges of finding an infant perspective

Despite the research questions and semi-structured interview guide focusing on caregiving, parent-infant interactions and child development, it was consistently more difficult to obtain detailed considerations about infant perspectives than about parents' experiences or caregiving. Participants were more able to conceptualise benefits and risks for parents than for infants and young children. Also, it was noted in data analysis that participants and focus groups commonly detoured to discuss young children's own device use and the effects it may have on them.

This issue was considered by informant 5— a psychiatrist—who considered that descriptions and understandings in the field of infant mental health were still emerging and that, as yet, we did not have adequate language or frameworks to describe how a parent and young child's interactions could be understood on a moment-to-moment basis. Further, the informant discussed the absence of ways to describe the challenges of parenting in an "authentic language". This impacts on the way we conceptualise parent-infant interactions, including mobile phone use.

Often when infant experiences were described, vignettes or observations that captured context and emotional experiences were used. Informant 3— a social worker—described a vignette of a mother on a mobile device watching a movie while on a long train trip in the

company of her young girl who had no toys or entertainment, except a doll. They told of the concern of watching the little girl make “interactive overtures” to her mother and being told to “stop bothering me and behave . . . if I’ve told you once, I have told you a million times!”. The informant talked of feeling sad that the time was not being used to share experiences because the mother was “mindless about the girl’s need . . . I don’t think I would have minded if she [the mother] had used the device as a plaything with the little girl, but it was mum getting massive separation”. The participant told of feeling so concerned for the child, with hours still to go on the train, that she offered the little girl a napkin with pictures on it to play with, and of her relief that the mother was not angry, but instead softened and engaged with her daughter around “putting the dolly to bed”, and her hope as she left the train before they did, that “it would last the extra hour” for the sake of the little girl.

In this case, the use of a vignette may represent a way in which an informant could present context, and describe a scene and setting along with an emotional experience, which was easier to verbalise than a hypothetical concern about a young child.

One common viewpoint was to consider an older child rather than an infant. Participants who considered a young child’s experience often wondered about a situation by imagining themselves in an infant’s position:

Focus Group 2 – inpatient nursing staff:

Interviewer: *The baby is looking at the parents’ face and the parent’s face is actually averted?*

Yes [pauses and says softly], *the baby must feel a bit alone at times, because the parent is not available.* Participant 1.

[Group pauses, everyone still, looks like they are considering this with concern].

But, there's actually some positives, especially in here where they're an inpatient and they're away from their other family, they bring dad up on the screen and the baby can see dad. Participant 2.

A connection, yes, for an older baby. Participant 5.

The pause in this discussion was of interest. In my clinical work, I have found that the emotional distress that it can cause to consider the relatively powerless position of infants and young children is significant. Given that I did not ask participants what they felt in the pause, only noting their non-verbal communication, it is entirely conjectural to consider what the participants felt in terms of their emotional experience. I can only hypothesise about the meaning of this pause. It may be that the participants considered my “wondering” about how a baby would cope to not be important and so changed the topic, or that they were considering the positives along with the negatives.

5.5 Mobile devices: transformative and disruptive social effects.

There was a consensus among participants that mobile devices were rapidly changing the face of human interactions. “This is potentially an enormous change, whether it is a good or bad change, that is something that has to be seen” (Informant 4 – psychiatrist).

This change was seen as moving out into everyday life and affecting how we connect with others and the world:

But literally, I am assuming that we were living in a world where there is constant awareness of what is going on electronically, and much of this comes through tablets

and mobile phones, you know, that we check if something has arrived. Informant 1 – psychologist

The change was also seen as potentially affecting or displacing other relationships or activities. With this came changing norms of use which allowed something that was usually socially unacceptable to become acceptable: “If you are sitting having a cup of coffee with a friend you wouldn’t pull your book out and read it!” (Focus Group 1 – multidisciplinary group).

A universal theme in the interviews and focus groups was that parents, much like everyone else, were using mobile devices, and predominantly smartphones, on a day-to-day basis, and that these devices change face-to-face and online lives, including in the parenting-infant space.

There were no suggestions from any participants that parents’ patterns of use were different from those of the rest of the population. In the data gathered, greater weight was given to the idea that parents had pre-existing patterns of use of mobile devices before raising children, than that parents considered their device use and modified it.

CHAPTER 6

Caregiving and mobile devices: “A blessing and a curse”



The findings in relation to parental caregiving and mobile device use have been outlined: device use was assumed to co-exist with caregiving; mobile devices were playing a role in everyone’s lives and the interruption that mobile devices caused was possibly different to other things that interrupted parenting; and mobile phone use could be seen as transformative or disruptive due to the device’s capacity to change lived experience.

Participants also considered the matter of how caregiving interacted with device use. This was described by one informant as “a blessing and a curse” (Informant 5 – psychiatrist).

6.1 Benefits for parents of device use

The need for parents to be supported and engaged with others while caregiving, rather than isolated and struggling, was a universally accepted theme. The concept that in contemporary society, this support would happen via online interfaces, was also endorsed by participants. The benefits for parents of online connections to others to mitigate isolation and to gather information about child raising were consistently expressed.

Geographical boundaries were seen as less important given online connections, with the potential for families and social relationships to come together in virtual rooms that allowed parents to connect with others:

I think mobile devices are creating their new kind of village life, where the whole family lives in the one room. It’s a virtual connection instead of a real connection, instead of all the different rooms in different places. But they’re essentially tied

together, and I think as people get used to this medium, the sense of geographical separation is going to disappear with all of the pluses and minuses that this entails.

Informant 4 – psychiatrist.

The positive aspects of online connections to others were that they offered support that could be accessed around the clock:

I think it suddenly floated out into most lives, because people are using their mobile devices 24 hours a day, so they may be checking their Facebook while they're settling their baby to bed at night, for example, at three in the morning with a feed.

Informant 4 – psychiatrist.

Because of this, a primary carer's sense of isolation could be reduced, either with the social connections available, or because shared parenting with a partner who was absent was easier:

Because it seems that parents will be in contact all day, so maybe parenting feels more shared. Less "let's wait till your father gets home" and more shared decision-making.

Informant 3 – social worker.

Information could be accessed about baby care, health, and wellbeing: "You can look up online and get an answer, you can talk to various people at any time day or night"
(Informant 4 – psychiatrist).

As well, recording family life to share with others and the use of online social networks provided a way to record and keep narrative stories of self or children:

But if I'd had Facebook when my children were younger, I think I would have used it. So someone commented recently, it made me realise that their Facebook postings over the course of the life of the child is actually a fabulous recording, like a diary, which is lovely, because there so many beautiful golden moments of my children that I would have probably posted. . . . And [I] have lost all that, I never recorded it. There are attempts to write in a scrapbook, and I knew that my mum was writing some things down. But I think I would have been a more active Facebook user if my kids were younger. Informant 2 – psychologist.

One informant considered that smaller families meant new parents had rarely been exposed to opportunities to practise child raising before they had their own children, and that this social and cultural change—along with parents living often geographically distant to older generations—contributed to parents lacking knowledge, confidence, and feeling unsupported when parenting. He felt that online connections might ease this, as well as improve mental health:

They might be less depressed than they otherwise might be. One of the big problems is that people have very limited social contact in a nuclear family set-up, where there is single accommodation, there is very limited social contact, and a very limited ability to engage in meaningful social roles outside of the child-rearing experience, and that could be a potent factor in some people and how it produces depressive symptomatology. Informant 4 – psychiatrist.

Patterns of use that provided distraction and were calming were considered, including that device use may be replacing more traditional ways to calm and escape from a difficult parenting moment:

They could be distracting themselves from the child who is crying, as an alternative to shutting the door which is a more traditional technique. I think it's quite an inventive space. Informant 5 – psychiatrist.

Also considered was that social networks on mobile devices offered relaxation and a respite from infant-focused tasks:

Parents are using that as a tool to regulate themselves, to calm themselves.

Sometimes perhaps it was "I will go outside and have a cigarette". Maybe now they're thinking, "I'll open up and have a little browse on Facebook". Informant 2 – psychologist.

Device use was seen by some as increasing the ease with which parents could manage their day-to-day life:

It just may mean the parent is more efficient at life maintenance, so this could potentially leave more time and emotional availability [for the infant]. Informant 3 – social worker

However, others saw device use as crowding life and reducing time to relax:

Mums actually don't have any downtime, because its breastfeed and be on the phone now, their head's buzzing with info. Our life these days doesn't stop regardless. Focus Group 2, inpatient nursing staff.

There was an array of views about whether this device use allowed parents to be ready to engage with their infants by providing a calming experience, versus whether it took parents away from being accessible to children due to distraction:

It's a moot point about whether that [device use] puts them into a more accessible space for the baby, because it is distracting and soothing them, a bit like meditation . . . or it may be getting off the subject of the baby altogether Informant 4 – psychiatrist.

Consideration of the effect parent's use had on infants depended in part on whether the use was more calming or distracting, and whether it was child-centred or child de-centred.

6.2 The negative aspects of device use for parents and caregiving.

A commonly expressed concern was an awareness that online connections to others could lack filters, or require a parent to choose to actively filter the connections they made. This might result in communications that could be negative, blaming, focused on comparison to others, or anxiety-provoking.

Online connections were seen to have limitations. Many participants considered they did not have the same quality of interactions that face-to-face engagements offered:

I don't think you want to overstate the benefits of the device [for online connections].

It's not a substitute [for face-to-face interactions]. Informant 5 – psychiatrist.

You can still get very, very lonely. Focus Group 2- inpatient nursing staff.

While the widespread view was that online social interactions and support could have a positive effect on parents, there was a less commonly expressed view that in online interactions—as in any social context—there could be prohibitions on sharing the difficult things in life in an honest way. Some expressed the view that social comparison, and sharing of glossy or idealised images and stories of self were heavily weighted in online social media. They felt that this weighting may lead to a discourse that was blaming, or eroded parents' self-confidence, self-worth, or perceived caregiving ability. This might result, they

said, in a need to compare oneself with others and “push it up to the cameras type stuff” (Informant 5 – psychiatrist), or could have the effect of confirming social hierarchy via online connections, and that this might include the baby in that dynamic:

I think that social things that are about the babies are an important area to look at, how much of what they’re doing is about baby? Is it about the status of the baby and therefore their status in their social network? And how much of it is approving or disapproving? Informant 4 – psychiatrist.

Informant 2—a psychologist—spoke in detail about a young mother’s connection to social media while raising her first child in an isolated and disadvantaged setting, of her “chronic” phone use which was her “safety blanket” to deal with the “high degree of scrutiny” she was under from health professionals. This not only rendered her absent from her baby for long periods, but also constantly reinforced the values of Western society “pop culture”. This had the effect that, for example, the mother spent the limited money she had on branded shoes for a baby who was not walking, and the informant considered she did not need. The informant recounted asking the mother about her thoughts on the “Kardashian culture” of a focus on branded objects:

I remember saying, “if you had shades of this in your life, if you were able to have those clothes or that thing, what would that be like?” She [the mother] said, “I would be happy then”.

The informant considered that the mother’s immersion in this online world was a double jeopardy. Not only was it her support and social interface (that also took her away from interactions with her baby), it was also feeding her belief that objects or possessions would

make her happy (at the same time exposing her to advertising and access to an interface to purchase items):

I guess I'm talking about the impact in terms of culture . . . the way the individual grows into that, they are immersed in the [online] culture. It is in the fabric of what we are doing. . . So, the increased accessibility to media is thwarting [other family and society] culture.

The implied constant availability of mobile devices was seen as a problem. Participants raised concerns about the ease with which “an emotional hand grenade” (Informant 2 – social worker) could be thrown via a mobile device, that coming across difficult or disturbing content could happen in a very sudden and unexpected way, and that in the past parents would have been much less accessible to the intrusion from others:

There may be some risks associated with how people use them, and people's capacity. . . some people are too nice, and don't feel able to protect themselves or their children. . . there is this sort of constant implied availability to everyone.

Informant 3 – social worker.

Further, this required parents to be cogent of the problem, guard their boundaries, and be able to say no to intrusions:

It may be that if the parents can't put a boundary around other people's intrusions . . . they kind of have to choose to do that, and they have to manage it. Informant 3 – social worker.

Absorption in the device, multitasking, and distraction were all aspects of mobile device use that all participants considered when thinking about the negative effects of use on

caregiving. They considered that these things also affected the relationship between parents and infants.

6.3 Do parents put devices aside when caring for children?

Participants had many different opinions on whether they considered that parents put their devices aside when caregiving. There was no unifying or dominant theme evident that explained reasons for parents using or not using a device while caregiving. Rather there was agreement that parents had always had a large number of things that interrupted their attention to their children, and that mobile devices were just one of those things.

Some considered habits of device use, including the addictive nature of devices:

Focus Group 2- inpatient nursing staff:

People just aren't really able to turn off from them, it's like an addiction. People cannot turn their phones off or leave it until the morning, they're always checking. Participant 2.

I'm so glad I didn't use them when I was feeding my children because I think about what I would miss out on, because I am addicted to mine. If I had a baby, I would find it hard. Participant 4.

Others considered it was not the lure of a device itself, but rather related to personal choice, or alternatively to problems a parent might be having, that increased the need to be distracted or distance themselves from a baby:

But we have this idea that people get addicted to screens, that they can't turn off, can't move away. I don't think it's necessarily true, unless there those issues anyway.

Informant 2 – social worker

So I don't think the problem is the device, there may be some risks associated with how people use them. Informant 3 – social worker

Others related device use to a parent making a choice to use a phone as a distraction from caregiving:

Because if you're mum and you've got a baby, well most mums are totally focused on their baby. I don't know, I just feel like if there is a tendency to be distracted . . . choosing to be totally absorbed in whatever on social media, instead of looking and interacting with their baby, that's a choice they're making! Focus Group 1 – multidisciplinary group.

Others commented on family or social group norms of device use:

I think it's interesting your background, because I'm the oldest one here, and for many, many years we didn't have a television. When I'm with my family, we're not distracted by phones. Even the younger ones are not distracted by phones, because that's the expectation in the family. Focus Group 2 – inpatient nursing staff

A number of participants considered that the type of parenting style or the attachment relationship may drive device use:

I think you're going to get a spectrum depending on the basic whereabouts of the parent-child relationship in that family, or the family dynamics. Some families are quite

neglectful of children. Others are very solicitous of the child's needs . . . It's a very varied picture. I think there is room for people who are thoroughly neglectful to show that neglect via electronic channels. Informant 4 – psychiatrist.

Others considered that “if parents need distance from their children then they find a way to do it whether they have a mobile device or not” (Informant 2 – social worker), and that this might be primarily a reflection of attachment style manifesting itself in how a parent uses a device and prioritises the need to attend to a child. Mobile devices are “tools that parents use to defend against availability [to their infants]” (Informant 2 – social worker).

CHAPTER 7

Infants, the parent-infant relationship, and mobile device use



When analysing the data and considering parents' use of mobile devices related to infants and the parent-infant relationship, the predominant theme that emerged was of the pervasiveness of mobile device use by parents: "I mean it's truly everywhere" (Informant 1 – psychologist)—leading to concerns about parents' use and the potential impact on infants and the parent-infant relationship. The important question that emerged was how infants and young children managed this "brave new world"? (Informant 5 – psychiatrist).

A concept proposed by Winnicott, that the baby exists only in relation to their caregivers, provided a workable framework for the analysis of the data relating to effects on infants and the parent-infant relationship: "There is no such thing as a baby . . . if you set out to describe a baby, you will find you are describing a baby and someone." (Winnicott 1952). Considering the data in light of this quote allowed the identification of five organising themes, which did not separate the parent-infant relationship from the infant, or the mechanisms from potential consequences, but rather allowed the interlocking components of these data to be presented in a meaningful way (Figure 2).

Figure 2. Five organising themes related to parents’ device use, infants, and the parent-infant relationship.



7.1 Theme one. Babies are “time sharing” their parents: attention and distraction.

Attention means to notice, consider, or take special care of something or someone (Stevenson 2010). It allows information to be processed, acted upon, and remembered. It is the cornerstone of learning and of developing and maintaining relationships. Attention often involves eye contact or listening. Distraction is something that prevents someone

from concentrating on something else, or that offers a diversion or recreation (Stevenson 2010).

