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The DISRUPT: A measure of parent distraction with phones and mobile devices and associations with depression, stress, and parenting quality.

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Abstract

The landscape of modern parenting has shifted as an increasing number of parents have and utilize smartphones and other mobile devices throughout the day. A validated measure of parent distraction with these devices is needed in the field. It is important to have a validated measure of parent distraction with mobile devices (e.g., phubbing, technoference), as this distraction can be common at times and could negatively impact the quality of parenting that children receive. In the current study, I developed a brief, parent-reported survey measure of parent distraction (DISRUPT), examined its reliability and validity (convergent, divergent) in two survey studies (Study 1, $n = 473$ parents; Study 2, $n = 294$ parents), and examined its usefulness in predicting parenting quality (predictive validity). Overall, the results provide initial support for the DISRUPT as a valid and reliable measure of parent problematic tendencies with their phone or mobile devices during time they spend with their children. The DISRUPT's items loaded together well and were internally consistent, and scores were associated with technology use (e.g., problematic phone use) and well-being variables (e.g., depression, stress) in the expected directions. Results also revealed the measure to be useful, as scores predicted parenting-related variables over and above other technology use variables. The DISRUPT also functioned as a mediator in a conceptual model of depression and parenting stress predicting parent distraction (DISRUPT) which then predicted parenting quality.

KEYWORDS
Mobile phone, parent–child relationship, parenting, parenting stress, phone distraction, phubbing, problematic phone use, smartphone addiction, smartphone use, technoference

1 | INTRODUCTION

The landscape of modern parenting has shifted as an increasing number of parents have and utilize smartphones and other mobile devices throughout the day (Pew Research Center, 2019; Rainie & Zickuhr, 2015). Researchers have begun to examine reasons for parent phone use as well as potential impacts of this use on their children (McDaniel, 2019; Radesky et al., 2016; Wolfers, 2021). Yet, a validated measure of parent distraction with these devices

is needed in the field. It is important to have a validated measure of parent distraction with mobile devices, as this distraction can be common at times and could negatively impact the quality of parenting that children receive (e.g., Hiniker et al., 2015; McDaniel & Coyne, 2016b; Radesky et al., 2014). In the current study, I developed a brief, parent-reported survey measure of parent distraction, examined its reliability and validity in two survey studies, and examined its usefulness in predicting parenting quality.

1.1 | Survey measures of parent device distraction

Although I will not review all of the literature on parent phone use (for a review see McDaniel, 2019), I will highlight here how *parent distraction* with phones or mobile devices has been measured via survey research. One line of research has focused on technoference, or intrusions and interruptions due to technology in face-to-face interactions (McDaniel & Coyne, 2016a). These measures tend to ask parents to rate how many times on a typical day various devices (e.g., phones, computers, tablets) interrupt parent–child activities or interactions (McDaniel & Radesky, 2018a, 2018b; Sundqvist et al., 2020). Others ask these questions but refer to specific contexts, such as coparenting interactions (McDaniel & Coyne, 2016b) or play, mealtimes, bedtime, and so forth (McDaniel & Coyne, 2016b; Newsham et al., 2018), and ask on a more general scale such as "never" to "very often." These measures however ask parents to recall the frequency of these instances which could be difficult for a parent to recall, may be biased toward only remembering the most salient—and perhaps most negative—times this occurred, or instances may be misremembered or not perceived by the parent at all. Indeed, we know from other research that parents often cannot accurately recall the amount of their phone use (Yuan et al., 2019). Moreover, these measures focus solely on the "interruptions" that parents notice. It is also possible to be cognitively distracted or focused on device use without displaying the physical behavior of picking up the device, which instances are likely not assessed by these technoference measures. In fact, research has found that parents who struggle with more problematic tendencies and thoughts about their device use rate more frequent technoference in parent–child interactions (McDaniel & Radesky, 2018a; Newsham et al., 2018). Technoference is only one aspect of parent distraction with mobile devices, and therefore a more general measure of parent distraction is needed.

