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Research Article

Moment-to-Moment Observation of Parental Media Use and Parent-Child Interaction: Quality and Media Multitasking

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Mobile media proliferation throughout society has infused and complicated environments that formerly were interaction rich (e.g., waiting rooms, restaurants, and playgrounds) with the presence of smart devices. Ethnographic studies have indicated that parental use negatively impacts parent-child interaction quality. The current study reviews and expands on previous research through observing systematically parent-child interaction quality throughout the course of an entire meal (30-140 minutes). Utilizing five-minute intervals, across 93 parent-child dyads, we assessed both within- and between-person moment-to-moment changes in parenting quality (i.e., parental positivity, negativity, and engagement) in the context of parental media use. Between-person, only positivity appeared to decrease when comparing low and high parental media use. Within-person findings indicated that when the parent demonstrated higher than *their* typical media use, we noted a significant decrease in the quality of engagement and positivity. Differing from ethnographic studies, no change in negativity was identified within-person. Utilizing a lagged interval analysis, we identified a pattern of increased parental engagement with their child following intervals with parental media use, identifying a pattern of parental media multitasking heretofore only observed in ethnographic studies. Implications of findings in the context of previous research and future directions are discussed.

1. Moment-to-Moment Observation of Parental Media Use and Parent-Child Interaction Quality

Mobile media devices (e.g., smart phones and tablets) have become such an integrated part of our lives that they are often felt to be an extension of the self [1, 2]. However, because of mobile media proliferation, environments that formerly were interaction rich (e.g., grocery stores, restaurants, and playgrounds) are now infused with the presence of smart devices. Although observational studies show that half to three-fourths of parents observed engage in media use while with their children in public settings (e.g., playgrounds and restaurants; [3–5]), little is known about the impact of mobile devices on the parent-child relationships. Restaurants, due to physical proximity, confinement within a small space, and limited activity choices, likely make engagement and distraction more salient than other environments in which parents and children interact (e.g., parks and playgrounds). Qualitative observations of parents and their children in restaurants have suggested that parental use of media may negatively impact the way in which a parent responds to their child's bids for attention and misbehaviors [6, 7]. The current study sought to extend previous observational studies by conducting detailed observations of parent device use and parent-child interactions during mealtimes at restaurants (broken into 5-minute intervals across the mealtimes), allowing for an examination of within-person associations between parent device use and parent engagement, positivity, and negativity towards their child over an extended period.

Parent-child interactions serve as crucial building blocks to many developmental processes [8, 9]. Research has indicated that parent-child interaction quality predicts cognitive and social-emotional learning [10], children's compliance

and behavior [11], and a variety of health-related outcomes such has healthy eating habits [12]. In the context of the home environment, parent-child interactions are naturally limited by routines such as homework and extracurricular activities or interrupted by distractions of cooking, cleaning, and home-based media such as the television. Therefore, public outings, whether to the park/playground, restaurants, mall, or other venues, have historically provided an escape from the everyday distractions and a time for concentrated connection [13]. These outings not only served as a time for connection but opportunities for learning important social skills, community norms, and healthy habits [14]. However, with the rise in affordability of mobile devices and 50-75% of parents observed utilizing media while in public with their children [4, 5, 15], this may be changing, posing potential opportunities and challenges for the parent-child relationship that have yet to be understood.

For parents, technology can serve as a distraction from stress and an escape from a busy, demanding world [16]. Parents use media for a variety of adaptive reasons such as staying connected to the world outside their home and to stay connected with loved ones during the exhausting early days of parenting a newborn [17–19]. Other parents report that it is an easy way to reward themselves or escape from stress or boredom within their parenting role [16, 20]. However, parents' media use may at times enhance stress, decrease mood, or be maladaptive ([21, 22]); result in negative social comparisons to others ([23]); and increase cognitive tension and stress related to multitasking technology and parenting [16].

The role of media in the interactions between parent and child and the impact on subsequent relationship and attachment outcomes is still under investigation. Linder et al. [24] found that parents who rated higher levels of media absorption and use were at greater risk for also reporting attachment insecurity between themselves and their child. Simply having the television on in the background in the home has been shown to significantly decrease interactions and verbal exchanges [25], and when toys talk and sing (i.e., digital toys), parents engage less with their children [26]. Therefore, media use may sometimes displace the important interactions that support learning [9, 27] and relationship building [24, 27].

