

Nod, nod, ignore: An exploratory observational study on the relation between parental mobile media use and parental responsiveness towards young children

Monika Abels, Mariek Vanden Abeele, Toke van Telgen and Helma van Meijl
Tilburg University, Tilburg Center for Cognition and Communication (TICC)

ABSTRACT There are concerns that contemporary caregivers are so absorbed by their mobile devices that it hampers their responsiveness to their children. Recent ethnographic work suggests that these concerns are warranted. Scholarly work on this issue is scarce, however, and systematic observations of the phenomenon are lacking. This chapter presents an exploratory study in which caregiver-child dyads were systematically observed to assess whether the tendency to respond and the timeliness, strength and emotionality of caregivers' responses to children's bids for attention are negatively affected by phone engagement (Hypothesis 1). Additionally, we investigated whether the relation of phone engagement to caregivers' responsiveness is different than the relation of other distracting activities that caregivers might engage in when caring for a child (Hypothesis 2). We observed caregivers and children between the ages of zero and five in Dutch consultation bureaus and playgrounds. Drawing from observations gathered from 25 caregiver-child dyads, the results show that the likelihood to respond, the time-

liness and the strength of caregivers' responses are each negatively affected by phone use. In addition, phone use appeared to be more engaging and therefore affected responsiveness more strongly than being engaged in other distractive activities. Given the importance of parental responsiveness for child and language development, these findings indicate an urgent need for further research on the issue and how it can be addressed.

KEYWORDS absent presence, absorption, child development, mobile media, mobile phone, parental responsiveness, phubbing

1 **INTRODUCTION**

Parental responsiveness refers to the contingency and sensitivity of parental verbal and non-verbal response to child behavior during child-parent interaction (Ainsworth, 1969; Baumrind, 1978; Feldman, 2007). There is broad consensus that parental responsiveness is crucial for child development (Darling & Steinberg, 1993). Parental smartphone use, however, is putting parental responsiveness to the test. Media authority Sherry Turkle (2012) has noticed that children compete with smartphones for parental attention. A recent poll among six thousand 6- to 12-year-olds (AVGtechnologies, 2015) confirms this: 54 percent said parents spend too much time on their phones, and 32% feel unimportant when parents are using them. Moreover, a handful of qualitative observation studies suggests that caregivers can become so absorbed by their phones that they ignore their children's bids for attention (Hiniker, Sobel, Suh, Sung, & Lee, 2015; Radesky et al., 2014).

Systematic observations are currently lacking in this field of research, and studies focusing on very young children are scarce. Hence, the first contribution of this chapter is to add to the base of knowledge by reporting the results of an exploratory observational study in which we used a systematic observation method to observe the impact of smartphone use on parental responsiveness towards small children.

Lower parental responsiveness may be observed not only when caregivers use their phone, but also when they are engaged in other non-child-related activities that caregivers encounter or select while

caring for their children (e.g., reading a newspaper, eating, social interaction). A second contribution of this study is that we examine how phone use compares to other distracting activities in terms of impact on parental responsiveness.

A third objective of the study, which we only describe briefly for the sake of completeness, is to examine the profiles of the caregivers who were more involved with their mobile phone during the interaction.

2 THEORETICAL FRAMEWORK

2.1 Parental responsiveness

The first objective of this study is to examine whether parental phone use is related to parental responsiveness towards young children. Parental responsiveness is crucial, particularly in the early years of life when important cognitive and socio-emotional developmental processes take place (Bornstein, Tamis-LeMonda, Hahn, & Haynes, 2008; Bowlby, 1988; McGillion et al., 2013). Parental responsiveness supports the young child in his/her active involvement with the environment, for example when parents respond contingently to the child's focus of interest (Landry, Smith, Swank, Assel, & Vellet, 2001). Such contingent responses contribute to child language acquisition (Tamis-LeMonda, Bornstein, & Baumwell, 2001), as does joint attention. In particular, following the child's lead encourages language learning (Tomasello & Farrar, 1986; Yu & Ballard, 2007). Language acquisition is of great concern to scientists and society as a delayed or impoverished language acquisition can have negative effects, for instance on academic achievements (e.g., Kastner, May, & Hildman, 2001). The *30 million word gap* (Hart & Risley, 1992) found between children from families with lower and higher socio-economic status, for example, has become a specter in academic and public discourse.

Socio-emotionally, parental responsiveness is important because it supports a young child's need to feel nurtured. When parents provide care in a nurturing, contingent responsive way, this facilitates the child's socialization by promoting predictability and trust in the reasonableness of parental demands (Maccoby & Martin, 1983). Moreover, responsive

parenting stimulates the development of a secure attachment style in the child (Bowlby, 1988) and contributes to the development of the child's regulatory capabilities (Dozier, Meade, & Bernard, 2014).

Although there appears to be a general agreement among caregivers, practitioners and researchers in Western societies that responsiveness during early childhood is a crucial ingredient for children's cognitive and socio-emotional development, parents sometimes struggle to put responsiveness into practice. For instance, parents may be preoccupied with other tasks and chores, or may experience the (early) parenthood period as boring (Wall, 2010). It is during these instances that mobile media enter the picture, as they enable parents to multitask their parenting activity with other – perhaps more exciting or urgent – digital activities.

2.2 **Parental mobile media use during child care: Building on earlier work**

The extant empirical work on the impact of parental phone use on responsiveness is limited, but nonetheless provides a compelling argument for further examining this issue. In an observation study in U.S. fast-food restaurants, Radesky and colleagues (2014) found that 16 out of 55 observed caregivers were absorbed by their screens during the meal. Qualitative observations of the caregivers' and children's behavior showed that phone-using caregivers responded to their children's bids for attention in a non-contingent manner (e.g., ignoring the child). Also, when a response was given to the child, it was oftentimes found to be in a non-supportive manner (e.g., responding with a harsh voice, or even physically pushing the child away in an attempt to be left alone).

In a second study that we know on the topic, Hiniker and colleagues (2015) collected data from 466 caregivers in a playground setting. Part of their study involved observations of 111 caregivers. Fifty-nine per cent of those caregivers used their phone while attending to their child(ren) playing in the playground. The researchers found that only half of these phone users responded promptly to a child's interruption of their ongoing activity, compared to 90% of non-phone-users.

The studies by Radesky et al. (2014) and Hiniker et al. (2015) provide preliminary evidence that concerns over the impact of parental phone use on parental responsiveness are warranted. A limitation of both stud-

ies, however, is that the children in these studies varied considerably in terms of their age. Indeed, both studies were aimed at observing caregivers of children who the observers believed to be between 0 and 10 years old. However, caring for a 10-year-old child is in many respects different from caring for a (very) young child, and momentary lacks of parental responsiveness likely have a different effect on the child depending on the phase of the developmental process. Socio-cognitive and socio-emotional developments, such as language acquisition and attachment, which seem to require immediate responsiveness, are developmental tasks anchored in infancy and early childhood (e.g., Bowlby, 1988; Erikson, 1959; Friedmann & Rusou, 2015). Thus, our current study focuses on this age period.

Both Hiniker et al. (2015) and Radesky et al. (2014) based their studies on field notes. As noted by the authors, this is a valid approach to first explorations of a topic, for example to identify main themes. However, it is difficult to include precise measures of frequencies and durations of behaviors using field notes only. Radesky and colleagues, for example, occasionally include time estimates, but the precision of these is unknown (e.g., “She [the child] doesn’t seem able to make it work, so she starts to make whining vocalizations ... a minute later caregiver notices the child is having difficulty”, p. e848). Hiniker et al. observed the duration of phone use of a subgroup of caregivers involved in their study, but it is unclear whether this subgroup overlaps with the sample observed to assess responsiveness.