Another line of research has focused on maternal distraction specifically during infant feeding. In this work, researchers have had mothers of infants keep feeding diaries where they record what else they were doing during the feedings (Golen & Ventura, 2015; Ventura & Teitelbaum, 2017). Although this type of measurement is useful, it is quite intensive and not always easily incorporated into studies of parent device use, not to mention it focuses only on mothers of infants.

Recently, a promising measure of parent distraction was published, the *Maternal Distraction Questionnaire* (Ventura et al., 2020). This measure asks mothers to rate how much they engaged in certain technology-related activities (e.g., watch TV, talk on phone) first on items referring to infant feeding times and second on items referring to time spent with their infant (excluding feeding times). Again though, this focuses on mothers of infants and also on the feeding context, so a more generalized measure is needed that can more readily apply to parents of children of all ages. Additionally, this measure focuses on specific actions (such as using a computer or talking on a phone) and the frequency of these actions. As stated earlier, it can be difficult for parents to remember the frequency of these actions, especially since use occurs intermittently throughout the day (Yuan

et al., 2019). Therefore, a measure that examines parents' general feelings as opposed to specific frequencies could prove useful. Finally, if one is attempting to assess the impacts of phone/mobile device use, then a measure that does not also include other technology devices is necessary.

Some have had children or adolescents rate their parent's device distraction (e.g., Stockdale et al., 2018). I do not review this literature here though as my purposes were to develop a measure that was parent-reported. Moreover, it was my desire that the measure could be used in samples of parents with children of all ages, and very young children may not be accurate reporters of parent device use or able to complete assessments due to their age.

The present measure, the *DISRUPT* (Distraction In Social Relations and Use of Parent Technology), is a 4-item measure intended to examine parents' tendencies toward problematic phone use during times they spend with their child. Problematic phone use has been measured in a variety of studies and deals with issues surrounding cognitive and behavioral struggles with device use (Augner & Hacker, 2012; Bianchi & Phillips, 2005; Hadlington, 2015; McDaniel et al., 2018; McDaniel & Radesky, 2018a; Pavia et al., 2016; Takao et al., 2009). The DISRUPT therefore has items that are related to components of behavioral addiction (Billieux et al., 2015), such as cognitive salience (e.g., thinking about the device) and loss of control (e.g., having trouble staying away from the device). The current measure is unique from general measures of problematic phone use as its items are specifically pointed toward phone use during time spent with their child, instead of focusing on phone use in general. To be clear, this measure is not intended to measure or diagnose phone addiction, nor is it intended to be a comprehensive measure of all aspects of problematic phone use. Instead, it is intended as a brief measure that can easily fit into most studies and can help to identify parents who may be struggling with phone use around their child. The DISRUPT is presented in the Measures section, and I examine its reliability, validity, and usefulness in the two studies in this article.

1.2 | A model of parent distraction with mobile devices and impacts on parenting quality

