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Are Parents Less Responsive to Young Children When They Are on Their Phones? A Systematic Naturalistic Observation Study

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Abstract

This study examined whether parents are less responsive to their young children (0–5) when they use a phone. We systematically observed 53 parent–child dyads in consultation bureau waiting rooms and playgrounds. Twenty-three parents used their phone at least once during the observation. Across the dyads, we observed parent and child behavior during a total of 1,038 ten-second intervals. Of these intervals, 641 contained a bid for attention from the child. Accounting for the nested nature of the data, we found that the odds of parents responding to their child's bid for attention were five times lower when using a phone than when not using one. Moreover, parents' responses were less timely, weaker, showed less affect, and were less likely to prioritize the child over other activities. While being fully absorbed in one's phone significantly decreased the odds of responding compared to when not using a phone, occasionally glancing at the phone did not, suggesting that parents may have developed a ''mode'' of phone use for managing dual attention over the phone and the child. In addition, while a higher intensity of phone use does seem to matter, it did not differ from intense engagement in other nonchild directed activities. The incidence of fully absorbed phone use, however, is greater. Finally, the results show that asking for consent for the observation beforehand leads to a decrease in the odds of phone use, suggesting a social desirability bias. Overall, the findings support concerns over the impact of parental phone use on child development.

Keywords: parental phone use, parental responsiveness, parent–child interactions, child phubbing, observation study, child development

Introduction

Parents spend time on their phone while caring for their children. Observation studies in playgrounds[1–4] and fast food restaurants[5] reveal that two to three out of four parents were on their phone at least once during the observed periods. There is growing awareness over the negative effects of this parental phone use on parent–child interaction quality. When parents pay attention to their phones, they are less likely to respond to their children's bids for attention,[2–6] show less affect and encouragement in their responses,[3,6] are less likely to initiate verbal and nonverbal interactions with the child,[7] more likely to respond harshly to their child,[5] and less aware of safety risks their children face.[3,8]

This decrease in parental responsiveness resulting from phone use may negatively impact healthy child development. When parents are on their phones, their ''still face'' (cf.[9,10]) is associated with increased emotional distress in children and can lead them to behaviorally disengage.[11–13] Parental phone use is also related to slower language acquisition in young children[14] and lower parental support during novel experiences such as eating unfamiliar foods.[7] Given the importance of high-quality parent–child interactions for children's cognitive and socioemotional development, further attention for these issues is urgently warranted.[15,16]

Naturalistic observation studies have contributed substantially to this emerging field by giving a rich and ecologically valid picture of the actual incidence and nature of

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parental phone use in public places and the associated changes in parent–child interactions.[1,3,5] To date, however, most studies were ethnographic in nature[2,3] or used a global sensitivity assessment.[4] The aim of the current study is to add a systematic observation study that examines the link between parental phone use and parental responsiveness to young children's bids for attention. Unlike previous observational studies, we observed parent–child dyads during multiple ten-second intervals and coded parental activities, children's bids for attention, and parental responses to those bids in each interval. Using this approach, we can examine both between- and intraindividual differences in responsiveness resulting from phone use. Based on the extant scholarship, we expect to find that:

H1: Parents are less responsive to their children's bid for attention when they are on their phones than when they are not.

H2: When parents respond to their child's bid for attention, their responses are less timely (H2a), weaker (H2b), display less affect (H2c), and are less likely to prioritize the child over other activities (H2d) when they are on their phones than when they are not.

Several scholars have noted the importance of differentiating between less and more absorbed forms of phone use.[15–17] Findings suggest that when parents are exclusively focused on their phone they are even less responsive than when they only occasionally glance at their phones.[3,7] Hence, we expect that:

H3: When parents' phone use is more intense, they are less responsive (H3a) and their responses are less timely (H3b), weaker (H3c), display less affect (H3d), and give less priority to the child (H3e) than when it is less intense.

Previous scholarship has noted that phone use is not the only nonchild-directed activity that parents can be involved in when caring for children; however, it appears that phone use is associated with larger changes in responsiveness than these other activities, presumably because it demands higher concentration and often is more prolonged.[3] Hence, we expect:

H4: Higher levels of nonchild related activity intensity also reduce responsiveness, but phone use does to a greater extent.