In addition, in both studies the instances of relevant behavior lacked a systematic definition and operationalization, making it difficult for the reader to understand exactly what behaviors were observed and coded/noted. For example, Hiniker and colleagues seem to have focused on children’s bids for attention in the sense of children’s intentional attempts to “interrupt or gain the attention” (p. 732) of the adult (e.g., calling out “Mom, look!”). Children’s bids for attention, however, may also be subtler and easier to miss. A child might, for example, seek eye contact with the caregiver without making any sound or movement. Also, some child behavior, such as the child that cries out because he/she hurts him- or herself, may not be an *intentional* bid for attention, but may bid attention anyhow. Particularly when examining very young children, these subtle

and unintentional behaviors seem relevant to the topic of responsiveness and the developmental correlates that we discuss here.

In short, while the ethnographic work done by Hiniker et al. and Radesky et al. is extremely valuable because it provides a rich description of a new phenomenon, it lacks a *systematic assessment*, which is relevant if we want to quantify an overall relation between phone use behavior and parental responsiveness. The first objective of this study is to add to the extant body of research on the relation of parental phone use to parental responsiveness, focusing on caregivers of children during the first years of life by using a systematic observational method.

We define *children's bids for attention* as all intentional and unintentional behaviors (including sounds, eye gaze and movement) expressed by the child that might solicit a response from the caregiver. We hypothesize that caregivers will be less responsive to these bids when they are engaged with a mobile device. We assess responsiveness by focusing on whether or not a response was given and three aspects of the responses. The first aspect is *strength*: a weak response is one in which the caregiver shows awareness of the child's bid for attention, whereas a strong response is one in which the caregiver actually interacts with the child. Another aspect is the *timeliness* of the response. Ideally, a response is contingent on the child's bid, meaning that it follows immediately after the child's bid. We examine this second element of responsiveness by checking whether the response is timely or not (yes/no). In terms of *positive emotionality*, a positive emotion can be expressed in the response (e.g., by smiling). Aspects that were not included because the negative poles were not observed were negative emotionality and valence of the response – a caregiver may reject the child, for example when the caregiver negates (“Don't throw that ball at me”), or may acknowledge/encourage the child (“Yes, that is a nice ball. Take it.”).

We expect to find the following results in our examination of caregivers' responsiveness:

H1: Caregivers' responses to their children's bids for attention occur (a) less frequently, (b) with a lesser strength, (c) in a less timely manner and (d) with less positive emotions when caregivers are engaged with a mobile device than when they are not. Finally, (e) children also have to make greater efforts to gain their caregivers' attention when caregivers are engaged with a mobile device than when they are not.

Both Hiniker et al. (2015) and Radesky et al. (2014) noted that there are differences in the degree to which caregivers are absorbed by their phones, and that this degree of absorption seems to affect responsiveness negatively. We examine whether we find support for this relation by investigating the following research question:

RQ1: Is there a negative linear relation between the degree of caregivers' absorption in phone use and their responsiveness to their children's bids for attention?

2.3 **Mobile devices versus other non-child-related activities?**

Caregivers can be involved in several different activities that might reduce their responsiveness to their children's bids for attention: they may be folding clothes, reading a magazine, preparing dinner, eating or drinking something, etc. A pertinent question that needs to be asked is whether phone use is qualitatively different from these latter activities (see Radesky et al., 2014).

There is reason to assume that the use of mobile communication technologies is different from the former activities. Hiniker et al.'s (2015) study revealed that most caregivers who used their phone were using it to access interactive social media applications, such as email and mobile messengers. These kinds of interactive social media applications induce a strong immersion of the caregiver into the activity. Communication applications differ from other sources of diversion (such as newspapers or the radio) in that they are dialogical rather than monological (Gergen, 2002). Media with a monological presence (i.e., one-way communication or broadcast media) provide information or stimulation to the user, but they can easily be ignored or moved to the background. Media with a dialogical presence, on the other hand, facilitate a flow of interactions that bring the user into a state of "absent presence" (p. 227): a state of physical presence, but mental absence. This leads to our second hypothesis:

H2: Caregivers are less responsive when they are engaged with their mobile phones than when they are involved in other activities.

2.4 **Caregiver predispositions: Fear of missing out, habitual phone use and problematic phone dependency**

Studies on phone use in the presence of (adult) others suggest that there are certain predispositions that may make people more likely to use their phone in the presence of others. Three such predispositions are having a higher fear-of-missing-out (FOMO; Przybylski, Murayama, DeHaan, & Gladwell, 2013), having a stronger phone checking habit (Oulasvirta, Rattenbury, Ma, & Raita, 2012) and a more problematic dependency on the mobile phone (Billieux, Maurage, Lopez-Fernandez, Kuss, & Griffiths, 2015). Thus, a second, exploratory research question guiding this study is whether caregivers who use phones during the observation report these predispositions more strongly.

RQ2: Do caregivers who used phones during the observation period report a greater fear-of-missing-out, habitual phone use and problematic phone dependency?

3 **METHODS**

3.1 **Procedure**

The research was conducted in two types of public places in the Netherlands: at one playground and two different child health centers. In these child health centers, children's caregivers are invited for check-ups and vaccination at regular intervals.

When caregivers with children of the appropriate age entered the playground/child health center, the study was briefly introduced to them. The caregivers were then asked to participate, and, in case they agreed, briefed more thoroughly and asked for a written informed consent. A unique ID number was assigned to the dyads. Caregivers were not fully informed of the objective of the study during the briefing to avoid alterations in their mobile phone usage. They were informed, however, that the study concerned caregiver-child interactions.

After consent was obtained the observations took place. Caregiver-infant dyads were observed for a maximum of ten minutes and 25 seconds (see coding procedure below). When the observations had ended, the

participants were asked to fill out an anonymous questionnaire. Finally, participants were debriefed, and the full purpose of the study was revealed. The ethics committee of the authors' faculty approved the study (REC #2017/11).

3.2 Participants and sampling

The participants of this study were an opportunity sample of caregiver-child dyads, with the children aged zero to five years. In all cases, the dyads needed to adhere to two criteria in order to be eligible for participation: (1) the child had to have an age between zero and five years, and (2) the adult caregiver had to be one of the child's primary caregivers (defined as being the legal guardian of the child).

Of the 25 dyads, nine participated on a playground and the other 16 dyads participated while having an appointment at the child health center. The gender ratios are shown in Table 1, and the children's birth ranks in Table 2. The children who participated were on average 26.3 months old ($SD = 18.1$), with 13 of them below 2.5 years, and 12 above. The caregivers (all of them the children's parents) had a mean age of 36 years ($SD = 4.4$). The highest education of most caregivers appeared to be higher vocational education (50%) followed by higher academic education (31%).

Table 1: Gender ratio of the caregiver-child dyads

Caregiver	Child		Total
	Son	Daughter	
Father	1	5	6
Mother	10	9	19
Total	11	14	25

Table 2: *Children's birth rank*

Older siblings	Younger siblings		Total
	No	Yes	
No	11	2	13
Yes	10	2	12
Total	21	4	25

3.3 Materials

The data were gathered via observations and a questionnaire. The observations provided information on the caregivers' phone use and their responsiveness to the children. The questionnaire was used to gather socio-demographic background information and self-report measures of the caregivers' fear-of-missing-out, habitual phone use and problematic phone use.

3.3.1 Observations

Observations were made according to a time sampling procedure that consisted of 25 timeslots. In each timeslot, the dyad was observed for 10 seconds followed by 15 seconds for noting the observed behaviors (see Abels et al., 2005, for a similar procedure). The observations were done by two trained observers (co-authors TVT and HVM), one focusing on the caregivers' behavior, the other on the child's bids for attention and the caregivers' responses. The intervals were coordinated using a mobile application called "Interval Timer" which gave a beep after every interval. Both observers listened to a recording (via one pair of earphones) that instructed them when to start and stop observing.

Coders were trained with video-recorded mother-child interactions. Intercoder reliability was established on observations of three dyads on the playground and was above Cohen's Kappa of .91 for each reported behavioral domain (caregivers' responsiveness = .918, children's bids for attention = .945 and non-child-related activities = .974).