Although there are many reasons parents may utilize their phones during parenting, such as to connect with others, to seek information, and to reduce or escape stress (Radesky et al., 2016; Torres et al., 2021; Wolfers, 2021), I propose that two key variables are parent depression and stress, and depression and stress can lead to greater parent distraction with mobile devices. Moreover, greater distraction would negatively impact the quality of parenting that children receive (see Figure 1 for the conceptual model). Prior research has shown that many individuals form a strong connection to their device, as if it were an extension of the self (Belk, 2013; Campbell & Park, 2008; Carbonell et al., 2013; Srivastava, 2005). Coinciding with this work and focusing specifically on parents, Radesky et al. (2016) interviewed parents about their device use and found that many parents expressed feeling emotionally connected to their device and
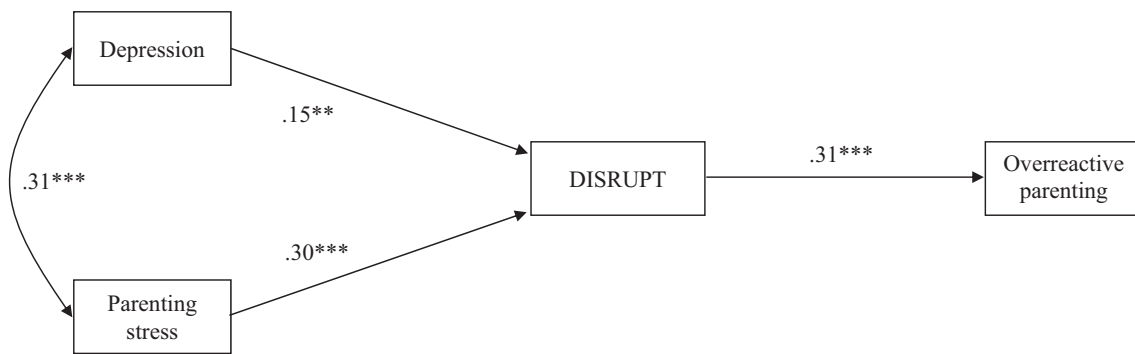
FIGURE 1 Model of depression and parenting stress predicting parent problematic use of mobile devices during parent–child time (DISRUPT) which then predicts parenting quality. The figure shows the standardized estimates. Parent gender, age, family income, and child age were included as control variables; any non-significant control variable paths were removed from the final model. The model fit the data well (χ^2 (17) = 30.26, p = .02; RMSEA = .04; CFI = .95; SRMR = .04)

using the device as a way to escape negative emotional experiences. Researchers have shown significant associations between depressive symptoms and greater problematic phone use in adults in general (Augner & Hacker, 2012; Demirci et al., 2015; Elhai et al., 2017; Takao et al., 2009) and also specifically in mothers (Newsham et al., 2018). Research on parents has also repeatedly shown associations between greater depressive symptoms and parent ratings of greater distraction with devices during parent–child time (McDaniel & Coyne, 2016b; McDaniel & Radesky, 2018a, 2018b; Newsham et al., 2018). Newsham et al. (2018) found that depressive symptoms were related to greater maternal technology use during parent–child playtime. Much of this work is cross-sectional. However, a recent study utilized passive sensing methods (i.e., an app continuously measuring phone use) and daily time diaries across 5 days and found that mothers utilized their phone for a greater amount of time in the presence of their children on days when they felt more depressed as compared to days when they felt less depressed (McDaniel, 2021). In all, this research suggests that parents who are more depressed would be more likely to engage in or withdraw into phone use during parent–child time.

Moreover, stress is common in daily parenting experiences, as parents manage their children's behavior and other difficulties. Again, parents at times withdraw into device use to escape or avoid this stress and child behavior (Radesky et al., 2016). In fact, some have indicated pretending to be on their device to not have to interact or deal with children in the moment (Oduor et al., 2016). Longitudinal research has shown parenting stress to be associated with increases in technoference (parent-rated technology interruptions in parent–child interactions) over time, and the authors argue that this increase is likely due to parents withdrawing into their devices to escape the stresses of childrearing (McDaniel & Radesky, 2018b). Radesky et al. (2018) also found that mothers with more difficult children used their phone more during observed mealtime interactions as compared with other mothers. Similar to Radesky et al. (2016), Wolfers (2021) also found that parents turn to their phones when faced with stress, and the phone use may serve a variety of purposes (e.g., to obtain information, as a distraction, to seek support). Yet, the effectiveness of this phone use on reducing or mitigating this stress still needs to be investigated by future research. McDaniel (2020) explains that there

may be "times when device use is effective and helpful to the parent. For instance, a parent does not know what to do in that parenting moment and had a trusted friend who they can call," but engaging in passive use (such as scrolling through social media) or avoiding life stress may be linked with worse well-being over time. Torres et al. (2021) recently found that parents who used their phones to escape parenting stress felt more guilty about this phone use as compared to parents who used their phones for other reasons during stressful parenting experiences. Overall, stress and phone use appear to be intricately tied in parents. Furthermore, although it is possible that specific kinds of coping utilizing phone use could assist parents with their emotional state, connectedness to the outside world, and so forth, unfortunately, we also see that phone use during parent–child interaction can influence the quality of parenting behavior and parent–child interactions (McDaniel, 2019).