Some participants were concerned that device use may alter parents' attention and cause distraction from the child: "the parent is time-sharing [the baby's] signals with a wide range of other compelling devices" (Informant 4 – psychiatrist).

Participants gave accounts of attention as a limited resource in our information-flooded world:

I think that attention and concentration is a very, very rare resource and becomes rarer as we speak, because we are completely flooded by information, and it is very difficult to filter and very difficult to focus on tasks that are really important and relevant. Informant 1–psychologist

One informant considered in detail the concept of attention, and the effects on attention in a world where information was not limited. The informant talked about Herb Simon, an economist, who defined attention economy. The informant used the idea of attention economy to explain parents' need to manage attention and cope with split attention as well as to prioritise attention to children when they need it:

We have multiple devices all the time delivering information to us . . . our attention, our ability to concentrate on something is suffering. Informant 1 – psychologist

Participants considered the concept of full versus split attention, distraction and multitasking. Some of this consideration was in relation to safety; some considered that a young child sometimes needed full and constant attention to keep them out of harm's way and that the distraction of mobile device use would affect this:

Of course, then there's the risk of the baby harming themselves, because you know you've got to have eyes in the back of your head when you're watching a baby. I've seen things happen because mum's been on the phone, and its [the baby] banged its head. Focus Group 2 – inpatient nursing staff.

Others considered that shifting attention allowed monitoring of safety:

I'm sure whenever there is direct parenting involved and they have to control their children, look after their safety, then I'm certain devices are moving to the side.

Informant 1 – psychologist.

Split attention was considered to be a common state for parents. Participants were clear that parents were able to make a choice to put a mobile device aside, and that occasional use, or use that focused on day-to-day managing of life, was not seen as causing a highly problematic level of distraction:

So if Mum is breastfeeding or feeding with a bottle, if she is to quickly text message and reply and then put it down, I don't see that there is a huge degree of harm.

Informant 2 – psychologist

However, this may sometimes require an infant or young child to make a bid for attention to prompt a shift of attention to them: “I think it's a divided attention thing. And kids will have to work hard to get and hold their mother's attention.” (Informant 5 – psychiatrist)

Some considered that even when a device was put aside, the idea of split attention still persisted:

But I would not be surprised if many, many people have some awareness of their mobile phones, maybe check some apps to see if something has arrived. I mean it's truly everywhere, and I'm assuming that many parents have an awareness of what's happening in the social networking world at all times. Informant 1 – psychologist.

How this might affect an infant was not explored by this participant, but other participants explained it as babies having to “time share” their parents (Informant 4 – psychiatrist).

There were three ways in which device use was seen as creating a problem for the infant and the relationship.

First, parents not being available to their baby due to distraction. Use that resulted in a high level of absorption and a lack of responsivity to an infant's cues or needs, was perceived very differently to brief or occasional use: “It's almost a form of neglect in a way, if the child's needs aren't being recognised” (Informant 2 – psychologist). In this case, the concern was that a parent may be unavailable for an interaction with an infant.

Second, distraction interrupting an engaged interaction. Participants expressed the view that mobile devices posed a potent distraction for parents, due to the proximity of devices to the parents, the devices' portability, and their capacity to move attention from other things to the device due to sensory stimuli from the device.

While not being available for an interaction was one component, others commented that a mobile device may be a distraction from a well-engaged interaction, resulting in a less engaged interaction or an emotionally dysregulating experience for the baby:

Focus group 2 – inpatient nursing staff:

I had an experience with a disadvantaged girl who was feeding her baby quite nicely and quite beautifully. Then her phone rang and it was a message that clearly emotionally dysregulated her - negatively. She put the baby down and focused on the phone. Prior to that she had been going quite nicely, then she just became dysregulated very quickly, which she is want to do. But I'm thinking if you didn't have that phone there it wouldn't have happened. Participant 4

The interruptions wouldn't happen so often or be so immediate [without a device nearby]? Interviewer

Less immediate yes. Participant 4

This attentional shift might come from focus on a device when an outside interaction or stimuli interrupted, such as a call, text, or alert. However, participants also considered that the attentional change may happen within a child-focused activity with a parent:

Focus group 1- multidisciplinary group:

Parents are interrupting the process [when getting out a mobile device to record something], it might be in a middle of the song or something, and there will be "oh, that was interesting, can you do that again" Participant 3.

Yes, aarh! [lots of laughter and agreement].

Funny, yes, the importance of capturing it. Participant 3.

Can you do that again because I didn't catch it. [Laughing] Participant 4.

While this was a light-hearted conversation in the focus group, there was awareness that even if the interruption was not initiated due to a lack of attention to the child, but as part of the interaction, it was still seen to interrupt the engagement.

Participants described, for example, the great joy parents take in recording a moment in time and sharing this with a young child or via social media. So, while the positives of this were noted for the parent, participants questioned how this might change the quality of the interaction, and that the effect on a young child or infant might still be of disengagement, or interruption.

The third way in which attention was considered in mobile device use was the effect that attention to a mobile device has on replacing other things.

I think it's a distraction from other real activities, real human activities, the ability to go and be able to enjoy nature, or enjoy other sorts of pursuits". Informant 2 – psychologist

This displacement included activities such as talking to a baby or young child, or play, and was described as happening more often than it used to:

They're not talking to the baby so often? Interviewer

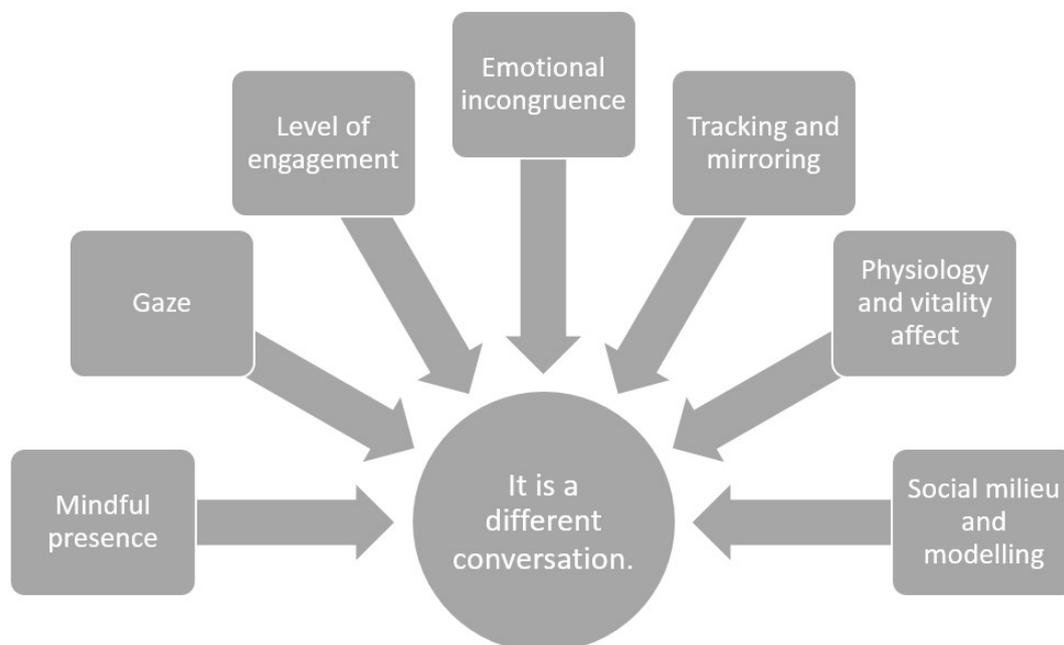
I just think years ago they [parents] used to talk more while they were feeding, whereas now they don't sit down and just talk to their babies or children. Focus group 2 – inpatient nursing staff

As illustrated, displacement of other activities was considered broadly for the effects it might have on gaze, conversation, getting to know a baby, and being present in interactions.

7.2 Theme two. “It’s a kind of different conversation”

While participants commented on different aspects of a “conversation” between infants and parents, all commented on features that changed the quality of the parent-infant interaction—that when devices are present, “it’s a different kind of conversation” (Informant 5 – psychiatrist). Aspects of a change in conversation were described by participants under seven key sub-themes (Figure 3).

Figure 3. Sub-themes: a different conversation



Semiotics is the study of signs and symbols and their use or interpretation (Stevenson 2010).

When considering the broad definition of conversation in semiotics, it is defined as “both verbal and non-verbal face-to-face interaction” and includes subtle and complex social, cultural and personal components (Bouissac 1998). Communication can be affected by factors outside of the people communicating, such as the channel of communication (face-to-face, via the internet or phone), as well as personal factors that might limit sight, hearing, and physical mobility. Conversation requires meaning-making via verbal and non-verbal

exchanges; turn-taking and turn-giving; and non-verbal communication, such as posture, facial expressions, eye contact, or listening, and “acoustic or visual pauses”, such as “silence and stillness” (Bouissac 1998).

Two examples of this sub-theme were given by one informant who explored how an adult experienced perturbation in a conversation.

The first quotation is the informant’s account of her experience during phone conversations with her husband:

I mean, the best parallel I can give is my own experience as an adult. If I ring my husband and talk to him about something, I can tell if he's looking at a screen. Because he's half-listening, because he's doing something else, and he is doing something that's quite engaging and really taking his attention. And so often, when I ring him he'll be in front of a computer screen, and he's just not reacting to what I'm saying and I get frustrated. Now the question is: what's that like for an infant? What's that like for attachment? What's it like for co-regulation? Because I think it is negative. You know, because I get frustrated with him and I go, “Are you looking at a computer screen? Get off the screen, listen to me!” Or I say, “Right, I'm going!” and then he'll look away [from the screen] and realise I'm pissed off. So this is two adult brains communicating with a screen in the way, and in the attunement, you just know immediately, it's different. Informant 5 – Psychiatrist.

This explains the experience of a conversation in which there is a distraction or interruption. The informant, even as an adult, had to guess at what was wrong as she could not see her partner. But even knowing the cause, it was emotionally unsettling and she had to work

hard to engage her partner fully in the conversation, sometimes succeeding, sometimes giving up or getting angry. She also considered this from an infant's perspective and the effects it may have on them and on the relationship.

A second quotation was in relation to technical problems with the interview with the same informant. This interview was conducted via teleconference. In order to reduce a delay in the audio connection, I turned off the camera on my side of the teleconference, so the informant could not see me, only hear me. This was the informant's response to me inquiring about whether turning my camera off had helped the conversation:

Well that's good, but I think it highlights another thing about tracking and a conversation, is that I'm going to read off a lot of your non-verbals and your gestures and I've lost those now. I can hear the inflection in your voice but I can't see your facial reaction to what I'm saying, so it's going to be a different kind of conversation. And I think this parallels what I'm thinking about with smartphones [and babies].

Informant 5 – psychiatrist.

This quote introduces the idea that when sensory feedback is missing, communication is changed, the experience is different, aspects of a conversation must be guessed about, and cues are unavailable.

The quotations in their entirety capture the qualitative change in a conversation which would not be communicated by its component parts. It communicates not only the informant wrestling with concepts as she talked, but also the struggle for an infant in trying, trying again, and trying a different way to engage a parent. It also perhaps captures the

confusion this struggle, and the parent's unclear cues may generate in the parent-infant conversation.

While considering the component parts of a change in conversation, it is important to clarify that infants have always had to compete for parents' attention. That is, parents have always had interests, distractions and activities to be involved in apart from caregiving and a focus on an infant or young child. Thus, the sub-themes presented are not done so to suggest that they are necessary for ideal or even good-enough parenting. Rather they are employed to understand how device use may change the experience an infant has of their parent, the infant-parent relationship, and the degree to which changes in the quality of conversation are observed to occur or have altered due to device use.

7.2.2 Mindful presence

Mindful presence is a "mental state achieved by focusing one's awareness on the present moment" (Stevenson 2010), and relates to noticing and experiencing the here and now, rather than being distracted by internal or external stimuli. Presence in mindfulness allows the grounding of awareness in the here and now in order to be stable (Hanson 2013).

Participants described the importance of the mindful presence of an adult in experiencing and sharing joy with a young child, in noticing the moment-to-moment experience of the child, and in getting to know their baby, as well as the effects this may have on the infant's future development: that the loss of this, replaced with a distracted presence because of mobile device use, may affect the quality of a conversation.

It is this distraction from the joy of one-to-one interaction. I think it detracts from people being mindfully present, it detracts from people being comfortable with just

watching and delighting in their child . . . I think the joy and the essence of human communication and interaction in real-time is getting lost. Informant 2 – psychologist.

7.2.3 Gaze

Gaze is defined as “a steady, intent look”, particularly with purpose or thought (Stevenson 2010). Gaze was described as a mechanism that indicated that attention was elsewhere and the quality of a conversation changed, but also the effort a baby might have to make to get that attention:

But they are not very observant of the feeding. They're texting, not observing what's going on with the feeding of the baby. Focus Group 2 – inpatient nursing staff.

I think it (the mobile device) intrudes into the parent-infant space in terms of gaze, and kids will have to work hard to get and hold their mother's attention. Informant 5 – psychiatrist.

As well as in indication of where attention lies, gaze was described by participants as having an effect on a baby and the relationship of a parent with a baby, as it was seen as a critical component in establishing a parent-infant bond and maintaining that attachment. It was noted that this required mutual gaze, not just one member of the dyad looking at the other: “The attachment is affected because there's no interaction with the baby's eyes looking at the mother, they're not looking at the baby, not noticing.” (Focus Group 2 – inpatient nursing staff)

Gaze was also considered a non-verbal component in social interactions and determining intimacy:

Focus Group 1 – multidisciplinary group:

I also wonder if being distracted by devices can impact on social skills. Participant 3

Turn-taking, talking, and looking in discussions. Participant 2

. . . and the idea of eye contact being part of a social interaction. Participant 7

Without the gaze of a parent and shared gaze, an infant might feel alone, which may affect a developing sense of self:

I wonder about the side of the face, because often you're holding [the phone] away

[mimes holding imaginary phone in one hand looking at it, imaginary baby in the

other], so the baby is actually not seeing a whole face but one side, a different part of

the body. Focus Group 2 – inpatient nursing staff

The question was posed about whether a parent's gaze avoidance, through displacement of gaze to screens, affected how an infant or young child came to understand and model closeness.

I'm just wondering if we're teaching children . . . [pauses]. To me, breastfeeding is an

intimate moment. Are we teaching children that in intimate moments you can turn

away and look at your screen and not even look at the person? Because there's

nothing more intimate than looking eye-to-eye at someone. Are we teaching our

children that that is not important? Focus Group 2 – inpatient nursing staff

One informant in the study group spoke in detail of the role of gaze in attachment relationships and bonding, as well as the potential that a baby might learn eye contact via what they see their parent doing. She described the vignette of a disadvantaged mother

who used her phone to calm herself and avoid contact with the baby. This informant considered that the baby never saw his mother look at him, rather he saw her gaze diverted away from him. The baby was gaze avoidant with his mother and others. The informant had worked intensively with the parent because of these and other concerns related to the baby's safety and development. The informant felt that the mother's mobile phone use set patterns of gaze between the mother and baby that were different from what they would have been without the phone:

But I had one of these "ah ha" moment . . . her [the mother's] pattern of eye contact was changed by the presence of the phone . . . the baby's averted gaze mimicked mum's gaze [to the phone]. So, if the baby was in arms here [motions baby in left arm, phone in right], mum was here [motions looking at phone], always looking at 90° away from the baby . . . Informant 2 – psychologist.

Interviewer: *If she hadn't had had the phone, do you think that she would have gaze avoided?*

No, I think there would have been much more appeal and attraction to look at the baby, there might be, and again this is conjectural, but without the stimulation of looking at the phone, the next most stimulating thing would have been the baby's face, I would hypothesise. Informant 2 – psychologist

When this hypothesis was put to another informant in the course of a later interview, the informant questioned the causal effect of a mobile device, considering that there may well have been other factors that affected gaze:

I don't know about that. It's speculative. I think that's a big call. I think gaze proximity in relationships are very complicated and there's a contribution from both the baby and the mother. . . If she [the informant] was in the room with this mum and baby and had a sense of that, you've got to trust that, but I'm wary about it. Informant 5 – psychiatrist.

Another informant considered the role of gaze in directing attention to a phone. That babies would look where a parent looked, and “so the baby, processing this, is going to realise pretty quickly in its non-verbal way that [there] is a whole lot of interesting stuff going on out there”. Informant 4 – psychiatrist.