3.3.2 *Observations of the caregivers' behaviors*

We coded a set of caregivers' activities that were either directed to the child, or non-child-related. *Child-directed* activities (e.g., talking, playing with objects, care) were coded but not reported here. The second category of caregivers' activities that were observed were *non-child-related activities*, which included all other activities a caregiver could perform while being in the presence of the child. These activities included phone manipulation, talking on the phone, reading, eating/drinking, talking to somebody else, listening to something while wearing earphones and other, which was then specified. The activities were coded using three levels of absorption into the activity: *passive*, *occasional* and *exclusive* (coded 1, 2 and 3). *Passive* was generally coded if an object was held but no active engagement with it was observable, for instance holding a coffee cup (passive drinking) or simply holding a mobile phone without looking or interacting with it (passive phone manipulation). *Occasional* was coded if a caregiver was involved in the activity part of the time, for example glancing at the phone occasionally or taking an occasional sip from a coffee cup. *Exclusive* was coded in cases in which the caregiver seemed completely focused on the non-child-related activity, for instance by constantly manipulating their mobile phone. Exclusive did not exclude the possibility of being aware of the child and his/her activities through different modalities (e.g., drinking coffee while looking at the child; looking at the mobile phone while listening) or occasionally glancing at the child.

3.3.3 *Observations of the child's bids for attention and the caregivers' response*

The second observer focused specifically on whether the child asked for the caregivers' attention. The child's action was coded as a bid whether or not the *intention* of bidding attention was observed. The rationale for this operationalization was that a caregiver's response would likely not depend on whether or not the child's action was an intentional bid for attention, which is anyhow difficult to assess, particularly in some behavioral modalities and among very young children. A distinction was made between different types of bids for attention considering, among other things, the caregiver's sense the bid is aimed at or the modality in which

it is produced: gaze (visual), other visual attention seeking (e.g., waving, jumping up and down), auditory (e.g., talking, banging toys), touch or taking object.

The second observer additionally coded the (absence) of the caregiver's response to the child's bids for attention in terms of the *degree*, *timeliness* and *emotion* of each response. The *degree* of the response refers to whether the parent responded to the child's bid, and, if so, whether the response could be categorized as a rejection or acknowledgement. We operationalized degree as a compound of two components: the *valence* of the reaction and the reaction *strength*. It was measured using five categories: "explicitly rejecting the bid", "softly rejecting the bid", "no response", "showing awareness of the bid but no action", and finally "acknowledging the bid by responding and/or interacting with the child". In the current study, however, no negative valences (i.e., rejections) were registered. Hence, the *degree* measure had only three values (no response, a positive awareness response, and a positive acknowledging/interactive response). Based on this measure, we computed two new variables: a *response* variable, indicating whether a response had been given or not, and, if yes, a *strength* variable, indicating whether that response was weak or strong. *Timeliness* was also a binary measure: when the caregiver responded, we coded whether that response was given instantly (coded intuitively, in coder training we observed that this was generally within 1–2 seconds after the bid) or with a delay. If the caregiver showed any *emotions* during the response, these were coded as either positive or negative; if no code was assigned, this implied the caregiver displayed a neutral emotion. We did not register negatively valenced emotions. Hence, the emotion variable was also binary in nature.

To summarize: For the statistical analyses, four dichotomous variables concerning caregivers' responsiveness were created to represent the caregivers' behavior:

1. *Responses*: whether (1) or not (0) a caregiver responded in any way to a child's bid
2. *Reaction strength*: awareness (0) or response/interaction (1)
3. *Timeliness*: whether the reaction was timely (1) or delayed (0)
4. *Emotionality*: whether the reaction had a positive emotional tone (1) or was neutral (0)

To give an example, when a child was waving at the caregiver, this was coded as a *direct bid for attention targeted at the caregiver's visual modality*. When the caregiver responded immediately by waving back and laughing, this was coded as a *response* that was *timely, strong* (i.e., an acknowledging/interaction response) and *emotional*. In contrast, making noises while playing was coded as an *indirect bid for attention aimed at the auditory modality* of the caregiver, and when the caregiver responded after four seconds by glancing at the child, this was coded as a *response* that was *not timely, weak* and *without emotion*.

3.4 Statistical analysis

To test whether caregivers' responses to children's bids for attention occur less (H1a), are weaker (H1b), less timely (H1c), and less likely to be expressed with positive emotions (H1d) when caregivers are using phones than when they are not, we performed logistic regression analyses with caregiver phone use during the interval (yes/no) as the predictor variable, and the former outcomes as the dependent variables. We examined research question 2, which asked whether the degree of the caregiver's involvement with the phone mattered, by repeating the former analyses but with the caregiver's level of phone involvement (none, passive, occasional and exclusive) as the predictor variable.

Children's bids for attention may differ in the extent to which they are successful in eliciting a response. It is likely that a bid that involves multiple modalities (e.g., simultaneously waving, shouting and looking at the caregiver), draws more attention, and is thus more likely to elicit a (timely, strong, positive) response from the caregiver than a bid that involves only one modality (e.g., waving only). We thus expect the number of modalities in which bids are expressed to predict the occurrence, strength, timeliness and emotionality of caregivers' responses. The caregiver's phone use, however, may moderate this relation: it may be the case that, when phones are present, more modalities are needed to elicit a (timely, strong, positive) response from the caregiver. For example, 'waving + shouting' may not be enough to elicit a response when the caregiver is using a phone, whereas it may be enough when the caregiver is not using a phone. To test this hypothesis (H1e), we performed stepwise logistic regressions with the number of modalities in which children bid for at-

tention, phone use (yes/no), and their interaction term as predictor variables and the occurrence, strength, timeliness and emotionality of the response as outcome variables.

Hypothesis 2 states that caregivers are less responsive when they are engaged with their mobile phones than when they are involved in other activities. To test this hypothesis, we compared the predictive strength of logistic regression models that use caregivers' level of involvement with the phone as the predictor with models that use involvement in all other non-child related activities combined as a predictor. To that end, we first produced the models using involvement in all other non-child related activities combined as a predictor. These models were then compared descriptively to the models produced for hypothesis 1. Finally, to directly test whether there are additional effects of phone use over and above the level of non-child related activities, a stepwise regression was performed with both the level of involvement in non-child related activities and phone use (yes/no) as the predictor variable and the occurrence, strength, timeliness and emotionality of the response as outcome variables.

In a separate section we briefly summarized the answer to research question 2, using independent samples t-tests to compare caregivers who used phones at least once during the observation with those who did not in terms of their fear-of-missing-out, habitual phone use and problematic phone use.

4 RESULTS

4.1 Descriptives

In total, 25 caregiver-child dyads participated in the study. An average of 22.9 observations were made per dyad (range 12–25). This resulted into a total of 572 observed intervals. In 67% of the observations ($n = 384$), the child showed a bid for attention directed at the caregiver. An overview of the frequencies in which children bided attention in each modality is given in Table 3.

Table 3: Overview of the modalities used by children to draw attention from their caregiver

Modality used to draw attention	Occurrences		
	Total by modality	M%*	SD*
Visual by moving	321	56.60	20.69
Auditory	197	33.67	19.71
Visual by eye gaze	134	22.57	18.05
Taking an object	129	22.72	25.12
Touching	55	9.91	12.36
Total nr of intervals containing a bid**	384	68.19	19.23

Note. *Numbers are based on % of occurrences per participant; **Total number (nr) of observations in which a child bided attention in at least one of the modalities mentioned

As for the caregivers' responses given to the children's bids, in almost all cases a response was given: in only 8% ($n = 46$) of the observed intervals was a child's bid *not* followed by a response. Out of the intervals in which a response was given, in most the caregiver was not engaged in any non-child-related activities (47%). The caregiver was passively holding a phone in 11 of the 572 observed intervals (1.9%). The caregiver was actively involved with the phone (scrolling, reading, typing) in 37 (6.4%) of the observed intervals. None of the caregivers used their phone during the first four observed intervals, and once caregivers started using their phones they continued doing so at least until the end of the observation. Interestingly, 75% of the mobile media use and all of the *exclusive* media use occurred during observations on the playground. Table 4 gives an overview of which activities caregivers were involved in when responding to their children' bids for attention.