Studies show that parents-on-phones often ignore children's bids for attention, even when they are very explicit (e.g., a cry for help).[2,3,5] A pertinent question that might be asked is thus whether children need to ''work harder'' to obtain a response when their parent is on the phone:

H5: Children need to express their bid for attention using more modalities to elicit a response when parents use a phone versus when they do not.

Finally, we performed our study in two phases: In the first phase, we obtained consent from parents before the observation. In the second phase, we obtained consent afterward. Because of social desirability bias,[18] asking for *a priori* consent may lead parents to use their phone less and with less intensity than when consent is asked afterward, thereby impacting their responsiveness. Such a finding is relevant for researchers who need to make decisions regarding when to obtain consent in the future:

Table 1. Gender Composition of Parent–Child Dyads

	Child		
Caregiver	*Son*	*Daughter*	*Total*
Father	9	6	15
Mother	19	19	38
Total	28	25	53

RQ1: Does asking for consent before or after observation produce differences in parents' responsiveness as a function of phone use?

Methods

Sample and procedure

The first phase of this study took place in spring 2017. We observed 25 parent–child dyads, 9 in a playground and 16 in the waiting room of a consultation bureau.* We asked for *a priori* consent and used two trained coders. The second phase took place in fall 2018. We observed 30 dyads in the waiting room of consultation bureaus. One trained coder completed the observation using a simplified coding instrument. Some coding categories of phase 1 were collapsed to correspond with the simplified coding of phase 2. Consent was obtained afterward. Two dyads did not consent to their data being used. In both phases, observations occurred during daytime (9 a.m.–5 p.m.). The observation started after parents settling in and ended after 25 observed intervals or when the dyad left the location. The university's IRB approved both study phases separately. Children's age was registered in phase 1 ($M = 26.28$ months; $SD = 18.06$, max = 5 years), but unfortunately not in phase 2. However, all phase 2 observations occurred in the waiting rooms of bureaus that offer consultations to children aged 0–5 years. Table 1 shows the gender composition of the 53 dyads. In total, 1,038 intervals were coded (min = 1, max = 25, median = 23 observed intervals per dyad).

Materials and measures

Coders were informed of interval start- and stop times through earphones and were trained with video-recorded parent–child interactions. After each observation interval, the coder had 15 seconds to note behaviors (see Abels et al.[20] for a similar procedure). Intercoder reliability was high for the coding categories in both phase 1 (Cohen's $\kappa > 0.91$) and phase 2 (Cohen's Kappa >0.83).

The coding instrument (Appendix A1) had three sections. First, parent activities were coded: phone use, child-directed activities, and nonchild-directed activities (which coders could specify further). There were four codes: 0 = no involvement, 1 = passive involvement (e.g., holding the phone or drink but not engaging with it), 2 = occasional involvement (e.g., occasionally interacting with the phone or a magazine), and 3 = exclusive involvement (e.g., being completely absorbed by the phone or a conversation). See Appendix A2 for the full coding manual. Based on the above coding, three

*The preliminary results of this research phase are reported in Abels et al.[19]

Table 2. Results for the Relationship Between Phone Use and Phone Use Intensity and Four Indicators of Response Quality

	Phone use (yes/no)		*Phone use intensity*	
	OR (CI)	*Model fit*	*OR (CI)*	*Model fit*
Timeliness	26.9 (5.5–131.8)	$\chi^2(1) = 19.6$, $p < 0.001$	5.8 (2.7–12.3)	$\chi^2(1) = 26.0$, $p < 0.001$
Strength	4.4 (1.7–11.4)	$\chi^2(1) = 10.3$, $p = 0.001$	2.8 (1.6–5.2)	$\chi^2(1) = 16.7$, $p < 0.001$
Valence	4.2 (1.5–11.2)	$\chi^2(1) = 8.5$, $p = 0.004$	2.7 (1.5–5.1)	$\chi^2(1) = 13.6$, $p < 0.001$
Priority child	6.2 (1.3–29.0)	$\chi^2(1) = 6.5$, $p = 0.01$	3.7 (1.5–9.0)	$\chi^2(1) = 13.1$, $p < 0.001$

Note: ORs represent the odds of decrease in the response quality indicator when phones are used versus not used and when phones are used more intensively versus less intensively.
CI, confidence interval; OR, odds ratio.

variables were created: *parental phone use* (yes/no), *intensity of parental phone use* (none, passive, occasional, exclusive), and *intensity of nonchild-directed activity* (none, passive, occasional, exclusive).