If parents become cognitively and behaviorally distracted with their mobile devices, then it is possible that parenting quality could suffer. Parents express difficulty multitasking between their device use and their children (Radesky et al., 2016), and this could decrease the timeliness of parent responses to child needs as well as the overall quality of these responses. Observational research has shown fewer verbal responses, delayed responses, and at times harsher responses to children's bids for attention when a parent is using their phone (Abels et al., 2018; Davidovitch et al., 2018; Hiniker et al., 2015; Kellershohn et al., 2018; Radesky et al., 2014, 2015; Reed et al., 2017). Moreover, these effects appear to be for parents with children of all ages. For example, mothers interact less often with their infant during feeding if they are simultaneously using a device (Golen & Ventura, 2015; Nakagawa et al., 2019; Ventura et al., 2019), while adolescents express that their parents are less warm in their parenting when parents are also using devices (Stockdale et al., 2018). It clear that children need an engaged and caring adult in their life. Therefore, if phone and mobile device use become so cognitively and/or behaviorally salient that the use begins to negatively impact parenting, children and child development could suffer over time— making it important to have a valid measure of parent distraction with mobile devices as well as to seek to understand the associations between parent phone use and family, parent, and child outcomes.

1.3 | The current study

In the current work, I developed the DISRUPT, a 4-item measure intended to examine parents' tendencies toward problematic phone use during times they spend with their child. I examined this measure in two separate samples of parents with children of varying ages (Study 1 ages 0 to 18 years, and Study 2 ages 3 to 6). I sought to:

1. Establish the factor structure of the measure via exploratory factor analysis, which high factor loadings of all items on a single factor would indicate homogeneity (Heale & Twycross, 2015), or that the measure indeed measures a single construct.

2. Establish the initial reliability of the measure by computing the Cronbach's alpha across the four items. The Cronbach's alpha is a measure of the internal consistency of the items, or that "all the items in a test measure the same concept or construct" (Tavakol & Dennick, 2011). A higher alpha score is also indicative of good homogeneity.

3. Establish the convergent validity of the measure by examining associations with other variables that should be similar to this variable (Widaman et al., 2011). Therefore, associations between the DISRUPT and other technology use measures (e.g., frequency of phone use, problematic phone use) were examined.

4. Establish the divergent validity of the measure by examining associations with variables that should not be highly similar to the DISRUPT (Widaman et al., 2011). In this study, associations between the DISRUPT and parenting/well-being measures were examined (e.g., depression, parenting quality). Although it was expected that the DISRUPT would still be associated with parenting and well-being measures (see the above literature review and conceptual model), if the DISRUPT is truly measuring problematic phone use around their children, then problematic phone use and the frequency of phone use around their child should show larger correlations with the DISRUPT than depression, parenting stress, and parenting quality. In other words, parenting/well-being measures should be less similar than those specific technology-related measures with the DISRUPT.

5. Establish the predictive validity of the measure, or ability of the DISRUPT to predict theoretically linked and important variables (Widaman et al., 2011), by (a) examining the ability of the measure to predict parenting-related variables over and above general phone use and general problematic use, and by (b) examining the measure in the conceptual model presented previously (see Figure 1).

2 | METHOD

2.1 | Participants and procedures

In Study 1, an online survey was conducted, and participants were recruited via Amazon Mechanical Turk. Participants were informed that the survey was about relationships, and to be included

participants had to live in the United States, be in a romantic relationship of 6 months or longer, live with the romantic partner, and speak English. In this sample, 648 parents responded. For the current study, I limited this sample to those parents whose child or children were all 18 years old or younger, leaving a sample of 585 parents. Of these 585, 476 had technology use data. Furthermore, of these 476, 2 did not respond with their gender and only 1 did not identify as male or female, which left us with a final parent sample of 473. In comparing the final analytic sample ($n = 473$) to those parents who had missing data and were not included ($n = 109$), those in the analytic sample were younger, $t (580) = 2.67$, $p < .01$. They did not differ on income, education, number of children in the home, or child age. Thus, Study 1 specifically included parents with a wide age range of children (ages 0 to 18 years).