Table 4: Overview of the caregivers' activities and responses given to children's bids

Activity	Response				Timeliness	
	Overall occurrence	%*	Total	%*	Total	%*
Without distractions	266	46.5	159	47.0	155	48.3
While looking around	106	18.5	63	18.6	62	19.3
With a second child	71	12.4	43	12.7	39	12.1
With other distractions	62	10.8	42	12.4	42	13.1
While talking	61	10.7	23	6.8	17	5.3
With mobile media	48	8.4	7	2.1	5	1.6
While reading	4	0.7	1	0.3	1	0.3
Talking on phone	0	0	0	0	0	0
Total	572		338		321	

Note. *Sums are above 100% because non-child-related activities were not mutually exclusive but could occur at the same time.

4.2 Is mobile media use related to lower caregiver responsiveness?

Hypothesis 1 stated that caregivers' responses to children's bids for attention occur less (H1a), are weaker (H1b), less timely (H1c), and less likely to be expressed with positive emotions (H1d) when caregivers are using phones than when they are not. To examine these hypotheses, we performed four logistic regression analyses with the *occurrence*, *timeliness*, *reaction strength* and *emotionality* of caregivers' responses in each interval as the dependent variables and whether or not the caregivers were engaged with their phones (1 = yes, 0 = no) in these intervals as the independent variable.

Logistic regression analysis produces a X^2 -value, which informs the reader about the goodness-of-fit of the model. The value can be used to compare the predictive strength of different models. The Wald statistic and its associated significance level indicate for each predictor in the analysis if it significantly predicts the outcome measure. The odds ratio (OR) informs about the size of the effect by indicating how the odds of a particular outcome change with each 1-unit increase in the independent

variable. Finally, the R^2 -values express model fit in terms of explained deviance.

The statistics are reported in Table 5, which shows that overall responsiveness, timeliness of the response and strength of the response were negatively predicted by caregivers' engagement with their phone. In other words, hypotheses 1a, 1b and 1c were supported: the odds of the caregiver responding to the child's bid for attention ($OR = 0.09$), the odds of responding timely to the bid ($OR = 0.04$), and the odds of responding by interacting rather than showing mere awareness ($OR = 0.17$) were significantly lower in intervals in which the caregiver was using a phone than in intervals in which the caregiver was not using a phone. No relation was found with the emotionality of the response (H1d was not supported).

Table 5: Caregivers' responsiveness during phone engagement and non-engagement intervals

	No phone (<i>n</i> = 365)		Phone (<i>n</i> = 24)		X^2	β	<i>SE</i> β	Wald	C&S R^2	N R^2	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>							
	Response	.92	.28	.50							
Timeliness	.95	.23	.42	.51	23.07	-3.20	0.63	25.53	.06	.16	<.001
Strength	.66	.47	.25	.45	8.3	-1.78	0.68	6.94	.02	.03	.008
Emotionality	.03	.18	.00	.000	0.79	-17.82	11602.71	0.00	<.01	.01	.999

Note. C&S = Cox & Snell; N = Nagelkerke

Hypothesis 1e stated that the relation between number of modalities in which children bid for attention and the likelihood of eliciting a (strong, timely, emotionally positive) response from the caregiver in an interval is moderated by whether the caregiver uses a phone in that interval: when a phone is used, more modalities are necessary to elicit a (strong, timely, emotionally positive) response than when a phone is not used.

For the analysis we created a sum score of bids for attention across all categories (eye gaze + visual + auditory + touch + takes object) for each interval. In 51% of the observed intervals bids, more than one modality

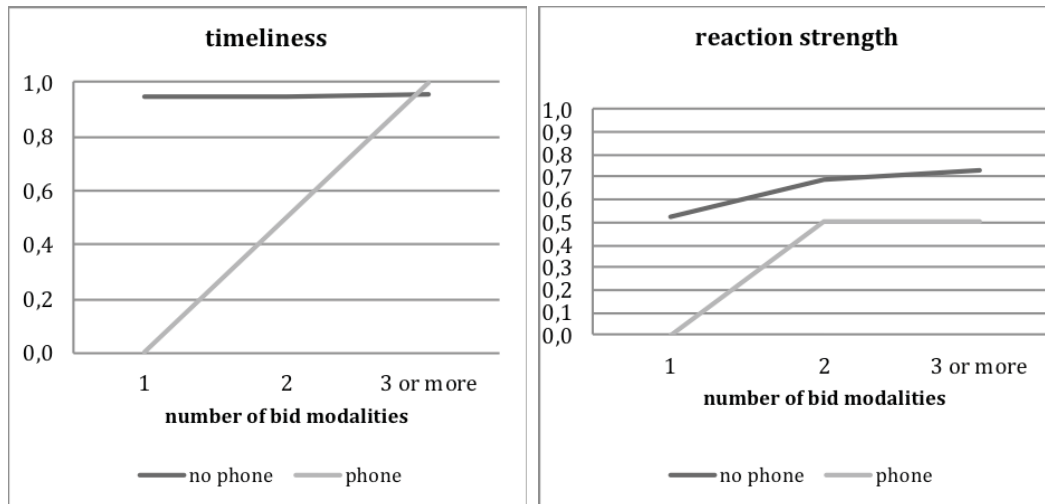


Figure 1: Responsiveness (*timeliness: left, reaction strength: right*) in relation to the number of modalities in which the child bids for attention for intervals with and without phone use.

occurred (i.e., 76% of the bids were multi-modal). Even though a maximum of five types of bids was possible, the observed maximum number of types of bids in any interval was four. The variable was skewed, with only one interval showing four modalities. Hence, we merged three and four modalities into one value, thus resulting in a *number of modalities*-variable with values ranging from one to three for the calculation.

We conducted four stepwise logistic regressions to test whether the *occurrence, strength, timeliness* and *emotionality* of caregivers' responses were predicted by the *number of children's types of bids for attention* (3 levels), *caregivers' engagement* with their phones (yes = 1, 0 = no), and the interaction between these two terms in an interval, respectively. The first term entered into the model was the interaction, followed by caregivers' phone use and finally, the number of bids.

The results showed that the number of bids was related only to the strength of the caregivers' reactions ($X^2 = 18.29$, $\beta = 0.45$, $SE = 0.16$, $Wald = 7.56$, $Cox \& Snell R^2 = .05$, $Nagelkerke R^2 = .07$, $p = .006$): the odds of a caregiver responding more strongly to the child's bid were significantly higher in intervals in which the child's bid for attention involved more modalities ($OR = 1.56$). While the interactions were not significant for any of the aspects of caregivers' responses, it seems that descriptively the sum of bids and phone use interact for timeliness and reaction strength

(see Figure 1). Caregivers who did not use their phones almost always reacted in a timely way, no matter how many bids there were in the interval. For caregivers who used their phones, timeliness increased with the number of bids addressed at them. For reaction strength, both phone users and non-users showed an increase in reaction strength when more than one bid was addressed at them, but the increase seems more dramatic in intervals with phone usage.

Our first research question stated that the degree of involvement with the phone might matter, as a more exclusive involvement with the phone might make caregivers less responsive. We coded to what extent the caregiver was involved with the phone (0 = no use, 1 = passive, 2 = occasional, 3 = exclusive). A third set of logistic regression analyses was conducted to see whether an increase in involvement with the phone is related to a decrease in responsiveness. This seems to be the case for whether or not caregivers showed a response ($OR = 0.32$) and the timeliness ($OR = 0.15$) and strength ($OR = 0.32$) of the response. An increase in phone involvement was not related to the emotionality of the caregiver's response. Table 6 shows an overview of the results.