7.2.4 The level of engagement in a conversation

Qualitative change in a conversation was expressed as an interaction “going nowhere” (Focus group 1– multidisciplinary group) as well as being interrupted, pruned, not shared, or things going unnoticed.

Some noted that what was displaced was the spoken part of conversation itself:

I was thinking about the effects of language. I was on the bus the other day, and there was a little girl, and mum was obviously texting, and the little girl was trying to communicate with mum, talking to her. And it just escalated where she ended up singing and shouting, trying to get her mum's attention. And mum was just answering in monosyllabic grunts, or “no” or “yes”, or . . . and the child was trying to engage in conversation, and the conversation was going nowhere. So, I was thinking about language, and I was thinking for babies when you're trying to develop the language. Focus Group 1 – multidisciplinary group

In the situation described, the parent was distracted, the distraction led to a conversation that went nowhere in content, and provoked bids for attention by the girl. What the participant described unfolding was a quest by the little girl for attention, by escalating her behaviour, “singing and shouting”, and in the mother’s avoidance of engagement with “monosyllabic grunts”.

The displacement of communication in the above case was described as a change in a verbal exchange. Other participants considered the pre-verbal exchanges, and made similar observations about conversations that might happen via gaze or play, and of the pre-verbal reply that a baby can make. It was noted that these conversations may occur less often or be more interrupted because they were displaced by attention to a mobile device:

They [mothers] have all got phones out on the unit. Everybody, whether they’re depressed, or anxious, or not. The phone is out and the baby is facing away, or they’ve got their computers with them. They all do it . . . and dads, they’re on their phones too, they’re not playing with the baby. Focus Group 2 – inpatient nursing staff.

7.2.5 Emotional congruence

Congruence is “agreement or harmony; compatibility” (Stevenson 2010). Thus, emotional congruence is the degree to which an emotion fits a context or other experiences associated with it.

The emotional congruence of parents’ responses was considered by many participants. Participants observed that, at times, device use resulted in parents expressing emotions that were incongruent with the face-to-face conversation or situation, because online content

that was being accessed carried a different emotional load. How this might affect babies was considered:

One of the things that occurs to me, is that if you've got someone on the phone, they can actually be reacting emotionally in multiple ways without any trigger apparent to people, including the baby. So, you may have a parent going from anger to sadness, and there is no context for a baby or a child to make sense of that. Focus Group 1 – multidisciplinary group

Differing accounts given displayed consideration of a wide range of ways in which this could affect a conversation:

I was thinking about the physiological response to reading a lot of it [online content] through Facebook. Facebook is a classic because it is so instantaneous, as you scroll through, oh that's joy, that's a relief, that's disgust . . . and just wondering what the baby would pick up from that. Focus Group 1 – multidisciplinary group

They might be doing something that is frightening, erotic, soothing, pleasing, pro-social, antisocial, you know "shoot 'em up, chop 'em up". They might be accessing soothing baby music. Informant 4 – psychiatrist.

Participants considered that the effect of this might be confusion for the baby, not understanding what the parent was responding to, or why, and thus not understanding how they feel themselves:

And they're having often quite serious conversations on the phone and the baby's seeing that face. Focus Group 2 – inpatient nursing staff

Because on the one hand she [the mother] will be responding to the conversation she's reading on the smartphone or the content she's reading, that will present a certain affect in the mother's face. Then the child will read that, and that will be confusing in terms of not tallying with their [own] emotional state.” Informant 5 - Psychiatrist

7.2.6 Tracking and mirroring in a parent-infant relationship

One informant (Informant 5 – psychiatrist) presented material that was of a specific and technical nature, and showed a high level of understanding of the principles of infant psychology as they relate to the parent-infant relationship and caregiving. She also endeavoured to understand what it was like for an infant when a conversation was going nowhere, when a parent was not mindfully present, or when a mobile device displaced other activities. She considered the effect, the mechanism of the effects, and the consequences. To explain this, she considered concepts of “tracking” and “mirroring” of a baby’s emotions as an important component of the parent-infant relationship which may be affected by mobile device use.

So there are two things. Number one, it's a fractured tracking of the infant.

The informant considered the effects of distraction by mobile devices and a delay in response, or a non-response. This resulted in a mismatch in emotions between an infant and parent. It also affected how well a baby could get a parent’s attention, because a parent was missing a baby’s cues. While a parent could manage this, and have a continuous experience of their baby, the informant considered that the baby’s experience, because of their age, immaturity, and sensitivity to the need for a responsive caregiver, would be fractured:

It'll be quite a discontinuous thing. I kind of liken it to a parent on drugs, where the tracking is not so good, but I think it will be similar to that. You haven't got a fully switched-on parent and they're missing stuff. But I think it's different [to drug use], in that the device can get in so close to the parent-infant space and interfere with that moment-by-moment co-regulation between the parent and the child.

She considered the varying effect of this fractured tracking, including that a delayed response or non-response might be distressing for a baby. She referred to developmental infant psychologist Edward Tronick's experiment, where a parent is instructed to interact with their baby and then stop this interaction, showing only a "still face" to the baby. This phenomenon might result in the baby being confused about the parent's intention in the same way that a baby of a depressed mother might be:

If you think about a mum with depression, or a mum who's highly anxious, they're [the baby] also going to get a mixed affective experience. They're going to have trouble working out "what is mum's anxiety or depression?" and "who are they"?

Or, the baby may have to work harder by increasing the amplitude of their responses:

Now, if there's that delay, because she's [the mother's] quickly checking her phone, it's a bit like a parent on a telephone, that they [the baby] will have to start grabbing you and climbing up your leg to compete with the phone conversation.

Possibly, the baby may have to be clearer in their cues in order to gain a parent's attention:

They'll have to be clearer in their signalling, and so not only are they clear to the mum but they're clear to themselves, because they're presenting a much more strongly communicated affect . . . I can't see how though. They're just little . . .

Or the child could give up: “The only way the child will be clear is by upping their communication or just retreating.” A baby who gave up in their attempts to gain a parents’ attention was of the greatest concern to this informant as well as others, as this would “collude with the divided attention”, the parent would not register that the baby needed them, and the parent would be “happy to keep on her alternative relational experience . . . because I think, for me, if the baby shuts down and gives up, the device will claim the mum” (Informant 5 – psychiatrist).

This informant also considered the concept of “mirroring” in the parent-infant relationship, that it is the parent’s job to monitor and reflect an infant’s experience so that they can understand themselves and begin to understand others:

If we think about mirroring in the infant, that they read themselves in their mother's face . . . and in that two-way conversation, if the infant has an experience, the mother will echo it back and she'll often echo it back modified.

However, if there was a delay or an incongruous emotion in the parent, it would confuse the infant and there would be an affect (emotional) mismatch:

In the mirroring, it will be a confusing mirroring, because on the one hand she will be responding to the conversation she's reading on the smartphone, or the content she's reading, that will present a certain affect in the mother's face.

7.2.7 Physiology and vitality.

Participants spoke not just of the psychological effect on an infant, of the change in the quality of the conversation, but also of the physical effects.

Concepts of physiological responses to a parent's absence were considered in terms of withdrawal, but also the more broadly based experience of dissociation and disorganisation, both of which affect arousal systems. One participant considered that clinicians were good at knowing when the relationship between the parents and baby was going well, and could rely on physiological markers: "We know when it's working better because we can look at the child and look at the level of physiological arousal." (Informant 5 – psychiatrist).

However, it was harder to pinpoint when the interaction was not going well, but nonetheless changes in physical state could mark this: "How shut down is the baby? How pink or pale? How much body tension is there?" (Informant 5 – psychiatrist).

Some considered this in terms of immersion in a family milieu, where a baby would be exposed to a bodily way of being:

One of the things that I think about is the postural effects, which is not just [phone use] but it is increased with the more people on their phone, and kids are . . . so they're not looking just at parents but siblings, and everybody just sitting slumped, and the effect that has on their whole physiology, their whole body in general, and also their emotional well-being. You know if you're slumped all the time, it's a depressed posture! And babies are just soaking up everything that is being modelled. Focus Group

1 – multidisciplinary group

One informant talked about a baby having to counteract distraction with a “more strongly communicated affect” (Informant 5 – psychiatrist) which had its origin in kinetics and the body-based experience or “vitality affects”:

If you're thinking about vitality affects, so that there'll be a sound or there'll be a movement shape. If we think of the emotion, through vitality affects, it is communicated by the temporal signature and the modality . . . the upstroke of a curve, when it peaks, when it crescendos, when it stops. They [the baby] might actually have to increase their signal, which when the mum finally matches it, is a much clearer correspondence in communication so that the child is making sense. But they might not. Informant 5 – psychiatrist.

7.2.8 Social milieu and modelling

There was discussion about the effects that being immersed in a social milieu could have on a young child, including lessons about how to undertake gaze and intimacy, and posture and physiological responses, that babies were “soaking up” (Focus group 1- multidisciplinary group)

Even when participants were orientated to the purpose of the research, and reminded at the beginning of the interviews that the areas of investigation focused on parents’ mobile device use, there was a tendency for participants to want to discuss device use by young children themselves.

On reflection, this was relevant to the research question, because as participants spoke of the modelling of behaviour — “monkey see, monkey do” (Informant 2 – psychologist) in a family context, they were also talking about the immersion of an infant or young child in a

family and cultural milieu. This milieu determines young children's own beliefs and behaviours about acceptable use, as well as their aspirations to use devices themselves.

Many participants pointed out that mobile devices were convenient and frequently used to entertain children, and that shared use had benefits for parents and older children: *"And the kids love it, they want to see photographs straight away!"* (Focus Group 1 – multidisciplinary group)

However, concern was raised that it replaced other activities that might promote their language, motor skills and lived experience of the outside world:

I think it's a distraction from other real activities, real human activities, and the ability to go and be able to enjoy nature, or enjoy other sorts of pursuits. Informant 2 – psychologist.

Further, device use may affect a young child's interaction with parents, even when that interruption is focused on the child: for example, a wish to record an interaction.

Participants also considered the effects this might have on how young children saw themselves, and how private their lives were. The pervasiveness of recording and sharing children's lives was seen to potentially affect their sense of self.

Focus Group 1 – multidisciplinary group:

It's like a lens between them and the parents. I mean, we always took photos and videos. But sometimes the focus is on them [the baby] and sometimes it takes the parent's focus away. Participant 5.

And kids have got the sense of “someone is looking at me” and “what I’m doing is entertaining or interesting”, you see them posing. I think that’s a really different phenomenon. Participant 3

“Yes, from the moment they are born it’s a photo, and that’s spread by the Internet, or on Facebook, from the very first moment, and it never disappears. Participant 5

“So it is kind of a recorded life that these kids are having.” Interviewer

“Yes, it is.” Participant 5

7.3 Theme three. Infant factors: capacity and vulnerability

Participants were very aware that the capacities of different infants at different ages varied, and that this affected their ability to compete with “divided attention” (Informant 5 — psychiatrist) or to “compete for space” due to a parent’s device use (Informant 4 — psychiatrist).

Some participants considered the amplitude of responses that infants and small children make, and that increasing the amplitude of bids for attention could be effective. But also, they raised concerns about the effect of increasing the amplitude of their responses on how others saw a young child. That they might have to “work hard” (Informant 1 — psychiatrist) at a cost to their development, or were at risk of their behaviour being pathologised as “naughty” (Informant 2 — psychologist), or as a sign of a developmental disorder such as ADHD where the “true essence of the child is muddied” (Informant 2 — psychologist).

For most babies, the easily observable “competition apparatus” (Informant 4 — psychiatrist), such as crying or appealing body language that drew the parent in, often was seen as a successful and effective means to gain attention. There were some infants who were seen

as more vulnerable because they were younger or less able to organise themselves to compete. The primary concern for participants was for infants and children who had given up trying to compete, and the risk that this posed for them. *Learned helplessness* is “a feeling of permanent helplessness which typically arises after exposure to an unpleasant event or stimuli, which the person observing or involved usually doesn't have any control over” (PsychologyDictionary.org 2016).

Some children may go down that path of shutting down. Informant 2 – psychologist

So, would that worry you more than a child who is protesting? Interviewer

Yeah, because it is more of that learned helplessness, and it's more that they have actually given up that they are going to get their needs met, but the child that is protesting is still trying different things, aren't they. Informant 2 – psychologist

While many participants did not outline in detail what a vulnerable infant may look like, there was concern about young children who withdrew, that if this pattern happened repeatedly it may affect the child's social and emotional development, mental health, or sense of self.

Those who did consider the concept of a vulnerable infant were referring particularly to a young child who already had insecure attachment relationships with care givers, had exposure to trauma, were very young, or sick, or developmentally delayed, or who had parents who had other psychosocial stressors, mental health, or drug and alcohol problems. Children like this were “very disorganised within themselves”, and thus might lack the ability to coordinate their responses. Or their parents may turn more to their mobile devices because their young child was fussy, not settling to sleep, not feeding well. The question

posed by one informant was whether this was “critically disorganising” for the baby—that it might affect the infant’s development. (Informant 5 – psychiatrist).

7.3.1 Can we consider a harmful dose?

One informant (Informant 5 – psychiatrist) considered the concept of harm beyond what could be observed: a harmful dose of exposure to a parent using a mobile device, and what this might constitute, as well as the associated concept of a critical dose at a critical time. She felt that at present it was hard to know how to understand the idea of harm, because there was as yet no clear way to conceptualise the problem: “it’s really tempting to be scared at the effect and baulk at the whole thing.” She felt this would be a mistake, given the extent of use of devices:

Really, we've got to get down to the molecular level of what is a harmful dose . . . at what stage is it harmful use? And what is harmful use? Is it the incongruous effect? Is it the delayed response time? Or is it the absent face? Which one?

She compared this to earlier work on the safety of alcohol use in pregnancy, stating that as mechanisms and effects of alcohol use were understood, clear public health information could be given that there was no safe level of exposure. She felt it important that there was consideration of a dosage effect in infants’ exposure to parents’ device use.

Despite the limitations she noted, she considered the concept of a critically disorganising experience and the effects this might have on an infant and the variables in the parent-infant relationship:

Whether it's critically disorganising, where the baby gives up and is not known to itself or its mother, I think will depend a little bit on the baby and a little bit on the

mother's dependence on the device. How much capacity has the baby got in terms of getting around that? And how much then will actually lead to different attachment or different sense of stress arousal or affect regulation?

She felt that the idea that a parent was well-attuned enough of the time was important. She referred to the idea from developmental psychologist Ed Tronick that parents need to be attuned 30% of the time. She hypothesised about future factors we might comment on once we had a better idea of mechanisms and effects:

Let's imagine five years in the future we've figured this out. So we will say to mums: 'You need to have this kind of time without your phone with your baby.' We've always talked about Floor Time.

Once the state of knowledge had increased, clinicians would need to teach parents what to look out for in terms of their phone use and how to ensure parents were tracking their baby, being with them in an attuned way:

We've got to imagine in the future, we'll have to give them [a baby] a certain amount of time that they need to have attuned work, where they're tracking their baby, where that's privileged . . . It might be that we say "in the first three months, don't use your device when you're with the baby". That would be sensible, that we're saying, "have device time, but don't do browsing for the first months, because that's when they're wiring up eye-hand coordination or that's when they're wiring up attachment". That would make sense, that we're able to give a really informed neurological kind of opinion.

She considered that the conclusions reached might be very different at different ages, and would need to allow for different babies' vulnerabilities. However, there also needed to be a move away from giving parents "this very idealised view of the ideal mother", where there is as yet little language to communicate to parents how to notice a child when the relationship is going well or badly, for being "frustrated, feeling bored and for not wanting to do it now". Without moving away from idealised versions of parenting, the risk was that "a certain bit of research will get over-generalised very quickly" in relation to advice about parents' device use, and this would increase the pressure on parents to live up to an idealised version of a parent, and the consequent risk of being blamed or judged.

It may be that an infant's vulnerability to a disrupted interaction with a parent may change dependent not only on the infant's age and stage, but also the infant's state of regulation—whether they are tired, sick, hungry, needing help getting to sleep or fussing.