Second, the child's bids for attention were coded. Behavior was considered a bid for attention when it could be conceived of as—intentionally or unintentionally—drawing attention in one of the following modalities: gazing at the parent (visual gaze), visually seeking for attention (e.g., waving, making big gestures or movements), auditory behavior (shouting, crying, calling the parent), touching the parent, or taking or giving an object from or to the parent. Based on the above categories, two variables were computed: *bid for attention* (yes/no) and *number of bid modalities* (min = 1, max = 5).

Third, the parent's response to a bid for attention was coded, if a bid was made. If a response was made, information about whether the parent's response was timely or not, weak (i.e., merely showing awareness) or strong (i.e., providing a noticeable verbal and/or nonverbal response), and the valence, negative (e.g., ''stop clapping!''), neutral, or positive (e.g., ''oh, you've learned clapping!'') was recorded. Due to low rates of negative valence, neutral and negative were merged. In phase 2, the coder's perception of whether the child was prioritized over other activities was included. The above categories were used as binary variables: *parental responsiveness*, *timeliness*, *strength, positive valence*, and *prioritizes child*.

Results

Before testing our hypotheses, we first examined if parents who used their phones at any point ($N = 22$, 41.5 percent) behaved differently than parents who did not. To that end, we explored whether, during intervals in which children bid for attention ($N = 641$), the likelihood of the caregiver responding to a bid for attention (73.5 percent of these 641 intervals) would depend on if the caregiver used a phone during any of the intervals (42.6 percent of caregivers). This and all following analyses were evaluated by comparing the performance of a mixed effects logistic regression model that includes a predictor and a random intercept for each child-caregiver pair to a model without the predictor. Appendix A3 contains model specifications for all analyses. We found no support for a between-person difference in responsiveness between parents who used their phone at least once versus those who did not ($\chi^2(1) = 2.5$, $p = 0.12$). In addition, location is not related to phone use at both the person level[†] ($\chi^2 = 0.02$, $p = 0.90$) and interval level ($\chi^2(1) = 0.0054$, $p = 0.94$).

We hypothesized that parents would be less responsive to their child when using a phone than when not using a phone (H1). Parents interacted with a phone during 12.9 percent of the intervals with bids for attention. The results show that in intervals with phone use, parents were less likely (odds ratio [OR] 5.4, 95 percent bias-corrected and accelerated (Bca) confidence interval [CI]: 2.5–11.8) to show a response to a bid for attention than in intervals without phone use ($\chi^2(1) = 19.3$, $p < 0.001$; H1 supported).

To assess the association between phone use and the quality of the response (H2a–H2d), we focus on intervals in which parents responded to a bid for attention ($N = 497$). Quality was assessed along four dimensions: whether the response was strong (62.2 percent), timely (92.6 percent), encouraging (62.3 percent), and prioritized the child (62.5 percent). The findings, depicted in Table 2, show that the odds of parents responding timely, strongly, with positive affect, and by prioritizing the child are decreased during phone use. In sum, responses were consistently of lower quality when parents used phones (H2a–H2d supported).

We hypothesized that phone use intensity (Table 3) would predict caregiver responsiveness (H3a). We treated intensity level as a categorical factor. A model with phone use intensity provided a better account of the data than a model without intensity ($\chi^2(3) = 26.0$, $p < 0.001$). Based on the model estimates, we see that passive phone use is related to caregivers who were less likely (OR 5.3, CI 1.7–16.1) to respond to bids for attention than when not using a phone. Similarly, active phone use was related to the caregiver being less likely (OR 16.1, CI 4.3–61.3) to respond than when not using a phone. Interestingly, the result was less clear for occasional phone use: caregivers who occasionally used their phone were only marginally less likely to respond to bids for attention (OR 2.1, CI 0.6–7.0), suggesting that this was not reliably different than when not using a phone (H3a partially supported).

To evaluate the relation of phone use intensity with the quality of responses (H3b–H3e) we consider only intervals with both a bid for attention and a response (Table 3). Unfortunately, in these intervals phone manipulation intensity was skewed; therefore, intensity was coded as a continuous variable and the following analyses should be interpreted

[†]Note that we do not report degrees-of-freedom because Monte Carlo simulation was conducted in view of the low number of playground observations.