Table 6: Engagement levels with the phone and responsiveness to children's bids for attention

	Engagement level with the phone							
	None		Passive		Occasional		Exclusive	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Response	.92	.28	.50	.55	.73	.47	.14	.38
Timeliness	.95	.23	1	.00	.25	.46	0	
Strength	.66	.47	.67	.58	.13	.35	0	
Emotionality	.03	.18	0	.00	0	.00	0	
		X^2	β	<i>SE</i> β	Wald	C&S R^2	N R^2	<i>p</i>
Response		27.3	-1.11	0.22	26.89	.07	.14	<.001
Timeliness		28.3	-1.9	0.38	24.40	.08	.19	<.001
Strength		10.8	-1.2	0.43	7.32	.03	.04	.007
Emotionality		0.8	-15.5	7289.5	0.00	<.01	.01	.998

Note. C&S = Cox & Snell; N = Nagelkerke

4.3 **Does mobile media use affect caregivers' responsiveness more strongly than engaging in other non-child-related activities?**

The second hypothesis concerned the engagement with the mobile phone as compared to other activities. This can be construed as two separate questions:

- A. If caregivers are engaged in phone use, is their engagement with the phone more intense than when they are engaged with other activities?
- B. Does the same degree of engagement in different activities have a different relation to responsiveness if a mobile phone is involved?

For each activity that was coded, we registered whether the engagement with the activity was passive, occasional or exclusive. A first exploration showed that parents were less frequently engaged with their phones than that they were engaged in other activities. However, when the phone was used, the engagement with this activity was most frequently exclusive while the most common engagement level for the other activities was occasional [$X^2(2, n = 306) = 26.77, p < .001$, comparing the relative occurrence of phone use over the different engagement level categories with the relative occurrence of other activities (summed) across these same engagement level categories, see Figure 2]. For example, of all intervals with phone use, 48% were exclusive, whereas of all intervals with other non-child related activities, only 14% were exclusive.

While this result shows that parents display proportionately more exclusive engagement with their mobile phones than they display exclusive engagement with other non-child-related activities, a question that remains is whether – at the same level of engagement – mobile phone use reduces responsiveness to children's bids for attention more than engagement in other activities. To test how much the occurrence, strength, timeliness and emotionality of a response is reduced by the caregiver's engagement in other non-child-related activities, we repeated the logistic regression analyses performed to test H1, respective to RQ1, but with whether or not a caregiver is engaged in a non-child-related activity (cf. H1), respective to how absorbed the caregiver was in the activity (cf. RQ1) as the predictor variables. The results are displayed in Tables

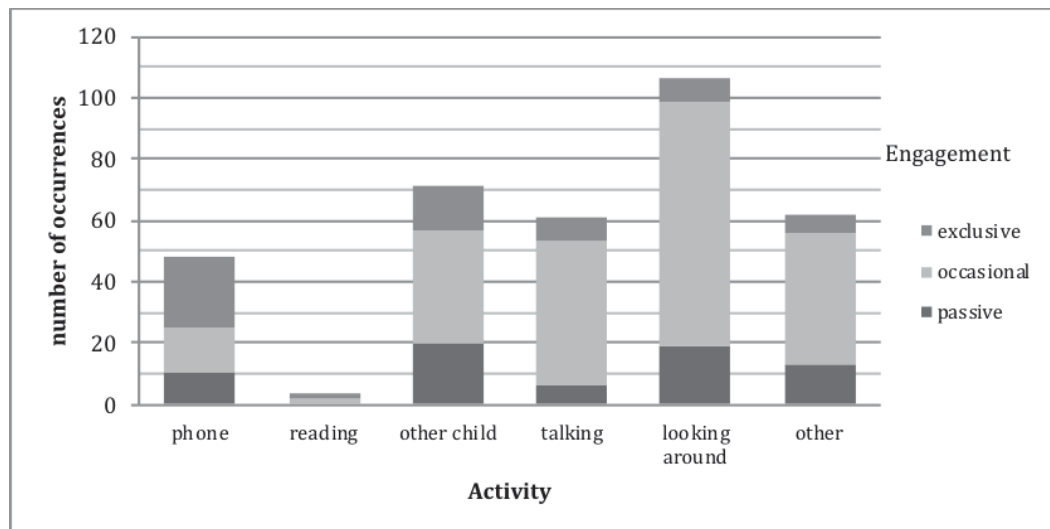


Figure 2: Parental engagement level during phone use and other activities.

7 and 8. Comparing X^2 -values with the analyses concerning hypothesis 1 (see Tables 5 and 6), it seems that the occurrence and strength of the caregiver's response are better predicted by overall non-child-related activity than phone use; timeliness of the response, however, shows higher X^2 -values for phone use.

Table 7: Caregivers' responsiveness during non-child related activity engagement and non-engagement intervals

	No other activity (n=179)		Other activity (n=185)		X^2	β	SE β	Wald	C&S R^2	NR ²	p
	M	SD	M	SD							
Response	.97	.15	.86	.35	18.70	-1.97	0.54	12.89	.05	.12	<.001
Timeliness	.98	.15	.91	.28	7.26	-1.42	0.58	6.01	.02	.06	.007
Strength	.77	.42	.55	.50	17.80	-1.00	0.24	17.20	.05	.07	<.001
Emotionality	.05	.21	.02	.14	1.85	-0.89	0.69	1.67	<.01	.02	.197

Note. C&S = Cox & Snell; N = Nagelkerke

Table 8: *Engagement levels with non-child-related activities and responsiveness to children's bids for attention*

	Engagement level with the phone							
	None		Passive		Occasional		Exclusive	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Response	.98	.15	.94	.25	.89	.32	.55	.51
Timeliness	.98	.15	.93	.26	.92	.27	.73	.51
Strength	.77	.42	.55	.51	.56	.50	.33	.50
Emotionality	.05	.21	0	.00	.03	.16	.00	.00
	X^2		β	<i>SE</i> β	Wald	C&S R^2	N R^2	<i>p</i>
Response	30.09		-1.1	0.24	21.99	.08	.18	<.001
Timeliness	9.46		-0.76	0.26	8.41	.03	.08	.004
Strength	17.60		-0.50	0.12	17.13	.05	.07	<.001
Emotionality	1.37		-0.39	0.35	1.23	<.01	.02	.267

Note. C&S = Cox & Snell; N = Nagelkerke

To answer the question of whether phone use adds a distraction above non-child-related activities, we performed four stepwise logistic regressions to see whether the occurrence, strength, timeliness and emotionality of caregivers' responses in an interval are predicted by the caregiver's engagement level in a non-child-related activity in that interval, whether or not they were using their phone in the interval, and the interaction of these two variables. In the stepwise regressions the interaction was entered first, followed by phone use and finally engagement level. The results are displayed in Table 9.

Table 9: *Engagement levels with non-child related activities, phone use and responsiveness to children's bids for attention (depicting only variables included in model)*

	X ²	β	SE β	Wald	C&S R ²	NR ²	p
Response Step1	31.02				.08	.16	<.001
non-child activity* phone		-1.16	0.21	30.87			<.001
Response Step 2	31.47				.15	.30	<.001
non-child activity* phone		-0.74	0.23	10.73			.001
non-child activity		-1.14	0.24				<.001
Timeliness Step 1	26.60				.07	.18	<.001
non-child activity* phone		-1.76	0.35	24.97			<.001
Timeliness Step 2	9.92				.10	.25	
non-child activity* phone		-1.47	0.36	16.47			<.001
non-child activity		-0.78	0.26	8.78			.003
Strength Step1	22.32				.05	.07	<.001
non-child activity		-0.54	0.12	21.46			<.001
Strength Step 2	4.62				.08	.10	.032
non-child activity* phone		-0.74	0.38	3.70			.055
non-child activity		-0.50	0.12	17.21			<.001
Emotionality	no variables included in model						

Note. C&S = Cox & Snell; N = Nagelkerke

As seen in the analyses above, the results indicate that higher degrees of engagement in non-child-related activities were related to fewer responses overall ($OR = 0.32$) and that these responses were weaker ($OR = 0.46$) and less timely ($OR = 0.61$). In short, being more exclusively engaged with non-phone related activities significantly hampered these aspects of responsiveness.

For response and timeliness, there was also a significant interaction with phone use. This means that an equal level of engagement in non-child-related activities was related to more ($OR = 0.48$) and more timely responses ($OR = 0.23$) if the phone was not used than when it was used (see Figure 3).