Alternately, some research suggests that certain types of technology interactions such as through joint media engagement can be used to bond [24, 28, 29] and enhance learning and development [30]. Joint media engagement (JME), in which the parent and the child interact together within the media (e.g., playing digital games together) or interact around the media content (e.g., discussing content of shows) can support learning [31] and may be protective of parent-child attachment [24]. However, several studies indicate that JME is rare and challenging to engage in, particularly in the context of mobile media devices, given the design of both technology and digital applications [7, 32–35]. Ewin et al. [32] noted JME in only 4% of observations in which a parent utilized media while with their child, and Radesky et al. [7] noted coviewing occurring in approximately 7% of observations in which a parent utilized media with their child present. Thus, the impact of parental media use is nuanced, and a better understanding of the immediate and long-term impact of parental media use on parent-child relationships is needed.

Several studies have attempted to further parse out the nuanced impact of parent media use through naturalistic observations in public environments such as playgrounds, parks, malls, waiting rooms, fast food restaurants, and full-service restaurants. Ethnographic in nature, these studies have identified concerning trends and themes in parent-child interactions—specifically noting decreases in appropriate and timely responses to children's bids for attention [3, 6, 32, 36], reductions in joint play or conversations [4, 37], and decreased sensitivity and warmth [7, 15]. Potentially more concerning was an observed lack of awareness of dangerous situations or injuries [36] as well as sometimes negative and even hostile responses to children's bids for attention when the parent was absorbed in their device [3, 6, 7, 36]. However, some studies have observed an ebb and flow to parental overtures and engagement with their children in the context of media use. Hiniker et al. [3] noted a pattern of parents' intentional reengagement with their children following extended phone use. The authors noted, this could potentially be a concerted attempt to "reconnect" or "make up" for the disconnection resulting from their phone use, posing interesting questions surrounding patterns of parental media use and a potential reunion phase following media use.

Of the observational studies thus far on the topic of parental media use in public environments, three have systematically assessed and rated the quality of parent-child interactions in the context of parental media use [15, 38, 39]. These three studies will be briefly summarized here as precursors to the current study.

Vanden Abeele et al. [39] observed in both waiting rooms and playground settings to assess for the quality of parent responsiveness in the context of children's bids for attention. Dyads were observed for approximately 4 minutes at 10-second intervals. Only observed intervals in which a child made a bid for attention were utilized in the analysis. In terms of between-person findings, Abeele et al. found that parents were less responsive to their child when using a phone than when not using a phone. Additionally, this study noted a significant decrease in timeliness of parental response, the strength of the response, and appropriateness of the response with greater intensity of mobile device use.

Wolfers et al. [15] observed parent-child interaction quality in a playground setting among 89 dyads for a maximum of 10 minutes. They timed device use and completed a rating of parental sensitivity at the close of the 10-minute observation. Greater duration of parental device use was associated with lower overall parental sensitivity. As the sensitivity rating was only taken at the end of the observation, it is challenging to piece out whether the sensitivity was due to overall between-person sensitivity issues (e.g., those who are heavier media users are also generally less sensitive/engaged with their child as compared to lighter media users) versus situational, within-person sensitivity (e.g., the media use negatively impacted the sensitivity in the moment).

Ochoa et al. [38] observed 98 dyads at 10-second intervals for a maximum of 5 minutes in parks, playgrounds, and mall food courts. Utilizing a largely dichotomous rating

system (e.g., initiated interactions yes/no) for each 10-second interval, the researchers noted a within-person decrease in joint attention, parental interaction initiations, overall amount of talk, and positive emotions when parents utilized their devices. Although they noted a trend, they did not observe a significant decrease in parental responsiveness to bids for attention. Additionally, they did not observe a significant increase in negativity when a parent utilized current study sought to expand the aforementioned findings by observing each dyad for an extended period of time (e.g., across an entire full-service meal) to further piece out whether formerly observed decreases in parenting quality in the context of media was due to trait versus situational differences—in other words, between-person (e.g., are heavy media users more likely to also engage in less positive parenting?) or within-person (e.g., during moments when media use is greater, is parenting less positive during those moments?). Additionally, the current study observed quality of interactions when media was present regardless of children's bids for attention and focused on assessing the quality of parent interaction behaviors. For example, a brief hushing of a child's loud voice is markedly different than a parent grabbing a child by the arm and raising their voice to tell them to be quiet. Both are instances of negativity but are qualitatively different and differentially impact the relationship between parent and child. Assessing the quality and not just the presence of a behavior provides a deeper understanding of the impact and the degree to which the behaviors occur and the relative impact of the parenting behaviors based on their intensity. The current study rated the quality of interaction across three categories of interaction, namely, engagement, positivity, and negativity, utilizing a four-point rating scale to provide a sense of the qualitative differences in each category of parenting behaviors on a moment-to-moment basis across the entire meal.