In the final analytic sample of 473 parents for Study 1, 319 were mothers and 154 were fathers. Parents were 35.95 years old ($SD = 7.72$) on average. Median family income was $60,000 ($SD = $42,816$), 79% were Caucasian, 93% reported a heterosexual sexual orientation, and 66% had an Associate's degree or higher. In terms of relationship status, 78.6% were married, 9.7% were engaged, and 11.6% were dating. Parents reported that the oldest child in their family was on average 8.80 years old ($SD = 5.21$; Range 0 to 18 years), and 62% had more than one child in the home. Parents were from the following U.S. regions: 43.3% South, 21.8% West, 21.1% Midwest, 12.9% Northeast, and 0.8% Alaska or Hawaii.

In Study 2, an online survey was conducted, and participants were recruited via Amazon Mechanical Turk. Participants were informed that the survey was about parenting, and to be included participants had to live in the United States, be a parent of a child age 3 to 6 years, live with their child, and speak English. The sample included 296 parents. As the number of participants who did not identify as male or female was limited ($n = 2$), I focused the analyses on 294 parents (176 mothers and 118 fathers). Thus, Study 2 specifically focused on parents' experiences with younger children specifically (ages 3 to 6 years).

In the final analytic sample of 294 parents for Study 2, parents were 33.10 years old ($SD = 6.94$) on average. Median family income was $55,000 ($SD = $43,088$), 76% were Caucasian, 87% reported a heterosexual sexual orientation, and 76% had an Associate's degree or higher. In terms of relationship status, 71.8% were married, 10.5% were engaged, 12.6% were dating, and 5.1% were unknown. The target child in the study was 4.25 years old ($SD = 1.17$; Range 3 to 6 years; 57% male), and 55% had more than one child in the home. Parents were from the following U.S. regions: 40.5% South, 25.9% West, 19.4% Midwest, 13.3% Northeast, and 1.0% Alaska or Hawaii.

2.2 | Measures

I now present the measures for both studies. Measures were included in both studies, unless I specifically mention that it was only measured in one study. Descriptive statistics and Cronbach's

TABLE 1 Descriptive statistics for study variables

	DISRUPT	Freq. of phone use	Problematic phone use	Freq. of phone use around child	Technoference in couple relationship	Depression	Parenting stress	Parenting overreactivity
Study 1—Fathers								
Mean	2.70	2.42	4.69	– –	2.77	0.66	3.74	3.83
SD	1.25	1.46	2.31	– –	1.70	0.71	1.66	1.75
Cronbach's alpha	0.90	0.78	0.90	– –	0.92	0.90	0.85	0.85
Study 1—Mothers								
Mean	2.91	2.37	5.32	– –	2.63	0.73	3.59	3.66
SD	1.27	1.30	2.40	– –	1.73	0.67	1.62	1.64
Cronbach's alpha	0.88	0.73	0.86	– –	0.91	0.88	0.85	0.79
Study 2—Fathers								
Mean	3.31	3.15	– –	2.54	– –	0.91	3.71	4.04
SD	1.10	1.66	– –	0.95	– –	0.67	1.45	1.61
Cronbach's alpha	0.83	0.80	– –	– –	– –	0.87	0.81	0.84
Study 2—Mothers								
Mean	3.34	3.07	– –	2.56	– –	0.83	3.99	4.12
SD	1.30	1.63	– –	0.91	– –	0.73	1.54	1.68
Cronbach's alpha	0.91	0.81	– –	– –	– –	0.90	0.84	0.80

Note: – – represents this was not measured in that particular study.

alphas are reported in Table 1. To establish convergent validity with the DISRUPT, I measured constructs that were similar or related to the DISRUPT; these included the general frequency of phone use, general problematic phone use, frequency of phone use during time spent with child, and technoference in the couple relationship. To establish divergent validity with the DISRUPT, I measured constructs that should not be as strongly associated with the measure as problematic use or frequency of use around their child; these included depression, parenting stress, and parenting quality. Finally, in other models (i.e., regression, SEM), the DISRUPT was associated with parenting variables (i.e., parenting stress and parenting quality) to establish predictive validity.