Table 3. Relationship Between Phone Use Intensity on Parental Responsiveness to Bids for Attention and the Quality of That Response

	No use	*Passive use*	*Occasional use*	*Exclusive use*	*Total count*
Intervals with bids for attention that produced a parental response	457	18	14	8	497
Intervals with bids for attention	589	33	22	32	676
Percent of intervals with successful bids for attention (H3a)	77.59	54.55	63.64	25.00	73.52
Percent of intervals with successful bids for attention that produced a strong parental response (H3b)	64.30	72	14.30	0	62.10
Percent of intervals with successful bids for attention that produced a timely parental response (H3c)	95.40	94.40	35.70	25.00	92.60
Percent of intervals with successful bids for attention that produced an encouraging parental response (H3d)	64.60	72.20	14.30	0	62.40
Percent of intervals with successful bids for attention that produced a parental response that prioritizes the child (H3e)	65.30	86.70	16.00	0	62.50

with caution. As before, we found a consistent pattern of lower odds for response timeliness, strength, positive valence, and prioritizing the child when phones were used than when they were not used (Table 3; H3b–H3e supported). For all measures, we see a consistent pattern of reduced quality in parents' responses when their involvement with their phone becomes more intense.

Our fourth hypothesis stated that involvement with a phone reduces responsiveness more than being involved in other nonchild-directed activities. To test this hypothesis, we computed two new variables. The first variable represents the intensity of parental distraction within the interval, coded as the maximum of the phone intensity measure and the nonchild directed attention. The second variable represents the source of distraction, if phone or nonchild-directed distraction was higher (intervals with equal distraction were excluded). A mixed effects logistic regression model with distraction intensity provides a better account of the data than a model without ($\chi^2(2) = 19.2$, $p < 0.001$): Higher levels of distraction result in lower odds of caregiver response to bids for attention (H4a). However, a model with only distraction source as a predictor was not preferred over a model without any predictors ($\chi^2(1) = 1.5$, $p = 0.22$). Similarly, the model with both main effects was not preferred over the model with only distraction intensity ($\chi^2(1) = 1.4$, $p = 0.24$) nor was the model with both main effects and interaction terms ($\chi^2(3) = 3.2$, $p = 0.36$). This suggests that phone use is not more impactful than other activities when controlling for distraction intensity (H4b not supported).

Our fifth hypothesis stated that when parents use the phone, children use more modalities to express their bid for attention than when they do not use a phone. We find a mixed effects logistic regression predicting caregiver response as a function of number of bid modalities is not preferred over a model with no predictors ($\chi^2(1) = 2.1$, $p = 0.15$). Similarly, the model with both number of bid modalities and a binary indicator of caregiver phone use was not preferred over a model with only phone use as a predictor ($\chi^2(1) = 2.5$, $p = 0.11$) nor was the model with both factors and an interaction term preferred over the phone use only model ($\chi^2(2) = 4.7$, $p = 0.09$). We additionally explored if particular modalities of drawing attention are more successful, especially when children are competing with the smartphone for parental attention. Only visual gaze showed a significant effect and did so for both the analysis that includes phone use ($\chi^2(1) = 6.6$, $p = 0.01$) and the analysis without ($\chi^2(1) = 5.8$, $p = 0.02$). However, models with all modalities provided a better account of the data than the visual gaze only model for both the models that include phone use ($\chi^2(5) = 14.9$, $p = 0.01$) and those that do not ($\chi^2(5) = 15.0$, $p = 0.01$).

Finally, we evaluated whether asking for *a priori* consent would lead to an observation of different parent behaviors than a posteriori consent (RQ1). A mixed effects logistic regression predicting caregiver response with caregiver phone use, consent condition, and the interaction of these two terms was preferred both over a model with only caregiver phone use ($\chi^2(2) = 35.4$, $p < 0.001$), as well as a model without the interaction term ($\chi^2(1) = 6.9$, $p = 0.008$). These effects appear to be driven by three patterns. First, phone use was lower when consent was collected in advance (6.2 percent) than afterward (21.8 percent). Second, overall responsiveness was higher with consent before (89.1 percent) than afterward (52.6 percent). This seems to be driven by the nonphone-using caregiver responses, which were higher with consent before (91.7 percent) than afterward (54.9 percent). However, the response probability of parents using their phone did not differ if consent was collected before (50.0 percent) or afterward (44.4 percent).