7.4 Theme four. Parents' device use: what is good for parents is good for their baby.

A dominant theme in the data, when thinking about the potential effects on infants, was the widely held belief that what is good for parents is also good for their infants. This came from a well-narrated discourse about the importance of supporting parents in order that they support their infants.

So I get it. We are not biologically just supposed to be a single-parent home alone with the child. Informant 2 – psychologist

If you've got a more integrated mum, you've got better parenting . . . they're going to be more connected and more related. Hopefully in the "head together" zone.

Informant 5 – psychiatrist

Thus, many of the factors relating to device use that were seen as positive for parents and caregiving, such as social connection, ease of day-to-day planning, and keeping in contact with other parents, could also been seen as positive for babies.

However, there were exceptions: participants were aware that there were times when a parent may not put a child's needs first, or a mobile device was used to escape from hard-to-tolerate caregiving or to "keep an infant at arm's length" (Informant 3 – social worker), or when attunement or tracking of the infant was affected.

Often mental health and psychosocial causes were seen as the cause of these problems: *"I don't think the problem is the device, there may be some risks associated with how people use them."* (Informant 3 – social worker). It was felt by some participants that parents had always had a large number of things that interrupted their attention to their children, and many other "tools that parents use to defend against availability" to their infants (Informant 2 – social worker).

One exception that was considered in detail was whether a parent's use of online, rather than face-to-face, social connections had any benefits for young children. Participants' views differed on this matter. One participant felt that online connections allowed a baby to experience regular connection with their extended family, something that had been lost in cultures with predominantly nuclear families who now tended to move further geographically from extended family support. This informant felt virtually mediated

interactions brought the baby back to a “new version of what might be closer to the evolutionary space”, in which the family was together in one room—but this time, one virtual room: “instead of different rooms in different places” (Informant 4 – psychiatrist). He considered this as perhaps a return to a “natural” state that babies have evolved to live in, where “people lived in long houses . . . and babies were in a social milieu 24 hours a day” and had to “manage a greater level of complexity before, and that’s natural to them” (Informant 4 – psychiatrist).

Others commented on differences between online and real-life interactions that parents had. It was considered that a baby could be part of a face-to-face interaction with their parent, in that the other person was physically present, would interact with the baby and the baby would form some relationship with the other person, but that this did not happen with an online interaction. Some felt that babies could not be a part of their parents’ online interactions due to the personal use of the device and infants’ developmental stage that prevented them from understanding screen interactions: “But it is not accessible to [a] child, is it?” (Informant 2 – psychologist).

Others felt that if a parent were involved in an interaction online, even an older toddler who understood cognitively what they were seeing, would not have the same quality of experience in an online interaction as a face-to-face one:

Focus Group 1 – multidisciplinary group:

But it [an online connection] would be a different sensory experience though, wouldn't it? Because the acoustics are not the same, and there is no smell, and there

is no tactile. And babies have trouble understanding what mirrors are all about, that there is actually a person in the mirror. Participant 1.

"You only get a part of the person" Participant 6.

"A part of the person, it doesn't make sense then." Participant 1.

These differences explored specifically, that online interactions lacked physical closeness, touch, smell, and a context. These were seen as vital to a baby, because "babies will relate very much to a person in a very felt and lived way" (Informant 5 – psychiatrist).

Another consideration in virtual connection versus real life, was the effect that a parent observing their baby interacting with another person, could have on a parent's sense of their baby.

What's interesting with extended families, is the mum can observe the baby in a relationship with another person. I think that's really powerful and that's what you don't get with devices. [Psychiatric colleague]'s talked a lot about that, when the mother observes the baby with someone else, that the baby comes alive to them in a new way. Clearly something very unique is happening and not just for the child. The child is being with someone, but being seen to be with someone is a unique thing . . . You can't compare an extended family and a device because you haven't got all those complex little things happening: real things happening, touch, feel, kissing stuff.

Informant 5 – psychiatrist.

7.5 Theme five. Alternative hypotheses about what might cause observed findings

As well as capturing information about parental caregiving in relation to device use, participants also explicitly and implicitly shared their views about caregiving, child raising, and their beliefs about what was in the best interests of young children.

Part of this discussion was a consideration of cultural and social factors that affected parents' ability to meet the needs of their children in ways that optimised early childhood development. Device use by parents was just a part of the conversations that unfolded about raising children in the modern world. Other potential causes of disruptions in parent-infant interactions were considered.

One participant considered that parents might have difficulty with the parent-child relationship in terms of how to prioritise their infant's needs, not because of device use, but because they lacked a sound knowledge of parental caregiving. The informant concluded that the addition of a mobile phone to this scenario might not change caregiving a great deal because of social and cultural change, which has resulted in smaller family size, a lack of exposure to child raising prior to parents having their own children, and geographical separation from extended family from whom this knowledge might be learned:

But I would suggest that the baseline of... the parent-child dyad, is so sketchy that I'm not sure it [mobile device use] would necessarily do much harm! . . . everyone has lost touch because of small families. They don't know how to raise children. Not only have they lost touch but they are at a major disadvantage of not having had any practice.

Informant 4 – psychiatrist.

For this reason, he saw technologically mediated connection with extended family and support networks as a very important way to address this knowledge gap, allowing parents quick and easy access to information about parental caregiving:

So it might be a benefit for the child. . . . it allows them [the parent] to communicate with people and yet still do their “must-dos”. Informant 4 – psychiatrist.

Another consideration by participants was that parenting or attachment style was the primary driver that affected the way people parented and prioritised caregiving to young children, rather than the use of mobile devices. *Attachment style* is the internal working model that individuals bring to a relationship with others, including young children, that is determined by the individual’s own early experiences of caregiving (PsychologyDictionary.org 2016).

Participants were clear that a parent’s attachment styles affected how they managed their own distress, determined how they managed closeness to others, how they responded to the different emotional needs of others, and whether they saw a baby as having their own thoughts, feelings and volitions. It also might determine how a parent used devices: “I guess it is about the avoidant attachment styles, the need not to be too present” (Informant 2 – social worker).

Although outside of the scope of this study and not inquired about specifically in the interviews or focus groups, there was some consideration by participants of potential harm to children related to exposure to electromagnetic radiation from wireless networks. Some considered the proximity of phones to young babies:

Mothers have always got their phones beside them... They've always got their phones right beside them, next to their baby's head.

Interviewer: Your concern about that would be in relation to radiation?

Yes. (Focus Group 2 – inpatient nursing staff)

The last interview (Informant 5 – psychiatrist) and focus group (Focus Group 2 – inpatient nursing staff) was undertaken after a national television broadcaster ran a story on a well-respected and widely viewed science show about electromagnetic radiation related to wireless technology with a particular focus on children (*Wi-fried* 2016). This program—*Wi-fried (Catalyst)*—suggested elevated risks related to wireless networks and radiation. However, it was widely criticised and found to be in breach of consumer laws for its lack of impartiality, rather giving undue weight to the unorthodox position that wireless technology posed a health risk. It generated considerable community discussion at the time. In both the interview and focus group that took place after this screening, risks of radiation were mentioned. Prior to the screening of the program, two out of four informant interviews mentioned concern about radiation, and it was not mentioned in the first focus group, which occurred before the show was aired. All mentioned electromagnetic radiation after the show. Given that the those interviewed after the screening of the science program were not asked whether they had watched or heard of the program, no assessment can be made of how likely the program and discussions it generated were to have affected opinions offered, however, clearly it may have.

CHAPTER 8

Future considerations of device use in parental caregiving.



Three informants considered that technological advances would drive rapid changes in interfaces between devices and people. These informants differed from others in that they had a research or clinical interest in information technology, and in the interaction between technology and human behaviour, especially mental health and child development.

They provided a consideration of three “ephemeral” things (Informant 4 – psychiatrist) that while likely to change quickly, and determined how devices were currently used. Devices were described as intimate technology that currently occupied a physical space that was often between parents and children. This position was due to the current technological interface that required devices to be carried on a person, handheld during use—thus requiring gaze and a free hand or one hand “and a hypermobile thumb!” (Informant 4 – psychiatrist). They considered that device use in the space was currently primarily “knowledge seeking” (Informant 5 – psychiatrist), managing parents’ anxiety about young children’s wellbeing. As well, they considered that current device use was to connect people to the outside world, via interactions mediated by voice, the written word, and images.

There was consideration of how even with the technological limitations of handheld devices, there was already the emergence of caregiving or monitoring of a child while physically absent via a mobile device. Examples included use of mobile devices and apps as baby monitors, or connecting virtually to see a child’s musical performance or monitor their behaviour.

Like the Wii for example, parents can use the Wii- like tennis coaching, to ensure that the child is doing enough practise. And you get that with electronic organs, they can record things that you do and play back . . . see, you don't even have to be present at your child's piano lesson. You can run a quick check on things [via computer mediated connections]. Informant 4 – psychiatrist.

However, these informants also considered that children were going to grow up with devices that have not yet been developed, and these were going to change their application. Three technological advancements already in process were seen as central to revolutionising the use of mobile devices: becoming smaller and flexible with increased battery life, and “wearable”; an increasing capacity to monitor physiological states; and the “perfection of machine language”. These technological advancements were considered to take use that was already in science fiction to the real world: “becoming science fact” (Informant 4 – psychiatrist).

The informants considered very different ways in which the technology may be used in the future, but a unifying theme was that the applications would change child outcomes and parental caregiving, not just manage parental anxiety about child outcomes.

Examples given were that monitoring of infants and young children would enable early detection of health problems (Informant 1 – psychologist), or that monitoring might also provide kinetic “information about routine and temperament that will be looking at the auguries” (Informant 4 – psychiatrist) and be capable of predicting development, personality, or mental health outcomes. This would allow parents and society to offer “actual informed action” (Informant 4 – psychiatrist) with the opportunity to change a child outcome that in the past has been limited. Or that apps for devices that might allow a

parent to monitor their own arousal state, thus notice when they were in a high anxiety arousal state versus an optimal aroused state to parent. In this example, the participant emphasised the importance of parents being able to notice their own emotions:

If you want to fix anxiety in the child, you fix anxiety in the parent. That is the alpha and the omega . . . because once the parent starts noticing it in themselves and then noticing it in their child, the child will get an understanding too. Informant 5 – psychiatrist.

This informant saw this use as creatively harnessing the capabilities of mobile devices where “instead of fleeing to your phone” (Informant 5 – psychiatrist) to avoid a difficult situation or emotion, a parent could turn to the phone to assist them in managing emotions and proximity to a baby.

Another rather more Orwellian example was that wearable and embedded technology would have the capacity to allow parents to monitor a child 24/7, and to “analyse that behaviour to say ‘put back that sweet, you didn’t pay for it’, and for that to come over in a little loudspeaker in the child’s ear” —with the “perfection of machine language, which is computers talking to people, it would be unrealistic to think that this is not going to happen” (Informant 4 – psychiatrist), and that it would allow the opportunity for parents to “externalise parenting to a device” and choose “which form of indoctrination, which precept, behavioural, educational” system the parent would use (Informant 4 – psychiatrist). It would also allow a collective societal approach to parenting:

If you don’t want a child to be neurotic, then you might need to interact with them in a certain way. Everything we know about the gene-environment interaction says that

that is relevant. So, I think that is where the interesting space is! I think that society will be insisting that if people have certain antisocial genes, that they are getting a proper intervention. Informant 4 – psychiatrist

The rapid technological change transforming device use was also considered by these informants as a challenge for researchers in the field, who would have trouble keeping up:

What you are talking about now, whether the mum is using the phone while she is trying to feed a baby at night . . . it's relatively ephemeral. The most important thing about it for me, is that it's a very rapidly moving target. So, if you do a study now, in six months' time it will be quite out of date. Informant 5 – psychiatrist

This participant considered that child-centred use rather than “child de-centred use”, and the creative ways in which parents used devices, needed to be the focus on ongoing research, not whether a device competed with a parent’s attention.

While some of the above concepts may appear far-fetched, they do reflect these participants’ views that the technology is changing rapidly and that the way it will be used in the future, as well as how it may be part of interpersonal interactions, may be very different to now.

CHAPTER 9

A discussion of findings: Mobile devices, parents, caregiving.



The focus of this research was to understand parents' mobile device use in relation to caregiving, parent-child relationships and young children. The combined findings of this systematic review and qualitative study offer insight into how parents' mobile device use might have an impact on them, as well as on parental caregiving and young children.

The systematic review and expert opinions from this research concur with other literature that mobile device use offers benefits for families and caregiving. However, other research with adults and adolescents is finding that technologically mediated interactions can be associated with negative effects. The findings of this research provide emerging evidence that mobile device use impacts on parents' caregiving capacity and possibly on parent-infant interactions.

It is important to consider the findings of this research in the context of the strengths and weaknesses of the existing research. In the systematic review, studies were observational and cross-sectional. The review also took place at a time of rapidly emerging research on this area of investigation. Thus, causality cannot be inferred, but potential bidirectional associations can be identified. There are also strengths of and limitations to this research that warrant consideration in interpreting these findings.

9.1 Strengths and limitations

This research is the first systematic review and qualitative investigation of expert clinician opinion related to the field of parents' use of mobile devices and how it might interact with caregiving.

Study One, the systematic review, is the first to integrate the available evidence about parents' use of mobile devices, caregiving and child development. It was a thorough, replicable review that surveyed published and yet-to-be-published literature and included all available studies, which had used diverse methods. Given that studies with null findings and non-English language research are less likely to be published (Easterbrook et al. 1991; Egger et al. 2003), hand-searching for unpublished papers and inclusion of non-English language studies with English abstracts reduced the potential for publication bias. It is of interest that the systematic review did not find relevant studies from other nations with high technological and psychosocial research proficiencies, such as Japan or Germany. Inclusion of publications by the first author Hyun (2011, 2013, 2013) from Korea demonstrate that non-English papers were accessed in the review. The absence of research from other nations may have been a limitation of this research, or may have been evidence of limited research in an emerging field. Including papers with only the abstracts in English may have reduced the non-English language bias, but also presented a limitation in the study. That is, when assessing the quality of the study methodology and reporting, these papers could not be scored or compared to others due to the limited information available.

Study Two, this qualitative study, had both strengths and limitations. Purposive selection is a well-described and valid methodology in qualitative research to find highly informed participants able to answer a particular research question (Marshall 1996). It is useful when

developing theoretical themes (Meyrick 2006). For example, purposive sampling of later participants for their particular expertise in infant mental health was governed by the results of early interviews. This sampling technique allowed access to detailed, diverse, and fine-grain perspectives from a small number of participants (Hansen 2006). It should be noted that exploratory studies of this sort that use qualitative methods do not seek to be generalised to a wider population. While sample size was small, this is not considered a determinant of quality (Rice & Ezzy 1999) and data collection continued until no new information was uncovered in interviews.

Combining individual interview data (which were more in-depth) with those from focus groups, allowed access to data from participants with diverse backgrounds and opinions. For example, Focus Group 1 included participants from a broad group of disciplinary backgrounds. It was used to ensure that outlying opinions, if they existed, would be voiced (Hansen 2006). There were also three informants who were engaged in work that involved information technology in their clinical and/or research work. This contributed to the varied professional and personal perspectives that were contributed.

The quality of the data might have benefited from member checking (participants checking the transcripts of the results or early data analysis findings). This was not undertaken because of the time and resource constraints associated with the research being part of a research higher degree.

The interviewer was known to participants to be like them—an 'insider' (Dwyer & Buckle 2009, Kouritzin, Piquemal & Norman 2009)—with a shared clinical background in perinatal mental health and infant development. This is considered a strength of the study but also raised some limitations. It allowed a free-flowing engaged conversation with an easily

shared understanding about theoretical observations regarding parents, parent-infant interactions and infant development. However, it also meant that assumptions could be made about understandings or intention in communications, or that a view or assumption may not be questioned from another perspective (Asselin 2003). Choosing participants from diverse clinical backgrounds reduced this risk and it was considered that the benefits of being able to access expert opinions and detailed data outweighed the risks stated above.

As this project was undertaken within higher degree research training, the data were primarily coded by the student researcher. This meant a risk of data confirming pre-conceived hypotheses, rather than being seen in alternative ways (Hansen 2006).

Nevertheless, the supervisors, who are from different disciplinary backgrounds, undertook some review and confirmation of coding in the transcripts and all interpretations were discussed with them. The findings were presented at progress presentations to the academic staff and research higher degree students in the Jean Hailes Research Unit, which yielded new perspectives and interpretations.