2.2.1 | DISRUPT

The *DISRUPT* (Distraction In Social Relations and Use of Parent Technology) measure is presented in the Appendix. Factor analysis and reliability results are presented in the Results. See the Introduction for more details on the development of this measure. Overall, the measure consists of 4 items (e.g., "During time I spend with my child, I find it difficult to stay away from checking my phone or mobile device"), and parents rate how much they agree with each item on a 6-point scale ranging from 1 (Strongly disagree) to 6 (Strongly agree). Based on the factor analysis, the four items were averaged to produce an overall DISRUPT score for each parent.

2.2.2 | General frequency of phone use

Parents responded to 4 items regarding their time spent on general mobile device use on a typical day, including "making calls on cellphone," "text on cellphone," "use social networking sites," and "play games on phone or mobile device." Scale points ranged from 0 (none) to 8 (5 or more hours). Items were averaged to produce an overall score.

2.2.3 | General problematic phone use (Study 1 only)

Parents responded to an established 5-item problematic phone use measure, the Mobile Problem Use Scale (MPUS; Phillips et al., 2012). An example item includes "I find myself using my mobile phone for longer periods of time than I intended." Items were averaged to produce an overall score.

2.2.4 | Frequency of phone use during time spent with child (Study 2 only)

Parents rated a single item, "While at home, how frequently do you get on your phone or mobile device during time you spend with your child?" on a 5-point scale ranging from 1 (Never) to 5 (Almost always).

2.2.5 | Technoference in couple relationship (Study 1 only)

Parents responded to an established 6-item technoference measure (TILES; McDaniel & Coyne, 2016a; McDaniel et al., 2018) that examines how frequently technology intrudes upon or interrupts their face-to-face interactions in their couple relationship. An example item includes "My partner sends texts or emails to others during our face-to-face conversations." Parents responded on an 8-point scale ranging from 0 (Never) to 7 (10 or more times a day). Items were averaged to produce an overall score.

2.2.6 | Depression

Parents responded to an established 7-item measure of depressive symptoms (CES-D-SF; Levine, 2013) that asks about symptoms during the past week, such as "I felt depressed" and "I felt everything I did was an effort." Parents responded on a 4-point scale ranging from 0 (Rarely or none of the time – less than 1 day) to 3 (Most or all of the time – 5 to 7 days). Items were averaged to produce an overall score.

2.2.7 | Parenting stress

Parents responded to 3-item measure of parenting stress. An example item is "Raising my children frequently causes problems" (Van den Troost et al., 2005). Items were on a 7-point scale ranging from 1 (Strongly disagree) to 7 (Strongly agree). Items were averaged to produce an overall score.

2.2.8 | Parenting quality

Parents responded to 5 items measuring overreactive parenting behaviors from the Parenting Scale (Arnold et al., 1993) where parents respond concerning how closely various behaviors describe how the participant is as a parent. Each item has a stem, such as "When my child misbehaves," and then scale anchors that are specific to each item stem—for example, "I raise my voice or yell" on one side and "I speak to my child calmly" on the other side. The center scale point is "Neutral" (5), and as scale points move closer to either anchor the parent is indicating that that particular anchor (such as "I raise my voice or yell") more closely describes their parenting. In other words, selecting the scale point "1" would represent that the anchor "I speak to my child calmly" "Very closely describes" their parenting, while selecting a scale point "9" would represent that the anchor "I raise my voice or yell" "Very closely describes" their parenting. The 5 items were averaged to produce an overall overreactive parenting score with higher scores indicating greater overreactive parenting.