There were three primary hypotheses for this study.

(1) Greater parental media use would result in lower observed parental engagement towards the child both between and within subjects

(2) Greater parental media use would result in lower observed positivity towards the child both between and within subjects

(3) Greater parental media use would result in greater observed negativity towards the child both between and within subjects

Additionally, it is interesting that Hiniker et al. [3] identified a pattern of postphone adult-initiated engagement in which adults enthusiastically and self-initiated a reengagement of their children after an extended use of their phone. The authors could not identify any studies that systematically assessed the potential for a parent's purposeful and active reconnection with their child after a period of disconnection that occurred because of media use. Therefore, the current study also sought to explore whether this pattern of engagement could be identified by using lagged analyses (e.g., does greater media use during one interval predict an increase in positivity, negativity, and/or engagement during the following interval?).

2. Methods

2.1. Participants. The participants of this study in our analytic sample included 93 adult and child dyads who were dining at casual restaurants in Southern California. While we were unable to determine if the adult was the parent of the child present or another caregiver, we utilize the term "parent" throughout the remainder of article for consistency. However, it should be noted that this could include other adult family members, babysitters/nannies, or other caregivers. Given the naturalistic observation nature of this study, race/ethnicity of participants was not documented. By appearance, 68.8% of the adults and 51.6% of the children were female in our observed sample. To differentiate between child's developmental level, children were categorized by their level of independent sitting: 86.0% independent sitting, 12.9% high chair, and 1.1% booster.

2.2. Sampling Procedure. Observability was the inclusion criteria for this study, which included clear visualization of the parent-child dyads and number of dyads at the table. Clear visualization required that both the parent and the child's face could be seen from the researcher's vantage point. The second criteria were that there were no more than two adult caregivers at the table. When large parties with adults were present, the adults frequently rotated caregiving thus making dyadic observations impossible. Due to this study being conducted entirely through naturalistic observation, it was determined to be exempt by the San Diego State University IRB. There was no interaction between those being observed and those observing, and no identifying information was collected on families that were observed.

Observations occurred pre-COVID (September 2018–May 2019) at fast casual dining restaurants in Southern California. Fast-casual restaurants are defined as ones that have entrees ranging from $10-20 and in which the diners are waited on at their table. As discussed in the literature review above, these restaurants were chosen to expand current research on media use in restaurants and impact on child-adult interactions during longer mealtimes (e.g., full-service meals) versus the typical meal length that occurs in a fast food restaurant. Data was collected in five-minute intervals for the duration of the dining experience and ended when their table was cleared or the diners left the restaurant ($M = 11.33$ intervals or 56.65 minutes, SD = 3.81 intervals or 19.05 minutes, Range = 6 to 28 intervals or 30 to 140 minutes; 73% had 9 or more intervals of mealtime data, or 45 minutes or more). Five-minute intervals, as opposed to shorter intervals, were chosen to observe for a sufficient amount of time in order to better determine the overall quality of interactions, provide greater confidence in these ratings, and increase the reliability of the coding.

2.2.1. Reliability. Observers were trained on the coding scheme discussed above utilizing video of in-restaurant parent-child interactions with and without media present. Observers in training compared their coding to a master coder. The master coders included the PI or Research Assistant who had displayed above 95% consistency in live settings. Once observers

reached above 80% reliability in video observations, they then engaged in practice in a live setting (e.g., at a restaurant) with a master coder until they reached above 80% reliability in absolute agreement. Recalibration of coding was conducted through joint live coding with a master coder every fifth observation, throughout data collection, to prevent coding drift. Observers ($N = 6$) included undergraduate child and family development students. Interrater reliability was determined with intraclass correlation coefficient (ICC). ICC estimates were based on a mean rating ($k = 2$), absolute agreement, two-way random effects model. As suggested by Koo and Li (2016), agreement was interpreted as poor < .05, moderate 0.5-.075, good 0.75-0.90, and excellent > .90. Overall, the ICCs for all codes indicated good to excellent reliability (more detail reported with each code below).