9.2 Mobile devices, and parents, caregiving.

The findings reported here concurred with existing evidence, that parents' mobile device use is ubiquitous and that mobile devices allow parents to remain socially connected, but also to access information about parenting, children's health matters and make day-to-day parenting easier (Ante-Contreras 2016; Christensen 2009; Hiniker et al. 2015). This connectivity may have both positive and negative effects on parents. There was evidence in both parts of this research that device use by parents may improve parenting confidence, help maintain an identity outside of caregiving (Gibson & Hanson 2013), and reduce social isolation (Ante-Contreras 2016, Gibson & Hanson 2013, McDaniel, Coyne, & Holmes 2012,)

thus mitigating against depression (McDaniel, Coyne, & Holmes 2012). It may allow parents to remain connected to family members or strengthen family bonds (Palen & Hughes 2007; Christensen 2009; Padilla-Walker, Coyne, & Fraser 2012). However, in both the systematic review and this expert opinion, there were concerns that mobile device use may be associated with poorer mental health, lower wellbeing, and a lower perceived parenting capacity. The interference of mobile device use on attention was a consistent finding in many included studies and in the opinions of these experts, with the capacity for this to interrupt caregiving or result in a poorer quality of caregiving (Hiniker et al. 2015, McDaniel & Radesky 2017, Radesky, Kistin, & Zuckerman 2014, Radesky et al. 2015). As well, there was consideration in this expert opinion that device use may be associated with increased parental stress because of the pressure parents may feel to be available to others and to continue to manage their online lives, and that it may compromise sleep and private time within a family.

Clinical experts in this study considered the use of mobile devices by parents to assist them when experiencing caregiving challenges: to help them stay calm or to distract themselves from the child or the situation. They spoke of the positive role that social media may play in constructing life stories that are recorded, narrated, and shared online, but also of the disadvantages of social media in reinforcing social hierarchies; presenting idealised unrealistic images of self, families, and parenting; or increasing the experience of having to compete or live up to notional ideals. This is borne out in the literature in relation to adolescents, which considers how self-image can be both positively and negatively affected by social media use (Valkenburg, Peter, & Schouten 2006; Steinfield, Ellison, & Lampe 2008; Sampasa-Kanyinga & Lewis 2015).

Clinical experts in this study considered the positive effects of connecting absent parents to children and their families. The potential positive effects of online-mediated connections for millions of geographically separated families across the globe cannot be underestimated, and has been identified in exploration of the impact of forced and economic migration. (Madianou & Miller 2011).

One question that arose in both studies, was whether parents would put their device aside when children need them. The findings in relation to this were mixed. Some studies and opinions indicated that parents might find it difficult to do this and that, at times, while using devices, parents might be unresponsive to children, show delayed or harsh responses, or prioritise their device use over the needs of a child (Hiniker et al. 2015, Radesky, Kistin, & Zuckerman 2014). There was some evidence that parents might underestimate their unresponsiveness to young children in their care (Hiniker et al. 2015).

Expert opinions from this study found there to be complex reasons as to why parents did or did not put mobile devices aside while caregiving. These included the social norms of device use, parenting or attachment style, and choice versus dependence on devices. Parents' device use was found to be a reflection of social norms. For example, younger parents were seen to be using devices more freely and within a wider range of socially acceptable settings. Outside of this expert opinion, there was no available literature about how the age of a parent might affect device use.

There were unclear findings as to whether parenting style might alter device use, with only limited consideration of this in papers in the systematic review; one study finding no association between device use and parenting style (Radesky et al. 2015), but other papers and expert opinions in this study considering the possibility that parenting or attachment

style may explain whether parents used a device when caregiving, or prioritised caregiving over device use (Hiniker et al. 2015; McDaniel & Coyne 2016b; McDaniel & Radesky 2017). While evidence is sparse, there is research that considers adult device use and attachment styles and has found that attachment styles interact with the frequency and pattern of mobile device use (Weisskirch 2012; Drouin & Landgraff 2012; Morey et al. 2013). It seems possible from this research that an adult who has an avoidant style in relationships will use a mobile device less frequently and disclose less about themselves. Thus, it could be hypothesised that if a parent were, for example, dismissive in parenting style, then this might consciously or subconsciously alter the way they use a mobile device while around their children, and how they prioritise their children compared to other things. This hypothesis is yet to be tested.

One finding (Hiniker et al. 2015) related to this area of investigation that requires more consideration was that parents could be intrusive on re-engagement with children after mobile device use. The loss of the usual ebb and flow of parent engagement with a child after a parent used a device was described, with parents sometimes seen to initiate an enthusiastic interaction with a child without the child requesting it, and on occasions this interaction interrupting the children's play. This was a minor finding of the study and the meaning of this behaviour was not further explored. However, in other studies outside this area of investigation, there is evidence that an intrusive parenting style can have poor outcomes for child development and the parent-child relationship. An intrusive style is characterised as an interaction that is non-contingent or parent- rather than child-led (Bornstein & Tamis-LeMonda 1997).

It is important to note that parenting style will also influence all facets of parenting, family relationships and personal choices about closeness and distance to others, not just in relation to mobile device use.

There was some emerging evidence about dependence on a device, seen either as a reflection of other psychosocial problems in a parent, or a measure of the addictive nature of the device itself. The systematic review found a cluster of papers from Korea (Hyun, Cho, et al. 2013, Hyun et al. 2011, Hyun, Park, et al. 2013) that examined technological addictions related to parenting. This was representative of a high level of research interest and concern about smartphone use in Korea and Taiwan (Koo 2011; Lee et al. 2014), as well as interest in parents' role in mediating young children's use (Kang 2008; Park 2012; Kim 2013). This appeared to stem from social habits in these societies that have resulted in high levels of internet and gaming 'addictions' in children and young adults (Kang 2008; Kang, Jang, & Kim 2011; Bang & Kim 2013), including use by very young children (Kim 2013).

Expert opinion from this study, and broader research related to adolescents, adults and device use indicate some evidence that mobile devices have features that promote psychological dependence. Mobile devices, especially smartphones, offer high levels of sensory stimulation, and social drivers to use, as well as set and variable rewards. Devices have features rich with sight, sound, and touch sensation that are known to be highly physiologically arousing during use (Lin & Peper 2009) and provide positive reinforcements due to the novelty of activities that are available (Eyal 2014).

Expert opinion from this research gave examples of variable positive social feedback when texting, posting or a "share" or "like" that may drive device use. As well, smartphones were described as allowing a small screen environment that immersed the user in online use and

removed them from attention to real-life stimuli without obvious prompts about the passage of time. These social prompts for use are described in the wider literature which considers the role a mobile phone can play in engendering a sense of belonging, via personalisation of the device and the connection to others that it brings (Fortunati 2002), and inattention to other salient stimuli (Misra et al. 2016). All these components are described as key components of behavioural addictions (Olsen 2011; Raylu & Oei 2002) and are prominent in highly addictive gambling activities such as electronic gaming machines (Coventry & Brown 1993; Olsen 2011; Raylu & Oei 2002). This raises the question as to whether features of mobile phones may actively promote use via pathways that reinforce dependence, thus leading to difficulties in some parents in turning attention away from a screen and to a child, or to excessive use that might lead to the neglect of other daily activities.

Both expert opinion and the systematic review found some indication that parents may have a decreased ability to monitor children, which may lead to accidents (Ante-Contreras 2016). This was an incidental finding in one study from the systematic review, but it was also commented on in this expert opinion and echoed in concerns in the grey literature (Glatter 2012). This concern is supported by findings that there are potent cognitive effects of mobile phone use related to split attention or multitasking. These effects include reduced decision making and planning in accident-prone situations, such as driving or pedestrian decision making (Misra et al. 2016). In contradiction to this, there was no mention of harm in the studies that observed nearly 300 playground interactions (Hiniker et al. 2015), an environment where risk of accidents is present (Norton, Nixon, & Sibert 2004), nor in more than 50 mealtime observations (Radesky, Kistin, & Zuckerman 2014). As well, a common

theme in one study found parents chose times to use devices when children were safe (Hiniker et al. 2015).

The use of mobile devices was seen by a significant proportion of parents in one study from the systematic review and some expert opinions as a compromise; with descriptions of parents wanting to use their devices less and feeling guilty about this use. However, findings were also that parents could choose to put devices aside in favour of face-to-face interactions with young children when caregiving and monitoring of children was needed (Hiniker et al. 2015). The theme of guilt did not emerge in this study's qualitative data, rather was expressed as a tension for a parent who wanted to remain socially active online, but also had to manage the interruptions in immediate family life that having a phone always on and always with them may bring.

CHAPTER 10



A discussion of findings: parent-infant interactions, infant development and theory emerging.

The findings reported in this qualitative study of expert opinion provide a rich information source from which to consider parents' mobile device use related to caregiving, the parent-infant relationship and young children. This is unique data as there have been no studies considering in detail parent-young child interactions or observations of young children related to their parents' mobile device use. In this systematic review, there was little evidence in relation to child outcomes, none related to infants and, of the little evidence available, most was descriptive in qualitative studies. Only one quantitative study in the systematic review included parental measures of child behavioural outcomes (McDaniel & Radesky 2017).

Despite the lack of other research, there is a qualified basis on which to initiate theory development. This theory development requires the combination of this study's finding with two other research fields. First, infant development and the role that parents play in this, and second, the effects of technologically mediated interactions on human behaviour, cognition, sense of self, and social interactions. These fields have robust theoretical frameworks that can provide a basis from which to consider theory development.

10.1 Overarching findings of expert opinion.

As already presented, expert opinions and studies from the systematic review showed some concern but also the consideration of many positive aspects of use in relation to mobile

device use, parents, and caregiving. However, the dominant finding in relation to mobile device use and the parent-young child relationship, as well as the infant experience, was negative. This concern was qualified. Experts considered that children are growing up in a technologically mediated world, thus need to learn how to negotiate that world. As well, there was a general assumption that if parents' mobile device use assisted a parent, then there would be benefits for their young children.

The primary concern was that attention was elsewhere or divided because of the distraction that device use caused parents. Thus, in a world of limitless online content and social connection that could be accessed across a 24-hour period, attention and time were the limited resources, rather than information, connection to others, or ability to access that information. In relation to time, the displacement of other parenting activities and quality time with an infant/young child was considered to be at risk, but so was the idea that mobile devices may increase the time a parent had for a child, as daily chores were undertaken more expediently. How often attention was impacted on, and whether a parent could shift attention to a baby when needed, affected the level of concern experts had about inattention and distraction. It should be noted that it was clear from the data that experts understood that mobile devices were only one of many things that might distract a parent from their child.

While concepts of distraction, inattention or split attention were explored, the experience for the infant or the child was seen to be the same: that the parent was distracted, their purpose was attending to something other than being with the child, and this affected the quality of the interaction. Experts considered a range of effects of this distraction, from a parent turning from device use to address an infant's needs in a timely, consistent manner;

to a parent not being available to an infant and missing infant cues; to being partially attentive, with the effect of delaying responses to an infant's cues; or to there being variable responses.

The qualitative change in a parent-infant conversation related to parents' device use was considered important when understanding the infant-young child's experience and the parent-infant relationship. The ability of a parent to be psychologically present in an interaction with a baby was seen to be important, not only in noticing and tracking a baby's cues, but also in gaze and shared gaze, verbal and non-verbal communication, sharing joy and vitality, and developing a strong relationship. Changes in the quality of the interaction could result in infants and young children becoming confused, distressed, behaviourally disturbed or withdrawn.

The use of mobile devices by parents was described as interrupting gaze, and this was a common concern for the infant and the relationship. There was consideration of how frequent interruptions of gaze may affect young children's sense of how to make eye contact and establish intimacy, as well as how it may impact on attachment relationships and the developing sense of self.

Concerns were raised that use of mobile devices may displace meaningful verbal and non-verbal exchanges between parents and infants. Experts noted that parents may react to content they accessed on their mobile devices with a range of emotions that varied in salience to the face-to-face context being shared with the infant. The concern was that online information or interactions might rapidly change a parent's emotional state, and that infants could be confused by a parent's incongruent emotion and not be able to make sense of their parent's or their own feelings. There was discussion of the effect of device use on

parents' tracking and mirroring of infants, and of how this was vital to healthy infant development and sense of self.

Young children were described as being immersed in a family and social context in which they modelled responses, not just behavioural but also physiological, and that this too may affect early body-based experiences.

How capable an infant or young child may be to compete with technologically mediated distractions in a parent was considered. Opinions on this were divided, with some experts considering that babies were well resourced to compete, while others that infants would struggle to compete. It was clear that the age and developmental stage of the baby affected opinions on this matter, with experts considering that babies who were younger, less developmentally advanced, had insecure attachment relationships with a parent, or who had a parent with other psychosocial issues may be more vulnerable to disruption. There was consideration of whether parenting style, attachment relationships among the parents or other psychosocial stressors may cause problematic device use.

One informant considered in detail matters of harmful or problematic use, especially in relation to infants and their capacity, developmental stage and relationship with the parent. The informant considered vulnerability in infants as well as our current limitations in describing parent-child relationships in a way that could be translated from idealised or simplistic notions of good parenting, to ones that parents could use and consider in the real world.

When experts considered the infant experience and infant development, they explored exceptions to the idea that what is good for a parent is also good for a baby. Times when

this might not apply were when a parent's mobile device use sealed the parent off from the young child, or resulted in a young child's needs being ignored, when the duration or intensity of use was high, or when the child was developmentally vulnerable.

There was consideration by experts that device use may not be the cause of problems relating to the quality of relationships, but rather a symptom of other social, psychological and cultural problems. A lack of parenting knowledge and skills related to social change in families was seen to be a potential cause for parents having poorly formed understanding about what babies need and how to parent them. As well, attachment security in parents and parenting style was seen as a potential determinant of a parent's use of a mobile device. Informants considered whether these things would affect how psychologically close a parent preferred to be with their baby, how they considered their baby's emotional needs and whether they prioritised a baby's needs over other things.

Experts considered the future of mobile devices and how rapid technological change would alter the questions that needed to be asked about information technology-human interfaces, including in the parenting arena. They considered that the current modes of device use that required a hand and gaze may be ephemeral. That the more important question was how devices were being used by parents and where this use was likely to take parenting practices, as interactions between parents and children had the potential to be increasingly technologically mediated. There was also consideration of the potential applications for mobile devices to improve child outcomes and parenting capacity.

When considering these findings, it is important to note that experts considered the question of how parents' use of mobile devices may interact with infants and young children and the parent-infant relationship in a balanced way with a trend to consider the middle

ground. That is, no right or wrong perspective was argued strongly, but there was, rather, careful consideration of the matter from different perspectives and with understanding of the complexity when considering a social behaviour. As well, while experts were from diverse professional backgrounds and had different personal opinions of device use, these differences did not create highly divergent opinions. Three factors affected how experts saw the issue. These were whether an expert considered mobile technology as transformative or as disruptive, infants as vulnerable and dependent or capable and resilient, and whether they considered that what was good for a parent was always good for an infant.

Experts wanted more research evidence available so that they could offer parents recommendations about mobile device use while in the company of infants and young children, which at present they considered they could not give.

10.2 Gaps in knowledge.

There was evidence of significant gaps in knowledge about this topic. The design of studies included in the systematic review did not allow attribution of causality or direction of observed effects, investigation of relevant confounding factors such as parental social class and emotional wellbeing, or the impact of factors that might moderate any observed associations. There were no studies about caregivers and infants, or any that used micro-analysis of parent-child interactions. The lack of consideration of young children and the parent-child relationship stemmed from a focus in existing studies on parents and caregivers' behaviours, without also extending that focus to the impact on children.

This appeared to be for a number of reasons: first, the nature of the research itself. The literature is emergent, thus researchers are only just beginning to develop hypotheses about how to understand the phenomenon of mobile device use on parents and how it

might interact with young children's experiences. As noted in an exploratory qualitative study by Radesky, there is a need to "further refine and operationalize our coding scheme . . . to begin to quantitatively examine these hypotheses" (Radesky, Kistin, & Zuckerman 2014). Second, research that involves children can be complicated. Ethics are more complex when minors are involved, even when the studies are social and non-clinical. Issues of consent, a need for proxy parental consent, potential exposure to harm, and methodological considerations all require detailed consideration in study design and research ethics (Balen et al. 2006). Because of this, research most commonly uses parental assessments of child function and wellbeing. Finally, in very young children who are pre-verbal/pre-literate, study design is complicated by requiring infant observation which, while a well-established method in social/developmental research, requires research resources and capabilities in this area.