3 | RESULTS

3.1 | Initial construct validity: Factor structure and reliability of the DISRUPT

An exploratory factor analysis revealed a single-factor solution accounting for 74.69% of the variance in Study 1 and 74.04% in Study 2 with all 4 items loading in the range of .80 to .89 (see Table 2). Thus, the four items were averaged to produce an overall DISRUPT score for each parent. Then, Cronbach's alpha was utilized to examine the reliability of the measure. The internal consistency of the items was good (Study 1 Cronbach's alpha = 0.88 for mothers, 0.90 for fathers; Study 2 Cronbach's alpha = 0.91 for mothers, 0.83 for fathers). The high factor loadings and internal consistency are indicative that the scale measures a single, consistent construct.

3.2 | DISRUPT measure descriptives

DISRUPT scores showed a relatively normal distribution, scores were represented on the entire range (1 to 6), and skewness and kurtosis were in the acceptable ranges. In Study 1, skewness was 0.13 and kurtosis was −0.94. In Study 2, skewness was −0.31 and kurtosis was −0.68. Overall, 38% in Study 1 and 53% in Study 2 had mean scores of 3.5 or higher, indicating that they at least somewhat agree that they struggle with these problematic tendencies during time they spend with their child. Mean scores are reported in Table 1. T-tests revealed no significant mean differences between mothers and fathers on their DISRUPT scores. As children require different levels of attention and have different needs at various ages, I examined associations with child age. Greater child age was associated with lower DISRUPT scores in Study 1 ($r = -0.23$, $p < .001$) and in Study 2 ($r = -0.13$, $p < .05$).

TABLE 2 Factor loadings for the DISRUPT items

Item	Study 1	Study 2
During time I spend with my child…		
1. I find myself thinking about what I could be doing on or messages/notifications I might receive on my phone or mobile device.	0.80	0.85
2. I find it difficult to stay away from checking my phone or mobile device.	0.89	0.87
3. I feel like I use my phone or other mobile device too much.	0.89	0.87
4. There are times that I could play with or interact with my child, but I am on my phone or mobile device instead.	0.88	0.86

3.3 | Convergent and divergent validity: Associations with technology use, parenting, and well-being measures

Associations between the DISRUPT and these other measures are presented in Table 3. First, as child age in Study 1 ranged from 0 to 18 years, I examined whether correlations in Study 1 were significantly different when the sample was split into those whose child or children were all age 5 or younger and those whose child or children were all age 6 or older (i.e., infant/preschool versus school-aged). No significant differences were observed, so correlations are not broken down by child age in Table 3. As would be expected if the DISRUPT truly measured what it purports to measure, the DISRUPT was significantly and moderately associated with general phone use, problematic phone use, phone use around the child, and technoference in relationships. This is indicative of convergent validity.

Finally, also as expected, the DISRUPT was moderately associated with depression, parenting stress, and worse parenting quality. However, problematic phone use and frequency of phone use around their child generally showed larger correlations with the DISRUPT than depression, parenting stress, and parenting quality (see Table 3). This indicates divergent validity (i.e., the DISRUPT measures the construct, rather than simply measuring parent well-being).

3.4 | Predictive validity: Predicting parenting-related variables, over phone use and problematic use

I ran two regression models in the Study 1 data and two regression models in the Study 2 data, one predicting parenting stress and the other predicting parenting overreactivity. Parent age, income, gender, and child age were controlled. Interactions with child age and parent gender were also tested. The purpose of these models was to examine the utility (predictive validity) of the DISRUPT in predicting parenting-related variables over and above other technology use variables

(i.e., general phone use, problematic phone use, and phone use around child). Therefore, the technology use variables were also entered into the models. Standardized betas are presented in Tables 4 and 5. Overall, higher DISRUPT scores predicted greater parenting stress and overreactivity, showing predictive validity even after controlling for other technology use variables.