2.3. Deleted Cases. We initially began observing two dyads simultaneously (if there were multiple caregivers at the same table). However, we found that most coders struggled to maintain sufficient quality, and we therefore quickly stopped this practice. This left us with only three observations in our dataset where two dyads had been observed. We eliminated one dyad within each of these three observations utilizing a random choice generator. Three cases were eliminated due to this procedural change prior to data analysis.

2.3.1. Demographics. Subjects' gender, group size, and child seating type (i.e., car seat, high chair, booster, independent seating) were collected as demographic data.

2.3.2. Parent Device Use. The percentage of time that the caregiver was on devices during each interval was completed at the close of the interval. Observers utilized a stopwatch to note the time spent on a device during each interval.

2.3.3. Parent-Child Interactions. The procedure for the caregiver-child interaction observation was modeled after the NICHD Child Care Study. A brief explanation of this procedure and coding system are provided here; for greater detail, readers are directed to the NICHD study publications (e.g., NICHD, 1999; NICHD, 2005). For the purpose of this study, three observation categories were adapted from the NICHD Child Care Study to serve as a framework for reliability training during video and live observation practice. These include Parent Engagement, Parent Positivity, and Parent Negativity.

(1) Parent Engagement. An engaged parent appears to be engaged with, and aware of, the child's needs for interaction to facilitate involvement with objects or people. In a layperson's words, the parent is "into being with" the child. This parent reacts contingently to the child's vocalizations or actions and facilitates the child's explorations. In other words, the parent converses, chats, talks to, plays with, and appears to want to interact and be with the child (even if he/she may be intrusive or insensitive). There is joining in the child's play, participating in "conversations" or even awareness of what the child is doing. The engaged parent seeks out and wants the child to look to them. The engaged parent pays attention to child eye contact, vocalizations, or other cues that call for parent attention and involvement. When they do interact, they are "in sync" and reciprocally playing, talking, or interacting. The engaged parent appears to be very interested in the child and may often display the emotional involvement in the child that characterizes a sensitive parent. The scale of this category of parent-child interactions is as follows: (1) none to very little engagement, (2) low engagement, (3) moderate engagement, and (4) high engagement. Interrater Correlation coefficient for engagement was .900, with a 95% confidence interval from .849 to .933, $F(107, 107) = 10.528$, and $p < .000$.

(2) Parent Positivity. Positive feelings and emotions are shown by (a) speaking in a warm tone of voice, (b) hugging or other expressions of physical affection, (c) smiling, (d) laughing with the child, (e) enthusiasm about the child, (f) praising the child, and (g) general enjoyment of the child. Positive regard is also evident when the parent listens, watches attentively, looks into the child's face when talking to him/her, has affectionate physical contact, and is playful. Ratings on this scale are based on both quality and quantity of positive regard. The scale of this category of parent-child interactions is as follows: (1) not at all to very little positive regard, (2) low positive regard, (3) moderate positive regard, and (4) high positive regard. ICC for positivity was .948 with a 95% confidence interval from .924 to .965, $F(107, 107) = 19.213$, and $p < .000$.

(3) Parent Negativity. This scale references the parent's negative affect with the child. Both frequency and intensity of negative affect toward the child are considered. Some markers of negative regard include (a) disapproval, (b) tense body, (c) negative voice when correcting, (d) abruptness, (e) tense facial muscles and strained expression, (f) harshness, (g) threatening the child or punishing without explanation, and (h) excessive roughness when touching the child. Ratings on this scale are composed of both qualitative and quantitative evaluations. The scale of this category of parent-child interactions is as follows: (1) no negativity to very little, (2) low negativity, (3) some negativity, and (4) moderate to high negativity. ICC for negativity was .810 with a 95% confidence interval from .722 to .870, $F(107, 107) = 5.235$, and $p < .000$.

2.4. Data Analysis. Descriptive statistics were run in SPSS 26. To test our research questions, we conducted three multilevel models (one for each outcome—engagement, positivity, and negativity) using Proc Mixed in SAS 9.4. We first split the time-varying predictor variable of parent device use into its between- and within-person portions [40]. Then, we entered these two variables along with the following control variables: linear slope of time, parent gender, child gender, number of children present at the meal, whether child was in a high chair, and number of adults present at the meal (see Table 1).