In this qualitative research, despite purposive sampling to allow access to well-informed expert opinion, it was still more difficult to access data about how experts considered an infant's than a parent's experience. This may have been a limitation of participant selection as explored already in the limitations of the study. However, it is also possible that it may be difficult to articulate how participants might understand and explain an infant's experience. One informant in this study speculated that models of understanding infant psychology and the component parts of the parent-infant interaction were as yet not well enough developed to allow a detailed understanding of the infant experience. While all adults have been infants, they cannot recall that experience; it persists in unconscious aspects of personality and relational styles, in emotional responses to the actions of others, and in body-based responses (Schoore 2001). Thus, it is harder to express and operationalise this

experience or put it into language, than to consider the experience of an older child or adult. While this reasoning could be seen as a limitation in participants' expressed knowledge, it may also represent a strength in the findings: a recognition by participants that the mental processes of infants are difficult to penetrate, and an awareness that they did not want to judge parents in relation to mobile device use, that opinions were more gut reactions to parents' mobile device use than a well-thought-out understanding.

It was also more challenging to integrate data about the infant perspective in data analysis. Despite the limitation and the knowledge gap described already, I considered it important to retain and make sense of findings related to informants' opinions of the subjective experience of an infant. There is good clinical and research evidence that considering the subjective experiences of a baby is important (Guedeney & Fermanian 2001; Mäntymaa et al. 2008; Paul & Thomson-Salo 2014). How a person feels about a baby is a *bona fide* way to think about social interactions and an infant's wellbeing. For example, in the Alarm Distress Baby Scale by Guedeney (Guedeney & Fermanian 2001) there is a sub-score for the feeling that the clinician has about a relationship with the baby. It includes how much effort and pleasure the interaction creates, as well as the subjective feeling of length of time passed during the assessment.

Presentation of fragments and "wondered about" ideas of participants, rather than clearly articulated discourse, did not lend itself to well-developed thematic consideration. In the findings of this qualitative study, words or phrases that were used in the transcripts about the babies' subjective experience could be captured as a list of words, some of which came directly from the data, others arose in coding the data: feeling alone, giving up, trying harder, waiting, sharing a parent, feeling sad, being worried, feeling confused, feeling

curious, being angry, falling apart, withdrawing, making do, coping, locking a parent in by deploying attention-getting resources. Except for *curiosity*, there was no evidence of a positive subjective infant experience. While *coping*, *waiting*, *trying harder* and *making do* may all be adaptive coping strategies, it is difficult to envisage any of these as likely to be experienced by an infant in a positive way.

10.3 Theory emerging

When trying to understand parents' mobile device use, the parent-infant relationship and the infant experience or development, it is important to consider not only the role mobile devices play in adults' lives in the context of caregiving, but also matters related to infant development.

Key concepts that can be used to integrate this study's findings into emerging theory are Winnicott's concept of 'good-enough' parenting (Winnicott 1952), the perturbation theories related to still-face type experiments, vitality affects, and infant capabilities. A further matter for consideration is that these concepts might be used to consider critical developmental windows when a baby is more or less developmentally vulnerable to the effects of parents' mobile device use.

10.3.1 Good-enough parenting

Winnicott asserted in his early psychoanalytical papers: "*There is no such thing as a baby . . . if you set out to describe a baby, you will find you are describing a baby and someone*" (Winnicott 1952). Generations of psychoanalysts and infant physicians have confirmed this assertion.

While infants have the capacity to adjust and adapt to a wide variety of family, social, and cultural situations, their core needs remain the same—that is, a need to have parents who attend to them consistently, to have their physical needs met; a parent who will be responsive to their psychological needs; and a stable living environment free of major trauma or upheavals. Parenting that is “good enough” (Winnicott 1952) enables a baby to be flexible enough to thrive.

Given that Winnicott’s statement has held true over many generations of parents and parenting, there can be an assumption that if mobile device use is associated with changes for parents and parents’ capacity to give care, then it must too change the experiences of infants. The questions that this research raises are whether mobile device use changes parents’ interactions, and how this change might flow on to infants and the parent/child relationship. Is any change a problem for young children? And, how concerned should we as a society, clinician or researcher be?

One question that arose in this consideration was: How are infants coping in a world with greater technological distractions? Opinions were split on this matter, with some opinions that babies could increase the amplitude of responses to attract their parents’ attention. Other opinions were that this might lead to babies having to be louder, clearer, or more insistent in their bids for attention, and that this might have consequences for them, such as having perceived behavioural problems. There was some concern that some babies at times may not be able to mount a response, and then may withdraw or give up, or not get what they need from a parent.

10.3.2 Attention

Mobile devices demand a user's attention and distract people from face-to-face relationships. When considering devices, there are many ways in which this research has found devices may compromise attention and have consequences on parental caregiving, as well as on the parent-child relationship. The concept of attention as a limited resource may be useful to explain these findings. Herb Simon's concept of attention economy is that:

In an information-rich world [where attention is the limited resource, not information or knowledge] the wealth of information means a dearth of something else: a scarcity of whatever it is that information consumes. What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention and a need to allocate that attention efficiently. (Simon 1971).

This is a useful concept from which to explore attentional change, with this research observing that parents' attention was elsewhere while using a device, and that this might reduce parents' response to children's bids for attention or displace other activities (Hiniker et al. 2015; McDaniel & Coyne 2016b; Radesky et al. 2015).

There was some suggestion in the research that in a caregiving context, the interference of a device in face-to-face interactions was associated with negative changes in parenting engagement with a child (McDaniel & Coyne 2016b, Radesky, Kistin, & Zuckerman 2014), changes in conversation (Radesky, Kistin, & Zuckerman 2014, Radesky et al. 2015, Turkle 2015) as well as joyful presence and gaze in interactions (Aagaard 2016, Radesky, Kistin, & Zuckerman 2014).

There are some suggestions from studies that consider adult interactions that split attention extends to times when a phone is not in active use (Misra et al. 2016). If this is the case, it may be that parts of a parents' attention may be on monitoring a device for messages or alerts, even when not in use. There are some suggestions that parents considered this effect and might make decisions about when to keep phones on their person or put away or on silent (Hiniker et al. 2015).

Parents are often dealing with situations that require split attention, as well as times of heightened emotions—for example meeting an older child's need while attending to a crying baby. Given the frequent night-time waking that is common in the first years of a baby's life, it may be that sleep deprivation may have a further compounding effect on attention. Thus, it could be assumed that inattention or difficulty dividing attention may well be increased among parents of young children and may impact on both the care of young children as well as device use.

10.3.2i Frequency of inattention when parenting or caregiving

This research indicates that it is important to put into context mobile device use by parents. Concerns are evident in relation to distraction, and it appears that distraction due to device use may be a potent cause of a lack of responsivity and that this may extend to parents' responsivity to children. But it also appears that attention to mobile devices while in the company of children may happen relatively infrequently (Ante-Contreras 2016, McDaniel & Radesky 2017, Radesky, Kistin, & Zuckerman 2014, Radesky et al. 2015), and only for very short time periods (Hiniker et al. 2015). It also seems that more parents are thinking about its potential effects on caregiving than not:

Our findings indicate that, for the majority of our participants, phone use occupies a small fraction of their time with their children and that this limited use is intentional. A small set of common, child-centric concerns—the need to 1) supervise, 2) be responsive, and 3) act as a role model—drive this intentional non-use. (Hiniker et al. 2015).

With parents' ownership and use of mobile devices being ubiquitous, the question this presents is whether the amount of time most parents are using devices is brief and inconsequential or significant to caregiving and young children. This research was not yet able to answer that question, but has raised the possibility that there may be a subsection of caregivers who use their devices in a highly absorbed way, for longer periods, or without consideration of their children (Hiniker et al. 2015, Radesky, Kistin, & Zuckerman 2014).

The neuroscience of attention is extremely complex, and full consideration of it is beyond the scope of my research. What is clear is that overloading attention or working memory via multitasking impairs a person's ability to consider what is relevant and irrelevant (Cain & Mitroff 2011), reduces information acquisition (Rockwell & Singleton 2007), impairs learning (Hembrooke & Gay 2003), increases errors, and reduces the ability to change thought process and direction (Foerde, Knowlton, & Poldrack 2006; Greenfield 2009).

Humans are evolutionarily designed to scan multiple sources of information and rapidly shift attention; it is a survival strategy (Simons 2000). However, in response to attention being compromised, "inattention blindness" can also occur. This is the likelihood that someone will fail to see an unexpected stimulus, given that mobile phones have been shown to be a potent cause for negative effects on attention, planning, judgment, and ability to change focus (Misra et al. 2016).

The salience of a stimulus and the complexity of information being taken in, especially when that information is rapidly changing or is multisensory, also affects situational awareness—which is the ability to perceive events as they change in an environment (Endsley 2000; Endsley & Garland 2000). There is also research that examines human ability to track multiple sources of information, pick out salient stimuli, and focus attention on them. This is described as the ‘cocktail party effect’—in which a person can listen to a conversation but also notice their name being called out, or the arrival of a friend (Bowman et al. 2011).

These findings perhaps explain why the issue of attention and distraction emerges as a recurring concern in this study’s findings. Mobile devices may be altering the attentional capacities of parents’ brains in potent and complicated ways. Thus, a parent may be immersed in highly complex sensory situations and rapidly changing information while caregiving and using mobile devices, which may decrease situational awareness.

Alternatively, it could be assumed that an infant would provide a salient stimulus and thus promote a high level of situational awareness in a parent despite the presence of a phone. Whether these states may potentiate other common inattentive states in parenting, such as induced by tiredness or multitasking, is yet to be considered.

Although it was a consistent finding across a number of the studies in this research that device use was mostly brief and relatively infrequent, it must be noted that other research shows that length of time on mobile devices is high in parents (Lauricella 2014). Thus, it may be premature to conclude that frequent use is uncommon.

10.3.2ii Social effect of inattention

Psychological absence, even if brief, is part of what causes the social effect of inattention.

Attention away from face-to-face interactions with others and to a mobile device indicates that a person is not psychologically present to others, or holds others at a lower priority than the mobile device: it indicates disinterest (Aagaard 2016, Gergen 2002, Turkle 2015). In this study's qualitative data, experts described inattention in parents leading to changes in the quality of interactions. This is confirmed in the research literature that notes a substantial relational effect of inattention on others. It is described as an experience of a conversation going nowhere, responses being muted, non-verbal communication shutting down, and a decline in the moment-to-moment attunement of one person to another (Aagaard 2016, Gergen 2002, Turkle 2015).

One interesting question raised in the literature is whether the cause of the inattention matters. Aagaard (2016, p. 229) notes that "although an absent present person may not actually be uninterested in what they are being told, it very much 'seems like it'". He found that this feeling persisted, even when the bystander was aware of why the device was being used, and even when they tended to do the same thing on their own device. In this study, experts gave accounts of a disruption of the interaction, even when the reason to use the device was a child-focused activity.

For example, recording a child doing a funny dance can take a parent away from an engaged interaction with a child during the recording. While recording an event can bring joy to those present as well as absent, and can be a record for the future of a moment in time, it can still disrupt. The disruption could be understood as a change in the parent's goal regarding the interaction. The goal may move from shared enjoyment to getting the child to

repeat the funny dance, or posting on social media. Misra described the role that posting on social media has in social hierarchy, making phone use “symbols of one’s relational ties” (2016, p. 279). This was echoed in expert opinions from this study, some concluding that parents might ‘push out’ their children’s stories or images onto the social media space to continue to reinforce success and hierarchy without considering how a young child might feel about or be affected by that.

10.3.2iii The role of gaze in signalling attention

Our windows are our eyes, through which we look at our soul, where the eyes become windows on the inner self rather than on the outside world. (Fera 2012).

Gaze is the primary mechanism by which someone indicates where their attention lies. It differs from other social cues in its potency and privilege: gaze has a “special status as an attentional cue” (Birmingham & Kingstone 2009). It is the use of gaze that mediates social interactions by allowing turn-taking and signalling hierarchical social positions and rules. Social attention has been found to be most strongly cued by gaze in both experimental and social settings and humans are primed to be very curious about where another person is looking (Birmingham & Kingstone 2009).

Gaze, especially a shared or mutual gaze, presents itself as a key component of a conversation. It helps us know the intentions of another by reading non-verbal communication, which contributes significantly more to social communication than language (Naini 2011).

This qualitative research found that when considering parents’ mobile device use and communication, gaze was a potent indicator of where another’s attention lay and was a key component of engagement and bonding. Descriptions in this research fitted well with

descriptions of absent presence as 'heads-down, gaze diverted down' (Aagaard 2016, Gergen 2002), to the loss of vitality in a conversation, (Aagaard 2016) and to the loss of back-and-forth emotionally engaged conversations (Turkle 2015). In the systematic review, gaze, or distraction of gaze was used as an indicator of higher levels of parents' absorption in a device (Radesky, Kistin, & Zuckerman 2014).

Gaze aversion in an infant was regarded by experts in this study as a sign of poor parent-infant interaction, and evidence of insecure attachment. It was also noted to be a way that young children may indicate their interests, that is by looking at and becoming interested in their parent's mobile device rather than others around them. Gaze is a key component in the first interactions between parents and their babies as they bond. It facilitates a strong connection that is maintained through attachment behaviour. Interruptions in gaze signal disengagement among infants. An infant uses gaze avoidance as a way to say 'I am not ready for a conversation', just as sharing gaze indicates interest, listening, and a readiness to interact (Murray, Andrews, & Parish 2005).

Interrupted gaze, or a lack of gaze, may change interactions between parents and babies and alter how well understood, kept in mind, or cared for a baby feels (Murray & Trevarthen 1985). Just as a baby indicates disengagement by looking away (Murray, Andrews, & Parish 2005), a parent not looking at an infant may indicate in a non-verbal way a focus on other relationships and interactions or experiences that are competing for a parents' attention. While gaze is an indicator of attention and attachment, it must be noted that its role in moderating an interaction is complex. It is only one non-verbal indicator of levels of engagement and attention. Also important are other attachment behaviours, such as proximity-seeking, touch, and smell.

10.3.3 Perturbation theories

Research by Turkle, Gergen, and Aagaard considers concepts related to infant development and the parent-infant relationship that fit well with the findings of this study: that attention in the parent-infant interaction, as well as the quality of interactions, are central.

Turkle considered in detail the effects of technologically mediated perturbations in interactions on older children, adults, and families (Turkle 2011c, 2011a, 2015). Gergen considered absent presence (Gergen 2002), and Aagaard considered vitality affects to explain the dampening down of an interaction and mismatched attunement between people when device use is involved (Aagaard 2016). Given the findings of this study that parental attention is a key theme, the question is how these perturbations might cause this effect.

There is a substantial evidence base that demonstrates interpersonal perturbations in parent and baby responses, and describes the micro-communications that both parents and child make in an engaged and disengaged interaction, and the active role that even very little babies play in this communication. The perturbation studies have been of great value in assisting researchers to understand a baby's engagement and disengagement cues. These studies have used experimental tools to investigate micro-communications and synchronicity of interactions: for example, the split-screen recording scheme. This has allowed video of the faces of both the baby and the parents (time synchronised with the simple use of a mirror so that both participants' faces can be seen at the same time) to be viewed and coded.

The classic experiment is the "still-face" or "blank-face" experiment (Brazelton et al. 1975; Fera 2012; Tronick et al. 1979), which investigates the effects of general responsiveness of a

parent. In this, after a period of engaged play, a parent is asked to stare blankly at the baby for a short period of time. This initial study was designed to allow researchers to examine what happened to a non-clinical study group when asked to look like a depressed mother. Over years, these experiments have been varied within the same and between different study samples and research groups (Reddy et al. 1997).