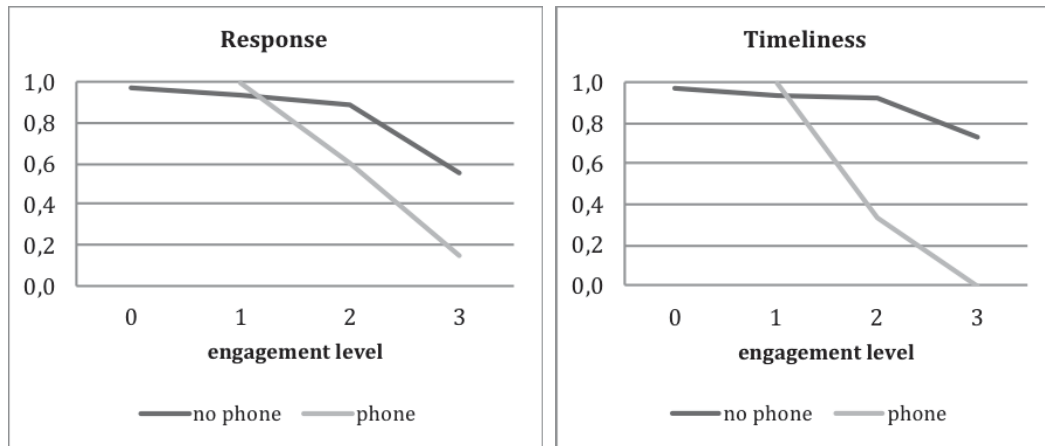


Figure 3: Responsiveness (*response: left, timeliness: right*) in relation to the intensity of engagement for intervals with a phone and intervals with no phone but involvement in other activities.

4.4 Observed phone use and caregivers' self-reported fear-of-missing-out, habitual phone use and problematic phone dependency

Finally, our second research question asked whether caregivers who used phones during the observation period reported a greater fear-of-missing-out, habitual phone use and problematic phone dependency. We examined this research question via independent samples t-tests, in which the caregiver served as the unit of analysis. We assessed FOMO with Przybylski et al.'s (2013) 10-item *FOMO scale* ($\alpha = .75$; $M = 2.24$, $SD = 0.73$; 7-point Likert scale). The difference in FOMO between caregivers who used a phone ($M = 2.24$, $SD = 0.73$) and those who did not ($M = 2.23$, $SD = 0.75$) was not significant, $t(23) = -0.025$, $p = .980$. We assessed habitual phone use with an adapted, 7-item version of the *Self-Report Habit Index* (Verplanken & Orbell, 2003; $\alpha = .92$; $M = 3.85$, $SD = 1.44$; 7-point Likert scale). The phone use habit of caregivers who used a phone during the observation ($M = 4.33$, $SD = 1.24$) did not significantly differ from the phone use of caregivers who did not use a phone ($M = 3.66$, $SD = 1.50$; $t(23) = -1.045$, $p = .307$). Finally, we assessed problematic phone use using a 6-item, adapted version of the *Smartphone Addiction Scale* (Karadağ et al., 2015; $\alpha = .61$; $M = 1.88$, $SD = 0.49$; 5-point Likert scale). Caregivers who used a phone did not report significantly higher addiction levels

($M = 2.03$, $SD = 0.51$) than those who did not ($M = 1.82$, $SD = 0.48$; $t(23) = -0.950$, $p = .352$).

5 DISCUSSION

This study aimed to examine (1) whether caregivers' mobile phone use is related to less responsiveness towards their small children, and (2) whether phone use is more distracting than being engaged in other non-child-related activities. With respect to the first aim, the results suggest that phone use lowers caregivers' responsiveness: in intervals in which the caregivers used phones, caregivers were less likely to respond to children's bids for attention, and when they responded, their responses were weaker and less timely. These findings support hypotheses 1a, 1b and 1c. Caregivers' phone engagement did not predict the emotionality of the response (H1d was not supported). We performed an analysis to examine if the intensity of the engagement with the phone mattered (RQ1). It did: in intervals in which caregivers were more absorbed by their phone use, responses were less likely to occur and were less timely than in intervals in which caregivers were less absorbed by their phone use.

We also tested whether children have to make greater efforts to gain their caregivers' attention when they are engaged with a mobile device (H1e). We found no support for this hypothesis. When examining the descriptives, however, the data show a trend of lowered responsiveness that manifests itself mainly in response to subtler bids for attention. That is, in intervals in which caregivers did not use a mobile phone, responses to the children's bids for attention were approximately equally strong and timely regardless of whether the child produced a bid using one or multiple modalities. In intervals in which parents were involved with their phones, however, a bid in a single modality was not likely to receive a timely or interactive response by the caregiver. If children produced at least two bids in an interval in which the caregiver used a phone, they still seemed to receive a less timely and weaker response than in intervals in which children produced at least two bids, but the caregiver did not use a phone. It would be interesting to examine further if the responsiveness of phone-using parents reaches a plateau at two or three bids, or

whether additional responsiveness can be achieved through additional bids by the children. Overall, our study thus shows that mobile media use is associated with decreased responsiveness, and further, suggests that children must work harder to get their parents' attention when mobile phones are involved in a social context.

It is important to remark that, overall, phone use was not commonly observed during the observations on the playground and almost never in the child health center. However, if the phone was used, the caregivers' involvement was most often *exclusive*, while the involvement with other non-child-related was most often *occasional*. This implies that phone use may have a different quality compared to other non-child-related activities. To examine our second research question, we compared if non-child-related activities involving the phone affected responsiveness differently than activities not involving the phone if they were of the same engagement level. The results show that when parents are engaged in other, non-child directed activities, such as talking to another person, reading a magazine or eating, their responsiveness is also hampered. In fact, the models for non-child directed activities predicted more of the variance in the occurrence and strength of responsiveness than the models for phone use; however, phone use appeared to have a greater impact on the timeliness of responses than being engaged in another activity, and when taking the intensity of the behaviors into account (i.e., passive, occasional and exclusive engagement), we found that – at an equal level of engagement – engagement in non-child-related activities was related to more, and more timely responses than engagement with the phone. All in all, these latter findings indicate that a moral panic about the phone's impact on responsiveness is unwarranted; parental phone use is part of a myriad of behaviors that caregivers engage in while caring for a child. Nonetheless, phone use appears to be a more absorbing activity than other activities and seems to affect specific aspects of responsiveness, such as timeliness, more strongly and may therefore also negatively affect types of child developments that rely on timely responses.

An additional exploratory research question (RQ2) asked whether caregivers who observed to use a phone while caring for a child would report a greater fear of missing out, habitual phone use and problematic phone dependency than caregivers who we did not observe using a phone. We found no statistical differences between the groups. It is im-

portant to note, however, that the sample size was small, and that we grouped caregivers on the basis of a (very) short observation period. A valid assessment of the former research question requires at least a longer observation period among a larger set of caregiver-child dyads. Moreover, it is important to point out the limitations of self-reports. Particularly when assessing frequent, yet irregular behaviors such as phone use, self-report data are known to be biased (e.g., Vanden Abeele, Beulens, & Roe, 2013).

In all, the results suggest that when caregivers use mobile media they are less responsive to children's bids for attention. From our current data, however, we cannot rule out a reversed causal interpretation, namely that caregivers who use mobile media are less responsive to their children's bids for attention to start out with, and their use of the phone is a behavioral manifestation of their non-responsiveness, rather than its cause. However, recent experimental studies have linked mobile phone use to still-face situations, indicating that phone usage has an extreme effect on the interaction even when it is not the caregiver's choice to use it (see Bohr, Khourouchvili, & Lau, 2017; Kildare & Middlemiss, 2017; Myruski, et al., 2017). This study lends indirect support to the notion that mobile media use hampers responsiveness.