Discussion

This study supports earlier findings that parental phone use predicts a decrease in parental responsiveness and response quality. Responsiveness is of key importance for healthy child development because during early childhood it forms the basis for crucial developmental tasks such as forming an attachment to the parent.[21] Consequently, our findings support concerns over the phone's impact on caregiver–child interactions.[15]

Interestingly, passive and fully absorbed phone use appeared more disruptive than occasional use. This suggests that occasional use may represent a special ''mode'' of dual task management where parents intentionally divide their attention between both the child and their phone. The finding that passive phone use (e.g., holding the phone in one's hand) is in itself already disruptive aligns with previous work

suggesting that the mere presence of the phone suffices for dividing attention.[22]

The finding that responsiveness decreases with higher phone involvement but also with higher involvement in other nonchild directed activities may at first glance dampen concerns over phone use; however, the incidence of absorbed phone use generally appears to be higher, while other tasks seem to allow for more intermittent attention patterns.[3,19] This suggests that the dialogic nature of phones makes them more likely to bring users into a state of ''absent presence''[23] than other activities.

Contrary to our expectations, we found that children do not make more insistent bids for attention when caregivers use phones. However, we did not evaluate how parent–child interactions develop over time. Previous work suggests that if children get no or a weak response, they may increase the intensity of the bid—sometimes causing irritation on the part of the caregiver.[5] In addition, children may develop more effective strategies with age. Future research is needed to explore these questions.

Overall, 43 percent of parents used a phone, which is low compared to other studies.[1–3,5] This likely stems from the fact that we observed most dyads for a relatively short duration. The setting in the consultation bureau waiting room may also encourage parents to ''act on their best parenting behavior.'' It could, however, also be due to culture or the participating children's age because a study in neighboring Germany on toddlers found comparably low phone involvement (48 percent).[4]

A limitation is that we did not systematically include factors such as locations, time of day, and children's age into the study design. These factors may have an effect on both the occurrence of parental phone use and any subsequent change in responsiveness. Moreover, we only observed the first 10 minutes after the parent–child's entrance into the location. Overall, relatively few observations of phone use were made, which explain the generally large confidence intervals for the parameters examined. A different time frame and longer observation period may produce more instances of phone use. Furthermore, video recordings, which were not used because of the ethical considerations involved when making such recordings in semipublic places, would generate greater systematic data.

In addition, this observational study does not permit causal conclusions. In fact, a reversed causal interpretation for our findings may be that parents' smartphone use is a behavioral manifestation of their overall nonresponsiveness, rather than its cause. Given that recent experimental work does support a causal effect of smartphone use,[7] future research may explore if there is bidirectional causality.

Finally, our study showed a social desirability effect: as anticipated, parents used their phones less when they knew they were being observed. Thus, our findings may underestimate the occurrence and effect of parental smartphone use on responsiveness. To obtain ecologically valid representations of parental phone in normal environments, unobtrusive observation thus appears crucial.

Concluding, this study is among the first to systematically examine within-person differences in parental responsiveness resulting from phone use. While there are limitations, such as a limited sample size, a lack of attention for bidirectional causality, and for the temporality of parent–child interactions, it validates other studies in this emerging field of research and adds estimates of the magnitude of effects.

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Author Disclosure Statement

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(*Appendix follows* →)

Appendix

Appendix A1. Coding Instrument

Participant ID:_____ Bureau:_____ Date:_____ Time:_____ Coder: _____

NON CHILD-RELATED ACTIVITIES (absorption) (0 = none, 1 = passive, 2 = occasional, 3 = exclusive)																									
Phone manipulation																									
Child-directed action																									
Other activity																									
Specify:																									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
CHILD'S REQUESTS FOR ATTENTION (0 = none, 1 = request)																									
Visual - Eye Gaze																									
Visual –Draws attention																									
Auditory																									
Touching																									
Takes or gives object																									
Object = phone																									
Mood (+/-)																									
CAREGIVER'S RESPONSE																									
Response (Y/N)																									
Aware or Interact (A/I)																									
Timeliness (Y/N)																									
Reject/Neutral/Encourage																									
Prioritizing child (Y/N)																									
Comments:																									

(*Appendix continues* →)

Appendix A2. Coding Manual: Waiting Room and Playground Interactions

Coding Manual

Caregivers and children up to 5 years will be observed in the waiting room, when they are waiting for their appointment (i.e., when they are not busy with weighing, talking to the receptionist, and so on) and when visiting playgrounds. Observation periods will be 10 seconds followed by 10 seconds to record the data on observation sheets. The following behaviors will be observed:

- Caregivers' nonchild-related activities
- Children's requests for attention
- Caregivers' responses to requests for attention

Observations will be done by one coder, who will code on all three aspects within the 10-second margin.