To examine our exploratory research question of whether parents might compensate for device use in one interval by increasing their engagement with the child in the next interval, we ran the three multilevel models again and added in the time lagged version of parent device use. As we were interested in whether the device use in the prior interval would lead to changes in parent behavior in the next interval, we also

Table 1: Unstandardized estimates for multilevel models predicting parent-child interaction.

	Model 1: engagement	Model 2: positivity	Model 3: negativity
Time	-0.027**	-0.034***	0.001
Parent gender	-0.189	0.049	-0.102*
Child gender	0.493**	-0.089	0.015
Number of children	0.041	-0.349*	0.031
High chair	-0.031	-0.557*	0.029
Number of adults	-0.218*	-0.068	0.008
Between-person device use	-0.009	-0.017*	0.002
Within-person device use	-0.010***	-0.005**	0.0003

Note: ***$p < .001$, **$p < .01$, and *$p < .05$. Parent gender (1 = male, 0 = female), child gender (1 = male, 0 = female), high chair (1 = yes, 0 = no).

controlled for the time lagged versions of engagement, positivity, and negativity. In other words, these models examine whether the outcome (e.g., parent engagement) in the current interval (t) is predicted by parent device use in the previous interval ($t - 1$), while controlling for parents' behavior in the previous interval ($t - 1$) and their device use in the current interval (t). Thus, as an example, an effect of lagged parent device use ($t - 1$) would indicate that device use in the previous interval was associated with a change in parent behavior from the previous interval ($t - 1$) to the next interval (t). We also included the same controls as in the previous models (see Table 2).

3. Results

Descriptively, 61.3% of parents used a device at least a little bit during 20% or more of the 5-minute intervals of their meal (see Table 3). Only 12 parents (12.9%) showed no device use at all during the meal, and 2 parents (2.2%) showed at least some device use during every interval across the entire meal.

In the between-person results in the multilevel models (see Table 1), we found that parent device use was associated with observed positivity ($b = -0.017$, $p = .02$) but not with engagement ($b = -0.009$, $p = .14$) or negativity ($b = 0.002$, $p = .19$). This indicates that those parents who used a device during the meal more, as compared to other parents who used a device less, showed less overall positivity in their interactions with their child, but they did not show any difference in overall engagement and negativity. At the within-person level, we found associations with observed engagement ($b = -0.010$, $p < .001$) and positivity ($b = -0.005$, $p = .001$), but not negativity ($b = 0.0003$, $p = .59$). In other words, during intervals when parents showed more device use than their typical amount of use, they showed a drop in engagement and positivity, but no significant difference in negativity. To be specific, for every 10 percentage points (or equivalent to 30 seconds) more of use during an interval, the model predicts the parent's engagement score would drop by 0.10 and positivity would drop by 0.05.

Examining the lagged analyses (see Table 2), we see that—controlling for prior levels of engagement, positivity, and negativity, as well as the current level of parent device use—greater parent device use in the previous interval was associated with an increase in engagement in the next interval ($b = 0.003$, $p = .04$), although there were no significant effects on positivity ($b = 0.001$, $p = .22$) or negativity ($b = -0.0003$, $p = .58$). The current level of device use also remained significant for engagement ($b = -0.009$, $p < .001$) and positivity ($b = -0.005$, $p < .001$). Of note, negativity was only significantly predicted by the prior level of negativity ($b = 0.483$, $p < .001$), not device use or any other prior levels of parent behaviors. Engagement was also predicted by the prior level of engagement ($b = 0.335$, $p < .001$) and prior level of positivity ($b = 0.086$, $p = .03$), while positivity was significantly predicted by the prior level of positivity ($b = 0.593$, $p < .001$).

4. Discussion

Parent and child interactions play a pivotal role in the developmental trajectory of children [10]. As technology permeates previously interaction-rich environments such as playgrounds and restaurants, parent-child interactions may change in ways yet unknown. Restaurants, due to physical proximity, confinement within a small space, and limited activity choices, likely make engagement and distraction more salient and potentially more impactful than other environments in which parents and children interact (e.g., parks and playgrounds). The current study sought to add to the literature assessing both within- and between-person effects of parental media use on parent-child interaction quality. Of the parents in our study, 61% of parents utilized media at least a small amount or more during 20% of the observed intervals. These numbers are consistent and fall in the middle of the ranges of parental media use observed in other studies (e.g., 40-75%; [3–5]).