While this interpretation needs further validation in future studies (for instance, with longer observation periods that capture longer episodes in which caregivers abstain from using their phone), we assume that mobile media use distracts parents who might otherwise be equally attuned to their children's bids for attention as those who were not observed using their mobile phone¹. Interestingly, this seems to be true even if the phone is only used passively (at least for the frequency of responses a child receives, see Table 6). This may be due to a preoccupation with the phone even if it is not in use at the observed moment. This phenomenon has been observed before; Przybylski and Weinstein (2012) found, for example, that the mere presence of a phone during a conversation lowers interactional outcomes such as perceived closeness to the

¹ This interpretation may be strengthened by the absence of any differences between answers of phone users and non-phone users to the "Brief Attachment Screening Questionnaire" (Bakermans-Kranenburg, Willemsen-Swinkels, & Van Ijzendoorn, 2003).

conversation partner, presumably because cognitive attention is directed to the present phone rather than to the interaction partner.

Our results suggest that urgent or intense attempts (operationalized here by a high number of different bids produced in an interval) to gain the caregiver's attention on the part of the child are more successful when a phone is used by the caregiver than subtle bids for attention. That probably means that, although anecdotal evidence exists that small children may be physically endangered by their caregivers' phone use, this seems to be an exception. This corresponds to an observation of Hiniker et al. (2015) who reported that phone use on the playground most often occurred after the child was in a secure environment, typically on a baby swing. On the other hand, more subtle exchanges that may be important to the child's socio-cognitive and socio-emotional development may go unnoticed when the caregivers are using mobile media. However, as our findings show, this appears to also be true when caregivers are involved in other non-child-related activities. It is normal and oftentimes necessary for caregivers to be involved in other activities such as cooking meals, doing the laundry or cleaning at least part of the time. The mobile phone is a new development, but its dangers probably lie more in its addictiveness and the amount of time caregivers potentially spend using it than in mobile phone use per se.

Theories emphasizing the importance of exclusive attention and immediate responsiveness to children build mainly on WEIRD (Western, Educated, Industrialized, Rich and Democratic; Henrich, Heine, & Norenzayan, 2010) cultural communities. Many other cultural communities have other ways of interacting with their infants. For instance, caregiver-infant play is not a universally valued or practiced activity (Lancy, 2007) and emphasized socialization goals are often not in the cognitive and linguistic domains. Guatemalan Mayan toddlers and mothers, for example, attend to several events at one time more frequently than their Euro-American counterparts living in the USA (Chavajay & Rogoff, 1999). Children are also expected to learn by observation rather than through direct instruction by their caregivers (Morelli, Rogoff, & Angelillo, 2003; Rogoff, Paradise, Arauz, Correa-Chávez, & Angelillo, 2003). Language acquisition is also rooted in cultural practices (Schieffelin & Ochs, 1986), with only particular infants participating in labeling routines typical of WEIRD communities while many others rely to

a much larger extent on overheard speech (see Hoff, 2006) that is not dependent on responsiveness to children's signals. Contingent reactions to infants' bids may even be related to developments that are not seen as positive universally (Keller, Kärtner, Borke, Yovsi, & Kleis, 2005). These cultural differences may imply that interactions with a mobile phone while taking care of a child may have different effects on children in different communities. For instance, caregivers used to attending to several events at the same time may find it easier to keep track of their children's bids for attention even when they are using their mobile phone. However, this is an open question for further research.

There are additional limitations of our study that provide suggestions for future research. Most importantly, our sample size was rather small, and in particular, the number of participants who used mobile media was low and the observation time limited (mainly because the time spent in the waiting room was rather short). Given the small number of phone users in our sample and the overall exploratory nature of our study, we did not calculate intrapersonal comparisons between situations in which the phone was used and in which the phone was not used. We performed our analyses at the interval level, without accounting for the nested nature of the data. It is possible that interactions of phone users differ systematically from non-users even in situations that do not involve the phone. For instance, these caregivers may not be as attentive to their children's bids or there are fewer bids, which the caregivers take as an opportunity to use their phone. The tendencies we see descriptively (i.e., the tendency that higher engagement with mobile media is related to a larger decrease in responsiveness, the tendency that phone engagement is related to a larger reduction in responsiveness than other activities with the same intensity) may reach significance in a replication study with more participants. Future studies should thus apply multilevel modeling to simultaneously assess relations at the interval and caregiver-child dyad level.

Not all of the observations were complete; the number of observed intervals ranged from a minimum of 12 to the maximum number of 25 intervals. In the four observations that lasted 12–17 intervals, we did not observe caregivers manipulating a phone. In two of the four observations that lasted between 21 and 23 intervals, however, the caregiver manipulated a mobile phone. Although there does not seem to be a very clear pattern concerning the onset of phone use (although nobody used it during

the first four observed intervals), parents who started using the phone continued doing so until the end of the observation. Hence, it is possible that we have missed out on some phone use intervals in the observations that finished early. Unfortunately, there are too few observations involving a phone to say whether prolonged phone use was related to different interaction patterns than brief phone use. In any case, it seems relevant to carry out longer observations in future research.

It is obvious that there are developmental differences in the nature of children's bids for attention. For instance, in the course of development children gradually learn to communicate through gestures and words (e.g., Fenson et al., 1994). Parents' responses may reflect the nature of their children's bids, which may partly explain why mobile phone use may manifest itself differently depending on the child's age. Given the limited sample size of our study, we did not focus on the question of how the age of the child is related to the association between mobile phone use and responsiveness. Descriptively, however, our findings suggest that caregivers who use their phone seem to have children who are older, and caregivers of younger children appear less intensely involved with the phone (age in months and phone involvement correlated significantly). It is possible that caregivers of older children are confident that their children will find ways to communicate effectively with them even if they are involved (more intensively) with their phones. It would be relevant for future studies to zoom in further on this question.

In contrast to the other studies on this topic (Hiniker et al., 2015; Radesky et al., 2014), we obtained informed consent from our participants before observing them. This had the advantage that we could assess precise background information and ask participants to fill out questionnaires on the children's development and their own mobile media use. However, we noted several times that when caregivers were approached and asked to participate, their mobile phone use changed (i.e., they put away a phone they were previously using). For approximately half of the participants a question concerning this was added to the questionnaires, but all except one claimed that their mobile media use had been typical during the observation. Particularly the absence of mobile phones at the child health centers seems noteworthy. This may be an effect of trying to present oneself as a good parent. However, we were told that some parents even use their phone while they are inside the examination room

with the doctor/health care professional. The influence of the location of observation needs to be studied further, maybe also taking into consideration more private settings (e.g., families' homes).

6 CONCLUSION

Our present study is among the first to systematically assess how typical and common parental use of mobile media is in young children's lives. Its findings show support for the hypothesis that mobile media use is negatively associated with parental responsiveness to young children's bids for attention. Future research can build upon the findings reported in this paper, by trying to link parental phone use qualitatively and quantitatively to developmental outcomes, such as attachment or language development. It may address, for example, whether children intensify their bids when parents are involved in their phones, or whether they just give up and stop addressing them. In addition, future work may look more closely at children's and parents' emotionality and how the valence of their responses change over time, for instance whether they get annoyed, and if so, under which circumstances. The current research findings suggest that the relation between parental mobile media use and responsiveness is complex. Nevertheless, we believe our study provides a valuable starting point from which this complexity can be examined further.