Nonchild-related activities

The activities are distinguished as follows:

- **Phone manipulation**: the caregiver manipulates his/her phone (e.g., typing a message, playing a game, browsing, and so on).
- **Other**: the caregiver is involved with something other than the mobile phone manipulation. If possible, please specify what the caregiver is doing in the comment space.

Caregivers' nonchild-related activities are coded in terms of whether the caregivers are involved with them. Involvement is generally coded by indicating yes or no:

0 None: if caregivers are not involved in any activity.
1 Passive: The caregiver is holding the object but is not interacting with it (this code is not applicable to talking or headphones).
2 Occasional: the caregiver is involved in his/her activity but also attends to something else occasionally.
3 Exclusive: the caregiver is focused on his/her nonchild-related activity without attending to anything else.

Child's requests for attention

The child's requests for attention are coded by the caregivers' modality they address:

- **Visual modality**: looking, waving, jumping up repeatedly
- **Auditory**: sounds made by toys, talking, shouting, crying
- **Touching**: touching the caregiver

Children's requests for attentions are coded in three levels of intensity:

0 **None**: the child does not request attention in a specific modality. The space is left blank.
1 **Indirect request**: the child glances at the caregiver (checking whether he/she is still there), makes a sound (with a toy or vocal, e.g., muttering to him/herself), or touches the caregiver (e.g., by accident while walking past) without any direct indication of wanting the caregiver's attention.
2 **Direct request**: the child stares at the caregiver, directs an utterance at the caregiver, or touches/leans on the caregiver.

A separate code is administered if the child **takes** an **object** from the caregiver or tries to do so.

The child's **emotional state** is coded also as being positive (+) or negative (–); if neutral the space is left blank.

Caregiver's response

The caregiver's **response** to the child's requests for attention is coded in terms of the following:

Yes The caregiver is responding to the child's request for attention.

No The caregiver is not responding to the child' request at all.

- **Awareness**: When the parent is fully aware of the child's request for attention it is coded Yes, when the parent is not aware of the child's request it is coded No.
- **Timeliness**: Coded if the reaction is appropriately timed by coding Yes (when response is timely) or No (when response it not timely).
- **Reject/Neutral/Encourage**: is coded R (when the request for attention is rejected), N (when the request is neutral), or E (when the request for attention is encouraged).
- **Prioritizing child**: is coded Yes (when the child's request for attention is prioritized over other activities) or No (when the child's request for attention is not prioritized over other activities).

Appendix A3. Model Specifications for Hypothesis Tests

H or RQ	*Model specification*
H1	glmer(response ~ phone_use + (1 | diad_ID)
H2a	glmer(timely_response ~ phone_use + (1 | diad_ID)
H2b	glmer(strong_response ~ phone_use + (1 | diad_ID)
H2c	glmer(valence_response ~ phone_use + (1 | diad_ID)
H2d	glmer(child_prioritization ~ phone_use + (1 | diad_ID)
H3a	glmer(response ~ phone_use + (1 | diad_ID)
H3b	glmer(strong_response ~ phone_use + (1 | diad_ID)
H3c	glmer(timely_response ~ phone_use + (1 | diad_ID)
H3d	glmer(encouraging_response ~ phone_use + (1 | diad_ID)
H3e	glmer(child_prioritization ~ phone_use + (1 | diad_ID)
H4	For distraction intensity: glmer(response ~ distraction_intensity + (1 | diad_ID) For distraction source: glmer(response ~ distraction_source + (1 | diad_ID)
H5	glmer(response ~ bid_modalities + (1 | diad_ID)
RQ1	glmer(response ~ phone_use + condition + phone_use: condition + (1 | diad_ID)

Note: All models were fit using the glmer function from the lme4 package (version lme4_1.1-21) in R (version 3.5.1).