In terms of between-person effects, parents with higher media use did not demonstrate significantly different engagement or negativity with their children across the observation period compared to parents with lower media use, although lower positivity was observed for parents with heavier media use. These findings are partially contradictory to findings of previous observational studies. Ochoa et al. [38] noted a significant decrease in joint attention, responsiveness, and initiation of interactions in higher media users; Wolfers et al. [15] identified a decrease in sensitivity; and Vanden et al. noted less parental responsiveness to children's bids for attention. For Ochoa et al., positivity was not significantly related to high or low media use which also contradicts our findings. The

Table 2: Unstandardized estimates for lagged multilevel models predicting parent-child interaction.

	Model 1: engagement	Model 2: positivity	Model 3: negativity
Time	-0.009	-0.008	0.000
Parent gender	-0.096	0.108	-0.032
Child gender	0.323**	-0.056	-0.011
Number of children	0.100	-0.110	0.019
High chair	-0.062	-0.307*	0.018
Number of adults	-0.118	-0.049	0.001
Between-person device use	-0.002	-0.004	0.001
Within-person device use	-0.009***	-0.005***	0.0003
Within-person device use ($t-1$)	0.003*	0.001	-0.0003
Engagement ($t-1$)	0.335***	0.042	0.000
Positivity ($t-1$)	0.086*	0.593***	-0.002
Negativity ($t-1$)	0.072	0.017	0.483***

Note: ***$p < .001$, **$p < .01$, and *$p < .05$. Parent gender (1 = male, 0 = female), child gender (1 = male, 0 = female), high chair (1 = yes, 0 = no). $t-1$ indicates a lagged variable.

Table 3: Number of parents who used a device for at least some time during the following proportions of their 5-minute intervals.

% of intervals where parent device use occurred**	n	%
0%	12	12.9%
1-9%	6	6.5%
10-19%	18	19.4%
20-29%	13	14.0%
30-39%	19	20.4%
40-49%	8	8.6%
50-59%	6	6.5%
60-69%	3	3.2%
70-79%	3	3.2%
80-89%	3	3.2%
90-99%	0	0.0%
100%	2	2.2%

**By occurred, we mean that the parent used the device for at least some amount of time during the interval.

differences in the current study compared to others who have looked empirically at parent-child interactions in public settings may be accounted for by the greater length of our observation periods. Vanden et al. observed for 4 minutes on average while Ochoa et al. observed for an average of 5 minutes, and Wolfer et al. observed for 10 minutes on average. Parent-child dyads in our study were observed at a minimum for 30 minutes, and the longest observation period was 140 minutes, which might allow for our observations to capture a greater representation of all parent behaviors and the fluctuations of interactions that may occur naturally across a meal due to the tasks involved in a restaurant mealtime (e.g., looking at menus, ordering, waiting for food, and eating). Although it is difficult to explain the mixture of findings across observational studies in terms of between-person differences, our study suggests that higher users may not always be less engaged with their children across an entire meal as compared with lower users. This finding may be similar to that of Gaudreau et al. [41] in which, observing in a lab, parental responsiveness to their child did not differ substantially when they utilized a cell phone to complete a survey vs. completing a paper survey. One other explanation for these findings may be the presence of joint media engagement. Specifically, when parents interact with their children around their media use (e.g., looking at photos), engagement may not suffer.

In terms of within-person effects (i.e., changes from moment to moment), when the parent demonstrated higher than *their* typical media use, we noted a significant decrease in the quality of engagement and positivity, but no change in negativity. This is consistent with the within-person findings of Ochoa et al. [38] as they identified a significant decrease in caregiver talk, initiation of interactions, and joint attention and positivity. Also aligning with our results, Ochoa did not identify a significant increase in negativity within the dyad associated with parental phone use. Although Vanden et al.'s study focused on changes in responsiveness to bids, the negative changes they found also align well with our within-person results. The results from the Wolfers et al. [15] study was not directly comparable as they assessed only between-person effects.

It is important to note that negativity was observed with low frequency throughout the observations and was not significantly associated with media use in any way. This finding seemingly contradicts ethnographic observations of increased negativity during parental absorption in media [7, 32]. A possible explanation for this discrepancy is the environment, specifically casual dining with wait-staff versus fast food environment, could potentially result in more observation of parent behavior as wait-staff frequently stop by the table, potentially leading to greater control over negative behaviors.