During the still-face experiment, an infant will generally look perplexed at their parent's lack of responsivity, then increase their bids for attention. They will then become distressed and gaze away from the parent, or use a more fleeting gaze to the parent, and may attempt to calm themselves with sucking or clasp a hand. This will be followed by physical disorganisation with loss of eye contact, disjointed arm and leg movements, loss of posture control, and finally withdrawal: when the baby may become still and disengaged. Aagaard (2016) and Turkle (2015) argue that the still-face experiment may create a scenario that is quite like a parent absorbed in texting or internet-based mobile device use. The descriptions of parents' behaviour while using a device were that they were unresponsive, eyes-down, offering no response or less vocal response (Hiniker et al. 2015, Radesky, Kistin, & Zuckerman 2014). Data from the qualitative study noted concerns about a baby making bids for attention to a parent and not being responded to, but also of an increased concern if the baby withdrew, as it may indicate that the baby is giving up.

While the lack of interaction from the still-face parent may well be quite like a parent looking at a mobile device in an absorbed way, it is clearly not identical. A parent on a device would be looking down, not at a baby, which is the posture many still-face experiments instruct the parent to adopt. A parent may shift attention back to a baby when the baby increases their bids for attention which, in the experimental situation, the parent is

asked not to do. A parent less absorbed in device use may speak to an infant, or touch them while using the phone. In the perturbation studies, the babies are often very young, they are strapped into a stroller or high chair, and they are not offered any alternative play things or distractions.

One question to consider is whether distractions from mobile devices are the same or different from other distractions. There is evidence in the findings of this research that features specific to mobile devices and the way people use them—the psychological and social reasons—do result in mobile devices being a more potent cause of distraction, thus a potentially potent perturbation in the interaction. The question that remains is, what is this difference like for a baby at any moment in time? For example, would the distraction of a parent talking to a friend in person be the same as talking on a phone, and how would those settings differ from device use without conversation (i.e. texting or online connection) for a baby?

When the still-face experiments were repeated with different types of interactional perturbations, responses in babies have been different. One variation to the experiment was a more natural interruption. In this case, participants in some studies were interrupted in their interactions with their baby by an experimenter coming into the room and talking to them (Cohn & Tronick 1989; Murray & Trevarthen 1985). When this occurred, babies became puzzled. They showed less positive emotions and of less intensity, but they were not distressed, instead waiting with quiet interest.

It seems from the natural perturbation study design, that a baby does cope better when the interruption involves another person and conversation. While the difference in reaction of babies has not been fully explained (Reddy et al. 1997; Striano 2004), it has been suggested

that even very little babies have the capacity to read and understand the difference in a social situation. It remains unclear whether for a young child, device use is too difficult for an infant to understand. It is not yet clear whether there is enough information for an infant to make use of, or for the baby to understand why the parent has withdrawn. There has been some investigation of this matter in perturbation studies by varying the type of naturalistic breaks in attention of parents, however, the findings were equivocal (Striano 2004).

Another variation of the perturbation studies are the double-video experiments between mothers and babies (Murray & Trevarthen 1985). These experiments either allow a baby to react to a mother in real-time via a video screen, or to replay an interaction. These examine contingent responsiveness. There are two relevant observations about this: the first is that even young babies (6–12 weeks old) can remain engaged while the interface between them and their caregiver is technologically mediated. However, in the interaction via a screen, the “mood seemed less exuberant” (Murray & Trevarthen 1985, p. 189). One matter on which expert opinions were divided was whether babies and young children could benefit from technologically mediated interactions that their parents might share with them, such as Facetime or Skype. It seems that at least in a controlled experimental environment, when other distractions are at a minimum, babies can use a technologically mediated interaction, but that the change in quality might change the emotional intensity of the interaction.

The other information the double-video experiment demonstrated is that as well as the non-response in the still-face, non-contingent responsiveness affects a baby in a similar way. Among babies who observe a replay of a parent responding (i.e. the replay being non-contingent with the baby’s responses), the baby quickly becomes perplexed, and not

engaged in the interaction, showing signs of distress and less positive emotions. This suggests that if a parent is responding to a young child, but that response is not cued by the baby's own social cues, it does not lead to an engaged interaction. It is possible that mobile device use, along with many other things that compete for parents' attention, might lead to this non-contingent response.

Finally, when considering the double-video experiment in the replayed phase it was found that when a baby is presented to a mother in a non-contingent time sequence, the mother's speech loses the characteristic pitch and modulation of motherese, which is "simple and phonologically clear [speech], often in a high-pitch, spoken by parents when communicating with young children." (PsychologyDictionary.org 2016).

This suggests that parents also are sensitive to contingent responsivity; that the mother's role is not "simply to fill in the gaps" (Reddy et al. 1997) but that the quality of the baby's interaction matters to parents. This raises a rather circular question. If distraction of the parent to a device reduces the responsivity of the baby to the parent, and when the parent re-engages with the baby they do not get a response, will this result in the parent being less inclined to engage, and perhaps more inclined to return to screen use? Would this inclination then cause the baby to be again less responsive? The same question could be posed for a young child who increases their bids for attention: a whining, screaming, intrusive child may decrease a parent's interest in engagement, thus increase their interest in engagement elsewhere. Certainly, this bidirectional effect was something noted by other studies (McDaniel & Radesky 2017) as well as findings reported here by expert opinion: "Because I think, for me, if the baby shuts down and gives up, the device will claim the mum."

This is somewhat speculative, but it is known that infants play an active role in communication from a very young age (Brazelton et al. 1975, Cohn & Tronick 1989, Murray, Andrews, & Parish 2005, Reddy et al. 1997, Tronick et al. 1979). For example, parents of babies who are less responsive for developmental or medical reasons, such as prematurity, autism spectrum disorder or intellectual disability, respond in different ways, such as being more directive in communication, and using fewer words (Murray, Andrews, & Parish 2005).

10.3.4 Vitality

Explanatory frameworks for attention and perturbations in an interaction, especially the role gaze plays in directing attention, focus mostly on non-verbal communication between parent and infant. These are important given that infants inhabit a pre-verbal world.

However, they do not capture other components of the lived experience of infants within their bodies.

Vitality affects are body-based experiences rooted in infancy and in the parent-infant interaction (Stern 2010). Experiences such as sleeping, breathing, and changing arousal or emotional states are the earliest of body-based experiences and involve movement and energy. Vitality affects have a shape, quality, and momentum associated with an emotional experience. But they are also socially oriented, and lead to the experience of making something happen; they have volition and agency. Stern (2010) considers the importance of parents in mirroring then augmenting or settling the intensity and shape of a vitality affect in an infant, helping them experience the affect, but also helping them understand the shape—the beginning, middle and end—of an experience. This is most important in the first months of life, and gives shape to body-based and emotional experiences over a lifetime.

While Aagaard's research was undertaken with young adults, and considered the effects of a person's phone use on partners or friends, it provides a useful and rarely presented conceptual framework that combines consideration of the relational effects of mobile device use, with psychodynamic concepts of infant development.

When thinking about vitality, Aagaard (2016) considers how in close relationships, a phone user looking away (or even preparing to look away) from a face-to-face conversation can have a substantial effect on another person. The partner will try to understand and resolve the situation with the cues available to them. Aagaard argues that with mobile device use, there are few cues. The device user is locked into phone use: head down, eyes averted, hands busy. With no cues, the conversational partner may become dysregulated, feel confused and seek to regain attention. But sometimes there are enough cues for a conversational partner to wait patiently, subdued but interested.

These descriptions are similar to the babies in the perturbation studies that examine either the still face or natural interruptions. But Aagaard also considers the dampening of vitality in the conversation, which occurs when there is a mismatch in intensity of an interaction between the user of the device and their partner in conversation. How this results in a loss of movement and direction in a conversation and an emotion, with "impaired social interaction [including] delayed responses, mechanical intonation, a motionless body, and a lack of eye contact" (Aagaard 2016, p.223). Expert opinions from this research described a similar change in conversations: "going nowhere", the device user just "sitting slumped".

What this model considers, most importantly, is the psychological combined with physiological consequences of being put on hold, told to wait, of being alone, or feeling not understood. Even for an adult, who knows what their conversational partner is doing on the

device, this situation creates loss of a sense of energy and volition, as well as perhaps other body-based experiences.

It is experiences with matched vitality that can lead to a deepening of a relationship (Aagaard 2016, Stern 1985, Turkle 2015). An infant is reliant on a parent to assist them in moulding these body-based affects by noticing their cues, but also matching the intensity of other experiences. If an infant because of their age and developmental stage cannot make sense of a parent's screen use, are there times when a parent's stillness is a marked misattunement? And if repeated often, could it affect an infant's experience of themselves?

There are many ways in which the infant's needs and experiences vary moment to moment. This includes times when a parent might need to be responsive and reactive, or might not be needed by the infant. However, a loss of vitality in relationships leads to the loss of a shared creative space to process a strong emotion, or to play and explore. This may leave a baby with a sense in their body of being put on hold, a dampening of joy, of feeling alone or withdrawing from exploration.

10.3.5 Infant capabilities

The available evidence from the systematic review is that older children may have mixed responses to a parents' device use, with some evidence that there may be behavioural effects (McDaniel & Radesky 2017, Radesky, Kistin, & Zuckerman 2014). Turkle describes older children and young people reporting the feeling that their parents were psychologically absent, describing sadness or frustration about this, and retreating to their own screen use when no parent is available (Turtle 2015). This raises the question as to how younger children cope when a parent uses a device. Qualitative data from this research suggests that young children will make bids for attention and may be well adapted to get

parents' attention. But experts were also concerned that some infants may not. Factors that were considered important regarding infant capacity were the age of the infants, with younger babies having less capacity; and older more physically and psychologically well-developed children managing better.

The perturbation studies suggest that the more understandable a situation is when a parent withdraws from an interaction, the better an infant manages. As well, a securely attached infant who has a responsive caregiver, or is not exposed to significant trauma or other psychosocial disturbance in the family, will be able to manage better in most situations.

When considering the question of an infant's capacity, there is a need to consider the role a parent plays in an infant's experience via tracking, mirroring and modulating infant cues.

Tracking is the process of following the path of something (PsychologyDictionary.org 2016).

Mirroring is the process of unconsciously copying the behaviours or non-verbal communication of another (Gergely & Watson 1996; PsychologyDictionary.org 2016). It is the mechanism by which people communicate empathy for others and it is central to the ability to feel understood and thus to the development of a robust sense of self (Kohut 1985). It is a two-way conversation, which does allow for the potential for a parent to be more or less responsive and a baby to be clearer or less clear in their communication. One question raised in this research was if a parent is less responsive, could an infant be clearer or stronger in their cues?

While capacity to cope is an advantage for young children, experts in this study did not see withdrawal of an infant as a helpful coping strategy, rather one likely to adversely affect infant development and the parent-infant relationship. They also identified the disadvantages for young children who increased the amplitude of bids for attention, which

could lead to attention-seeking behaviour being misunderstood by adults as naughty, or a manifestation of psychopathology in the child.

10.3.6 Concepts of a harmful dose at critical times

Given the limited state of knowledge and lack of research that may address causality, it is premature to comment conclusively on whether there are long-term effects related to parents' mobile device use for children. However, the critical question of whether device use by parents is harmful was raised in expert opinions, and is central to discussions about technically mediated interactions and their effects on all human interactions and relatedness. Bearing this in mind, there is still an opportunity, on a qualified basis, to speculate about the matter of harm. On this qualified basis, there are two theoretical frameworks that can be used to consider the question of harm: first, considering parental responsivity; second, considering domains of child development and the different parenting skills that development in different domains requires.

10.3.6i Parental responsivity

Tronick and Cohn found in laboratory observations of non-clinical groups, that infants and their parents spent only 30% of the time in attuned interactions, moving between coordinated and mis-coordinated states over a matter of seconds (Tronick & Cohn 1989). Repair of mis-coordinated states occurred another 30% of the time. In this review, there was consideration of the difference between normal and abnormal interactions by referring to the literature about depressed mothers. Babies of depressed mother expressed less positive emotion, had more self-soothing behaviours (e.g. gaze avoidance, sucking, touching of face and body, clasp hands, and repetitive body movements), and a greater expression of negative emotions (crying, anger). Tronick postulated that when things go wrong, it is not

just the misattunement that causes the problem, but the lack of success in reconnecting that leads to longer term difficulties for children. Tronick calls this “the good, the bad, and the ugly”:

The good is that normal stuff that goes on, that we all do with our kids. The bad is when something bad happens but the infant can overcome it. After all, when you stop the still face the mother and baby start to play again. The ugly is when you don't give the child any chance to get back to the good. There is no reparation and they're stuck in that really ugly situation. (Tronick 2009)

It remains unclear how much of a decrease in parenting responsivity due to any life event/activity might have a harmful effect, let alone whether parents' device use might cause harm.

10.3.2.6ii Domains of child development and different parenting skills.

The other way to consider the question of a harmful or critical dose is by thinking about what infants might need from parents for different developmental domains, and whether there are ways in which a parent's device use might be problematic for a child's development in particular ways. Children need different kinds of parenting at different times and in different situations. Parenting practices vary among cultures, and infants are biologically very flexible (Bornstein & Tamis-LeMonda 1997; Bornstein 2013; Murray 2015), but “particular parenting practises are each associated with particular patterns of child development” (Murray 2015). There was evidence from this research that technological interference can disrupt a broad range of parenting activities (McDaniel & Coyne 2016b). Thus, there is a valid basis on which to hypothesise that a parent's device use, its type, and

the timing of use in relation to the different kinds of caregiving may change children in variable ways.

Murray provided a useful summary of her work in a public lecture at Reading University. She divides child development into four distinct domains (Murray 2015). The first is social understanding. Parents assist babies in developing this by tracking and mirroring an infant's response. Both these processes are especially important in the first three months of life. Experts interviewed in this study concurred that tracking and mirroring are central to infant development. In the parent-infant relationship, both the infant and the parent track and mirror each other (Meltzoff 1990). The parent, however, needs to be responsive to the infant's cues first by tracking them, but then by reflecting those emotions back to the baby in a modulated or manageable way, so that the infant can understand them. It is this mirroring that allows infants to begin to understand thoughts, feelings, and intention in themselves and others: a process called mentalisation (Fonagy, Gergely, & Target 2007). Thus, if a parent's mobile device use has the capacity to disrupt a parent's ability to track and thus mirror a young child's emotional experience, it may be particularly problematic in the first three months of life.

The second area of child development that Murray describes is emotional regulation and self-control: managing difficult emotional states and aggression. Murray considered that this required a parent to be able to soothe a very young infant; assist an older baby in exciting play as well as help them calm down; and in an older child begin to test limits, to provide routine and structure in a kind and caring way. A change in the parent's ability to provide this is likely to be predicted by the parent's attachment security and general parenting knowledge and skill. Thus, other than the possibility that a parent using a device might be

generally less responsive, it is unclear to see how mobile device use would impact on this area of parenting, unless associated with other psychosocial or mental health problems in a parent.

The third area of child development Murray considered was attachment. This is determined by the style of interaction between a parent and child that occurs repeatedly in day-to-day life. It requires a consistent responsiveness from a parent in relation to meeting a child's needs, especially dealing with times when the child is separated. This area of child development is highly determined by a parent's own early experiences and attachment security.

Attachment patterns of interactions are established from birth. While attachment styles can change over time, secure attachment and the most disorganised type of insecure attachment tend to be stable over time. Attachment is important in determining how a person manages intimacy and relationships through a lifetime, and as a determinant of mental health.

This research found that experts were divided on how they considered device use and attachment might interact. The primary uncertainty was whether very frequent or prolonged device use might cause enough disruption of the consistent responsiveness of a parent to result in a child becoming insecurely attached. Another uncertainty related to whether device use by a parent who has an insecure attachment style might vary from that of a securely attached parent. For example, parents with an insecure attachment style might use a mobile device to avoid intense emotions, keep a child at arm's length, or might be neglectful of a child's emotional needs.

The final area of child development Murray considers is cognition. To promote a child's cognitive development, there is a need for a parent to be generally and contingently

responsive to a baby, which assists them in engaging in reciprocal interactions that promote cognitive development. There is evidence that maternal responsiveness that is not directive or intrusive—especially to non-distressed cues—are predictive of attention span and ability to master a task, as well as symbolic play and language development in older toddlers. In addition to this, parental assistance in play and exploration of their environment by helping a baby stay focused on a task, or master a skill, is important. The perturbation studies provide a framework to understand how mobile device use in parents may alter general and contingent responsiveness, and thus cognitive development.