REFERENCES

- Abels, M., Keller, H., Mohite, P., Mankodi, H., Shastri, J., Bhargava, S., ... Lakhani, A. (2005). Early socialization contexts and social experiences of infants in rural and urban Gujarat, India. *Journal of Cross-Cultural Psychology*, 36, 717–738.
- Ainsworth, M. D. S. (1969, March 10). Maternal sensitivity scales. Retrieved from http://www.psychology.sunysb.edu/attachment/measures/content/ainsworth_scales.html.
- AVGtechnologies (2015). The AVG 2015 digital diaries executive summary. Retrieved from https://now.avg.com/wp-content/uploads/2015/06/dd_2015_executive_summary_final.pdf

- Bakermans-Kranenburg, M. J., Willemsen-Swinkels, S. H. N., & Van Ijzendoorn, M. H. (2003). *Brief attachment screening questionnaire*. Unpublished Manuscript, Centre for Child and Family Studies, Leiden University, The Netherlands.
- Baumrind, D. (1978). Parental disciplinary patterns and social competence in children. *Youth and Society*, 9, 239–276.
- Billieux, J., Maurage, P., Lopez-Fernandez, O., Kuss, D. J., & Griffiths, M. D. (2015). Can disordered mobile phone use be considered a behavioral addiction? An update on current evidence and a comprehensive model for future research. *Current Addiction Reports*, 2, 156–162.
- Bohr, Y., Khourouchvili, M., & Lau, Z. (2017, April). *Technology and caregiver-child interaction: An exploration of the effects on infants of mobile technology involved parents*. Paper presented at the Biennial Meeting of the Society of Research in Child Development, Austin, Texas.
- Bornstein, M. H., Tamis-LeMonda, C. S., Hahn, C.-S., & Haynes, O. M. (2008). Maternal responsiveness to young children at three ages: Longitudinal analysis of a multidimensional, modular, and specific parenting construct. *Developmental Psychology*, 44, 867–874.
- Bowlby, J. (1988). *A secure base: Parent-child attachment and healthy human development*. New York: Basic Books.
- Chavajay, P. P., & Rogoff, B. B. (1999). Cultural variation in management of attention by children and their caregivers. *Developmental Psychology*, 35, 1079–1090.
- Darling, N., & Steinberg, L. (1993). Parenting style as context: An integrative model. *Psychological Bulletin*, 113, 487–496.
- Dozier, M., Meade, E., & Bernard, K. (2014). Attachment and biobehavioral catch-up: An intervention for parents at risk of maltreating their infants and toddlers. In S. Timmer & A. Urquiza (Eds.), *Evidence-based approaches for the treatment of maltreated children* (pp. 43–59). Berlin: Springer.
- Erikson, E. H. (1959). Identity and the life cycle: Selected papers. *Psychological Issues*, 1, 1–171.
- Feldman, R. (2007). Parent–infant synchrony and the construction of shared timing, physiological precursors, developmental outcomes, and risk conditions. *Journal of Child Psychology and Psychiatry*, 48, 329–354.
- Fenson, L., Dale, P. S., Reznick, J. S., Bates, E., Thal, D. J., Pethick, S. J., ... Stiles, J. (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development*, 1–173.
- Friedmann, N., & Rusou, D. (2015). Critical period for first language: The crucial role of language input during the first year of life. *Current Opinion in Neurobiology*, 35, 27–34.
- Gergen, K. J. (2002). The challenge of absent presence. In J. E. Katz & M. Aarhus (Eds.), *Perpetual contact: Mobile communication, private talk, public performance* (pp. 227–241). Cambridge: Cambridge University Press.

- Hart, B., & Risley, T. R. (1992). American parenting of language-learning children: Persisting differences in family-child interactions observed in natural home environments. *Developmental Psychology, 28*, 1096–1105.
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world. *Behavioral and Brain Sciences, 33*, 61–83.
- Hiniker, A., Sobel, K., Suh, H., Sung, Y. C., Lee, C. P., & Kientz, J. A. (2015). Texting while parenting: How adults use mobile phones while caring for children at the playground. In B. Begole, J. Kim, K. Inkpen, & W. Woo (Eds.), *Proceedings of the 33rd annual ACM conference on human factors in computing systems* (pp. 727–736). New York: ACM.
- Hoff, E. (2006). How social contexts support and shape language development. *Developmental Review, 26*, 55–88.
- Karadağ, E., Tosuntas, S. B., Erzen, E., Duru, P., Bostan, N., Sahin, B. M., ... Babadağ, B. (2015). Determinants of phubbing, which is the sum of many virtual addictions: A structural equation model. *Journal of Behavioral Addictions, 4*, 60–74.
- Kastner, J. W., May, W., & Hildman, L. (2001). Relationship between language skills and academic achievement in first grade. *Perceptual and Motor Skills, 92*, 381–390.
- Keller, H., Kärtner, J., Borke, J., Yovsi, R., & Kleis, A. (2005). Parenting styles and the development of the categorical self: A longitudinal study on mirror self-recognition in Cameroonian Nso and German families. *International Journal of Behavioral Development, 29*, 496–504.
- Kildare, C. A., & Middlemiss, W. (2017). Impact of parents mobile device use on parent-child interaction: A literature review. *Computers in Human Behavior, 75*, 579–593.
- Lancy, D. F. (2007). Accounting for variability in mother-child play. *American Anthropologist, 109*, 273–284.
- Landry, S. H., Smith, K. E., Swank, P. R., Assel, M. A., & Vellet, S. (2001). Does early responsive parenting have a special importance for children's development or is consistency across early childhood necessary? *Developmental Psychology, 37*, 287–403.
- Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent-child interaction. In P. H. Mussen & E. M. Hetherington (Eds.), *Handbook of child psychology: Volume 4. Socialization, personality and social development* (pp. 1–101). New York: Wiley.
- McGillion, M., Herbert, J., Pine, J., Keren-Portnoy, T., Vihman, M., & Matthews, D. (2013). Supporting early vocabulary development: What sort of responsiveness matters? *IEEE Transactions on Autonomous Mental Development, 5*, 240–248.
- Morelli, G. A., Rogoff, B., & Angelillo, C. (2003). Cultural variation in young children's access to work or involvement in specialised child-focused activities. *International Journal of Behavioral Development, 27*, 264–274.

- Myruski, S., Gulyayeva, O., Birk, S., Pérez-Edgar, K., Buss, K. A., & Dennis-Tiwary, T. A. (2017). Digital disruption? Maternal mobile device use is related to infant social-emotional functioning. *Developmental Science*. Advance online publication. <http://onlinelibrary.wiley.com/doi/10.1111/desc.12610/full>
- Oulasvirta, A., Rattenbury, T., Ma, L., & Raita, E. (2012). Habits make smartphone use more pervasive. *Personal and Ubiquitous Computing*, *16*, 105–114.
- Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior*, *29*, 1841–1848.
- Przybylski, A. K., & Weinstein, N. (2013). Can you connect with me now? How the presence of mobile communication technology influences face-to-face conversation quality. *Journal of Social and Personal Relationships*, *30*, 237–246.
- Radesky, J. S., Kistin, C. J., Zuckerman, B., Nitzberg, K., Gross, J., Kaplan-Sanoff, M., ... Silverstein, M. (2014). Patterns of mobile device use by caregivers and children during meals in fast food restaurants. *Pediatrics*, *133*, 843–849.
- Rogoff, B., Paradise, R., Arauz, R. M., Correa-Chávez, M., & Angelillo, C. (2003). Firsthand learning through intent participation. *Annual Review of Psychology*, *54*, 175–203.
- Schieffelin, B. B., & Ochs, E. (1986). Language socialization. *Annual Review of Anthropology*, *15*, 163–191.
- Tamis-LeMonda, C. S., Bornstein, M. H., & Baumwell, L. (2001). Maternal responsiveness and children's achievement of language milestones. *Child Development*, *72*, 748–767.
- Tomasello, M., & Farrar, M. J. (1986). Joint attention and early language. *Child Development*, *57*, 1454–1463.
- Turkle, S. (2012). *Alone Together*. Philadelphia: Basic Books.
- Vanden Abeele, M. M. P., Beullens, K., & Roe, K. (2013). Measuring mobile phone use: Gender, age and real usage level in relation to the accuracy and validity of self-reported mobile phone use. *Mobile Media & Communication*, *1*, 213–236.
- Verplanken, B., & Orbell, S. (2003). Reflections on past behavior: A self-report index of habit strength. *Journal of Applied Social Psychology*, *33*, 1313–1330.
- Wall, G. (2010). Mothers' experiences with intensive parenting and brain development discourse. *Women's Studies International Forum*, *33*, 253–263.
- Yu, C., & Ballard, D. H. (2007). A unified model of early word learning: Integrating statistical and social cues. *Neurocomputing*, *70*, 2149–2165.