However, Ochoa et al. [38] conducted their observations in fast food/food-court environments and did not find a significant increase in negativity associated with parental media use. Similarly, Konrad et al. [42], observing parent-child dyads in a lab environment, did not observe a significant increase in negativity towards the child when utilizing media. There appears to be a consistent difference between ethnographic observations of parental negativity compared to interval coding of negativity across studies. This could potentially be explained by the salience of negativity in the context of field notes. Without information about the length of the interaction or intensity of the negativity, it may potentially emerge as a prominent theme when coding field notes when compared to interval ratings. While in-the-moment sparks of negativity or negative reactions to a child's attempt to draw a parent out of their media absorption may be present, the overall effect on parent-child interaction quality may not be as impactful as previously noted in ethnographic studies.

The "in-the-moment" effects of parental media use, as identified by this study, are, overall, not positive for parent-child interactions. However, the current study also sought to assess if, as observed by Hiniker et al. [3], parents might demonstrate a pattern of intentional and increased engagement following a period of media use. Utilizing a lagged interval approach, we found a significant increase in parent engagement with their child following an interval in which they engaged in higher than their typical media use. These results were significant after controlling for previous levels of engagement, positivity, negativity, and current phone use, as these factors often also contribute to levels of and changes in engagement, positivity, and negativity. This provides some initial evidence that parents may sometimes engage in this compensation strategy identified by Hinkler and colleagues (2015). Specifically, parents may have adapted ways to "make up" for the decreased quality in interactions during media use by making a concerted effort to increase engagement following the termination of their media use, essentially engaging in a reconnection or reunion phase following media disconnection. Yet, the effect is small and needs replication in future studies.

The findings of this study provide some additional insight into potential adaptations and patterns of use parents may develop when utilizing media with their children. What is not known is whether this pattern is mutually beneficial for the parent and the child. Does the child fully recover from the disconnection with the parent's concerted effort to reconnect after the parent's media use? Is this method more effective than the parent who attempts to multitask or divide their attention between media use and child interactions? For example, in their observations, Hiniker et al. [3] also noted three other patterns of parent use, including parents that used media for short bursts only, those that attempted to multitask by glancing back and forth between device and their child, and those that waited for times when the child was safe and occupied to use their device. Yet, parents report greater cognitive fatigue associated with having to switch between their digital interactions and their familial interactions [16]. Multitasking literature specifically focusing on the role of mobile device disruptions on the quality of in-person interactions empirically confirms the experience of information overload and the degrading effects of media multitasking on the perceived quality of interactions and feelings of closeness [43, 44].

Might clear disconnection with clear reconnection result in less negative effects on the quality of interactions (both perceived and observed) when compared to a continual multitasking throughout? It is possible that mobile devices allow parents to have greater opportunities to be with their children as they can continue to stay connected to work while on an outing with their children, outings that might not otherwise occur. Some researchers have also indicated that occasional phone use does not have a significant impact on quality of parental responsiveness [39]. Therefore, we need to better understand the tipping point at which the use has lasting impacts on the child and the parent-child relationship as well as potential patterns of use that might be less detrimental to the dyadic relationship. These tipping points may be difficult to determine, as the tipping point likely changes depending on factors such as child age, context, expectations, and in-the-moment desires and needs. It may also be parent- and/or child-specific, as a parent's intentions, behaviors, and media use will be interpreted through the lens of the child regardless of the intent of the media use to the parent. Additionally, although there is some initial evidence that explaining one's media use during an interaction can help to alleviate potential negative effects (e.g., [43]), it is not clear how well this would work with young children. It is crucial to provide clarity and understanding around the immediate and long-term impact of media multitasking and media use in the presence of children to provide informed, functional guidance for parents in an increasingly digital world.

As this study was a naturalistic observation design, we were unable to get more than basic demographic information that we could observe from afar. Additionally, as observations were performed in larger fast-casual restaurants, it was challenging to hear discourse between those being observed and much of the observation relied on nonverbal cues. Although the current study design is strong and allowed us to examine within-person changes from moment to moment in 5-minute intervals across an entire meal, some changes in behavior and reactions to parent technology use may occur at times on a second-to-second basis.

This study adds to the literature by pointing to the complexity of media use and its impact on both subtle and overt relational factors in the parent and child relationship. Further research is needed to begin parsing out what contextual factors mitigate or exacerbate the effects on early attachment formation and the maintenance of healthy parent-child relationships. These early relationships and experiences set the foundation for a child's developmental trajectory, so it is important to begin to explore effective strategies to help parents cope with parenting in an increasingly digital world.

Data Availability

The data for this study is not currently publicly available.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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