To summarise, there is evidence that parents need to provide different kinds of caregiving to children at specific times for various developmental areas, and that distinct activities with a parent will provide children with proficiency in a range of developmental and social and emotional skills (Bornstein & Tamis-LeMonda 1997; Reddy et al. 1997; Murray 2015).

Over a day, there will be times when a child will need their parent to comfort them, or assist them to calm, or settle them to sleep. There will be other times when exploratory play; or play that is just outside of their developmental reach, will need to be scaffolded; or they may need to experience shared attention, joint play, or require limit setting. If a technologically mediated interruption repeatedly occurred at a particular time of a day or during particular activities, this may have very different effects on children. There is some qualified basis on which to consider that social understanding and cognitive development could be most likely to be affected by parents' device use.

10.3.7 Other factors that influence the parent-infant interaction.

It must be noted again that device use by parents is one among many interruptions that occur in the day-to-day lives of children and parents. For many parents and their children,

device use may be an infrequent source of qualitative change in a relationship. It may also be that other much more significant experiences, family and social situations may be creating more potent reasons for a baby and parent-child interaction to go well or badly.

Parenthood is a time of considerable change in an adult's and family's life. Associated with this can be significant stress, isolation, changes in roles in a family and in life outside the family (Gottman, Katz, & Hooven 1996; Snellen 2010). A baby presents unique and often unexpected challenges for parents to accommodate and adjust to. Psychosocial stressors outside caregiving can be prominent. These stressors, which can be reflected in mental health problems, are known to have very significant effects on caregiving, parent-infant interactions and outcomes for young children.

10.3.8 The future of technologically mediated interactions

Technological and social change is moving rapidly, with some evidence in this research that the rapid nature of this change means that the concerns of contemporary parents and children will be different to those of parents in even the next 2–5 years. This research has found impending technologies that may drive change will be the perfection of machine language and voice recognition software, flexible solutions for power generation, and embedded technology. These together may bypass the need for “hands on devices and eyes on screens” and instead utilise neural networks. This could create another set of opportunities and drawbacks, as devices not only change relationships but begin to have the capacity to change users.

In the future, people will be connected to each other in multisensory ways with enhanced trans-human capacities—a human who evolves beyond “current physical and mental limitations, especially by means of science and technology” (Stevenson 2010). Some experts

in this study saw exciting applications for devices to notice and scaffold arousal levels and emotions, to help us reflect on our internal states and communicate these to others, and for improved capacities for early detection of medical and behavioural concerns about children, thus enabling targeted interventions to change child outcomes. However, participants also saw the potential for misuse of technological advances in the parenting and child-raising spheres.

Meanwhile, there is emerging evidence of a society-led move away from constant connection, to instead notice what is being missed, and what is being lost when engagement with a device takes priority. One example of this is when a marketing firm collaborated with linguists to find a name for being snubbed by someone on a phone: *phone snubbing* became *phubbing* (Mc Cann Australia 2013). This group wanted to see if inventing a word would create discussion of a growing social issue that had no name: it did. The story was covered in 750 media reports in 50 countries. Another example is the YouTube video *Look Up* by filmmaker and spoken word artist Gary Turk, who considers the inferior life lived if only through smartphone connections (Turk 2014). This video has been viewed more than 59 million times. Googling *digital detox* brings up hundreds of references, especially related to children. In this research, Hiniker talks of a “pushback against technology” (Hiniker et al. 2015) and is developing apps that assist parents in managing their own, and their children’s, device use.

When reviewing the development of Sherry Turkle’s 30-year period of qualitative study about technologically mediated life, it appears that the opportunities she initially explored in her early work regarding our relationship with technology and representations of self online, have turned from optimistic and enthusiastic, to concerned. Her most recent book

considers that “We have embarked on a giant experiment in which our children are the human subjects” (Turkle 2015 p. 62).

CHAPTER 11

Conclusion



In an emerging field of interest about the interaction between parents' use of mobile computing devices, parental caregiving, the parent/child relationship and young children, the findings of this study are original. They combine consideration of emerging research from a systematic review of the literature, with expert clinical opinions in a qualitative study. The findings from clinicians of a wide array of backgrounds considered broad cultural, social and relational aspects of parents' device use, but also offered detailed observations of patterns of use and potential ways in which relationships may be perturbed by device use on the basis of known paradigms of infant psychology, parent-infant relationships and child development.

11.1 Implications for future research

Gaps in the literature and future directions for research emerged from the findings reported here. More needs to be known about why parents use mobile devices as well as patterns of use. Adding to the observational data by McDaniel (McDaniel & Coyne 2016b) about the day-to-day use of mobile devices by parents would assist greatly in understanding parents' use and the targeting of further areas of research. There is also little observational information about how much parents are using devices in the company of young children. In the three studies that considered this matter (Hiniker et al. 2015, Radesky, Kistin, & Zuckerman 2014, Radesky et al. 2015), different ways of measuring use made comparisons difficult, and they represented very small sample groups. There was some evidence that parents might underestimate their use (Hiniker et al. 2015). Thus, observing parents' use or

capturing of phone use data would improve the reliability of findings. Tracking location and duration of use on devices would offer an interesting opportunity to see how parents' use of devices occurs as they move through their day, as well as assisting in determining how much use occurs while with children.

Hiniker et al. (2015) established that a sizeable proportion of parents feel guilty about their device use, and some of them wish to curb their use. They point out that a future area of research could be to assess models of understanding about how parents decide to use, or not use, devices while with young children, and to target interventions based on preferences and beliefs about phone use.

Given that raising young children is known to be a time when roles change, and social isolation can impact on parents' functions, relationships, and health and wellbeing (Tyano et al. 2010; Snellen 2010; Austin & Highet 2011), it will be important to investigate further the role technologically mediated interaction may have on assisting parents and parenting/caregiving with observational studies.

Only one study addressed how device use co-exists with caregiving activities, and interrupts parenting or coparenting activities (McDaniel & Coyne 2016b), thus further investigation of this area is needed.

Given some consideration in the literature that mobile devices can have features that promote psychological dependence, it would be worth investigating further the question of dependence and addiction to devices in parents. This is especially important as compulsive use may put children at risk if parents were to prioritise device use over the needs of their children.

An interesting peripheral finding of this research was that parents' mobile device use may increase children's risk of physical harm (Ante-Contreras 2016). Consideration of this could be included in any naturalistic studies considering caregiving.

Hiniker et al (2015) considered the level of interest that parents might have on device-based interventions to assist them in integrating their mobile device use with parenting. While the level of interest was low, this idea may well have huge community application, even if only taken up by a small number of parents. The Human Centred Design & Engineering Faculty at the University of Washington, where Hiniker conducts research, is already involved in app development related to parenting and child use. This research group has found that apps that assist in mindful parenting, or scaffold how parents can notice and manage emotions, first in themselves and then in their children, would have utility for community use. There are known evidence-based interventions that promote attachment and parenting that are reflective to a child's needs (Bakermans-Kranenburg, Van Ijzendoorn, & Juffer 2003), for example, programs such as Circle of Security and Watch, Wait, Wonder. But at present such programs can only be accessed in specialised child development or mental health services.

One expert in this research considered that currently as a parent, one was "fleeing to your phone", but that it may be that in future parents would have an app that would allow them to notice and monitor their own psychological arousal and manage it. This would then assist them with parenting/caregiving and in helping their children to manage emotions:

If you want to fix anxiety in the child, you fix anxiety in the parent. That is the alpha and the omega Because once the parent starts noticing it in themselves, and then noticing it in their child, the child will get an understanding too.

It will be interesting to see how the apps development field may lead to greater access for parents to these resources.

There are no available studies that consider how parents' device use affects the moment-to-moment interactions between a parent and young child. Given that direct observational measures of infant-young child wellbeing, infant regulation, and attachment security or distress in the parent-infant relationship have not been considered in relation to device use by parents, studies that consider both the interactions between parents' use of devices on attachment security as well as general and contingent responsivity would be helpful.

Existing study design and data analysis templates exist already from the decades of still-face, double-video and dyadic and triadic split-screen experiments (Als, Tronick, & Brazelton 1979; Fivaz-Depeursinge & Corboz-Warnery 1999; Murray & Trevarthen 1985; Nadel et al. 1999). These have coded the moment-to-moment interactions between a caregiver and infants-young children, and provided operationalised coding schemes for domains of child response to parent interaction and disengagement.

Laboratory settings allow easier access to interactions that can be recorded and coded, in which modification of interactions and interruptions could be investigated, and samples of same-aged children could more easily be undertaken. Including information about attachment security prior to any intervention study would assist in determining whether mobile device use is affected by attachment styles in parents, or whether it impacts on attachment security in infants of parents with high use. Given the existing evidence that the reason for disengagement of a parent from a baby may vary the effect on a child, including triadic interactions in studies would be of interest.

Further studies in the laboratory setting, of the type similar to that of Radesky, Kistin and Zuckerman (2014) with a primary focus on child responses would allow more detailed consideration of how distraction and disengagement of a parent may affect not only parental behaviour, but also the child's response. In this study, no data were presented on children's responses to parents' use of devices. Further analyses of existing data as part of the methods would address this gap. This method shows promise as it allows the opportunistic use of existing videos of parent-child interactions, which can be examined in detail. There may well be other videoed interactions between parents and children available worldwide, which may also contain incidental device use. Given that existing data samples may be from several years ago, their use would also allow consideration of whether and how, over time, patterns of incidental mobile device use may have changed.

When considering what is known about the stages of child development (Bornstein & Tamis-Lemonda 1997, Murray 2015), it may be important when considering study design to focus on a particular developmental stage or caregiving activity. For example, if a research aim was to consider the effects of parents' mobile device use on gaze or social understanding, it would be most relevant to look at parents' interactions with their babies in the first months after the birth of a baby, and to consider how they track and mirror their babies. However, if the area of investigation was to explore effects on children's cognitive development, the focus might be better placed on the contingency of parents' responses.

Using naturalistic settings would allow investigation of how real-world device use plays out in parent-child interaction. Naturalistic observational studies during meal times and in a playground that have a focus on child responses to parents' device use could add to the existing literature that has already been undertaken in these settings (Radesky et al. 2015).

The finding in one study that parents can sometimes re-engage with a child in an intrusive way after a period of device use was a peripheral but interesting finding (Hiniker et al. 2015). Given the evidence in face-to-face dyadic and perturbation studies, that a still face and intrusive play can have the same effects on infants (i.e. disengagement, gaze avoidance), it may be that less well attuned interactions after a parents' device use might change a young child's readiness for interaction, which in turn may also affect the parent's sense of being needed by the child. The importance of this issue lies in its potential effect on attachment security. It would suggest a need for further investigation and consideration in observational studies of the effects on a young child of re-engagement of a parent, as well as disengagement.

There was little research that included fathers. Most research relating to both this area, infant psychology and the parent-child relationship involved mothers. For example, when fathers have been involved in parent-infant interaction studies, it has mostly been *in addition* to mothers (Fivaz-Depeursinge & Corboz-Warnery 1999). There is evidence that men use mobile devices for different reasons (Billieux 2012), as well as that fathers often have different styles of engagement with young children and different roles in the family (Lamb 2004). It is also known that when looking at child outcomes related to fathers' health, wellbeing and roles, findings are different (Wilson & Durbin 2010). As an example, the one study in this review that involved fathers as part of the study design and outcomes found that the findings related to mothers' device use did not extend to fathers (McDaniel & Radesky 2017). This matter is important, not just in order that men be included in research related to parenting and child outcomes, but also because the feminisation of the parenting literature risks pathologising women.

11.2 Mobile devices and the next generation

Mobile devices are a part of life in the twenty-first century. The use of devices is growing and is driven by market forces, increased accessibility, affordability, and functionality, as well as consumer demand. This use has occurred prior to careful consideration of any potential effects of the use of mobile devices on relationships. Given the ubiquity of device use and the growing evidence that social change related to technologically mediated interaction is changing human patterns of behaviour, it would be wise to consider the interaction between parents' device use and young children, as these children may be most vulnerable to perturbations in relationships, given their age, stage, and dependence on care from others.

There is growing evidence of an association between device use and the quality of relationships, as well as some emerging evidence of the mechanisms of this association related to attention, responsivity and displacement of other activities. While there are already well-established theories of understanding the development and psychology of infants and young children, which consider in detail what young children need from their parents for optimal early childhood development, this research contributes to the emergent literature on how these frameworks may apply to parents' mobile device use.

When considering the matter of mobile devices, future research needs to look at the known confounders and moderators of parenting/caregiving and family relationships with young children in order to better understand how mobile device use might drive or be driven by the broad psychological, social and cultural factors that surround raising children.

In a time of rapid technological and social change related to the use of mobile devices, research undertaken now must think ahead, beyond current issues of today, to what might follow, in order that future research will be relevant to the real-world issues.

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Appendix

Appendix A. Interview guide for semi structured interviews and focus groups.

Introduce myself

Remind the participant of the aims of project, which is to collect key informant opinions about parental use of smart phones while with their infants or children and the possible effects this use may have on infants or young children.

Draft interview question stems.

Questions will begin with phrases such as “I am interested in your thoughts on...”, “I wonder if you could tell me about...”, “Could you please tell me your thoughts on.....”

Prompts: only use if relevant to the answers of stem questions and if further detail is needed

Questions to be explored with key informants.

Please tell me what you think about parents’ smart phone use in the presence of their young children.

Please tell me your thoughts about whether the culture of mobile device use is changing?

Prompt: If it is changing how you do think this affects parents’ use of mobile devices while in the company of babies and young children? Prompt: How do you think technology developments in mobile devices and data accessibility are affecting usage when with children?

Please tell me about the ways you have seen smartphones used in your contact with parents of young children?

If you were/are raising a child now, how would you use mobile device in front of your baby or young child?

Could you tell me about your thoughts on whether parents’ smart phone or mobile internet enabled device use affects parenting/caregiving? *If informant thinks that parents’ mobile device use in front of young children has effects: in what way? Prompt: Do you consider it has any effect on infant/early childhood development? What about the relationship between parents and their young children? How might that effect be transmitted?*

Do you think there are factors in parents that affect their mobile device use when with their young children?

What do you think might constitute problematic mobile device use among parents with young children?

Are there other factors that you consider important to think about in relation to this question that we have not already discussed?

Appendix B. Kmet Checklists for assessing reporting quality of studies (Kmet, Lee & Cook 2014)

Table 1. Checklist for assessing the quality of quantitative studies

| | Criteria | YES (2) | PARTIAL (1) | NO (0) | N/A |
|----|--|------------|----------------|-----------|-----|
| 1 | Question / objective sufficiently described? | | | | |
| 2 | Study design evident and appropriate? | | | | |
| 3 | Method of subject/comparison group selection or source of information/input variables described and appropriate? | | | | |
| 4 | Subject (and comparison group, if applicable) characteristics sufficiently described? | | | | |
| 5 | If interventional and random allocation was possible, was it described? | | | | |
| 6 | If interventional and blinding of investigators was possible, was it reported? | | | | |
| 7 | If interventional and blinding of subjects was possible, was it reported? | | | | |
| 8 | Outcome and (if applicable) exposure measure(s) well defined and robust to measurement / misclassification bias? means of assessment reported? | | | | |
| 9 | Sample size appropriate? | | | | |
| 10 | Analytic methods described/justified and appropriate? | | | | |
| 11 | Some estimate of variance is reported for the main results? | | | | |
| 12 | Controlled for confounding? | | | | |
| 13 | Results reported in sufficient detail? | | | | |
| 14 | Conclusions supported by the results? | | | | |

Table 2. Checklist for assessing the quality of qualitative studies

| | Criteria | YES (2) | PARTIAL (1) | NO (0) |
|----|--|------------|----------------|-----------|
| 1 | Question / objective sufficiently described? | | | |
| 2 | Study design evident and appropriate? | | | |
| 3 | Context for the study clear? | | | |
| 4 | Connection to a theoretical framework / wider body of knowledge? | | | |
| 5 | Sampling strategy described, relevant and justified? | | | |
| 6 | Data collection methods clearly described and systematic? | | | |
| 7 | Data analysis clearly described and systematic? | | | |
| 8 | Use of verification procedure(s) to establish credibility? | | | |
| 9 | Conclusions supported by the results? | | | |
| 10 | Reflexivity of the account? | | | |