3.5 | Model of parent distraction with mobile devices and parenting quality

Utilizing the Study 1 data (as this had the largest sample with the greatest range of child ages), I ran a path model in Mplus 8.4 representing the conceptual model of parent distraction with mobile devices and possible impacts on parenting quality (see Figure 1). I also controlled for parent gender, age, income, and child age. The model fit the data well, $\chi^2 (17) = 30.26$, $p = .02$; RMSEA $= .04$; CFI $= .95$; SRMR $= .04$. Standardized beta estimates are presented in Figure 1. Overall, the conceptual model was supported, with greater depression and parenting stress predicting higher DISRUPT scores, and higher DISRUPT scores predicting more overreactive parenting. I also examined whether there were indirect effects on overreactive parenting from depression and parenting stress through the DISRUPT. I utilized 2000 bootstrapped samples in Mplus which produced the bias corrected confidence intervals for these effects (Shrout & Bolger, 2002). Both indirect effects were significant (ps < .01).

4 | DISCUSSION

Overall, the results provide initial support for the DISRUPT as a valid and reliable measure of parent problematic tendencies with their phone or mobile devices during time they spend with their children. The DISRUPT's items loaded together well and were internally consistent (demonstrating some initial construct validity and reliability), and

TABLE 3 Correlations between DISRUPT score and other measures

	Freq. of phone use	Problematic phone use	Freq. of phone use around child	Technoference in couple relationship	Depression	Parenting stress	Parenting overreactivity
Fathers							
STUDY 1—Child age 0 to 18 ($n = 154$)	.55***,a	.58***	– –	.52***,b	.35***	.38***	.21**,d
STUDY 2—Child age 3 to 6 ($n = 118$)	.34***	– –	.52***	– –	.38***	.59***,e	.26**
Mothers							
STUDY 1—Child age 0 to 18 ($n = 319$)	.27***,a	.58***	– –	.32***,b	.24***	.37***	.37***,d
STUDY 2—Child age 3 to 6 ($n = 176$)	.22**	– –	.56***	– –	.26***	.32***,e	.25***

Note: Matching superscripts denote those correlations that are significantly different between mothers and fathers within a study ($p < .05$). Superscript d is $p = .076$.
***$p < .001$; **$p < .01$.

TABLE 4 Study 1 regression models predicting parenting-related variables with DISRUPT versus other technology measures

	Model 1	Model 2
	Parenting stress	Parent overreactivity
	β	β
Controls		
Parent age	.02	.02
Income	.00	.04
Parent gender	.09*	.04
Child age	.01	.00
Tech variables		
Freq. of phone use	.03	.05
Problematic phone use	.09*	−.04
DISRUPT	.30***	.33***
DISRUPT × Gender	– –	– –
DISRUPT × Child age	– –	– –
DISRUPT × Gender × Child age	– –	– –
F-value	12.75***	7.69***
R^2	0.16	0.09

Note: A dash (– –) marks interactions that were tested but removed as they were not significant. Gender was coded as 1 = father, 0 = mother. Income is in $1000 units. Standardized betas are reported.
***$p < .001$; **$p < .01$; *$p < .05$.

TABLE 5 Study 2 regression models predicting parenting-related variables with DISRUPT versus other technology measures

	Model 1	Model 2
	Parenting stress	Parent overreactivity
	β	β
Controls		
Parent age	.09	−.04
Income	−.10	−.06
Parent gender	−.10	−.01
Child age	.01	−.06
Tech variables		
Freq. of phone use	.01	.00
Freq. of phone use around child	.07	.09
DISRUPT	.31***	.21**
DISRUPT × Gender	.16*	– –
F-value	9.71***	3.43**
R^2	0.22	0.08

Note: A dash (– –) marks interactions that were tested but removed as they were not significant. Gender was coded as 1 = father, 0 = mother. Income is in $1000 units. Standardized betas are reported.
***$p < .001$; **$p < .01$; *$p < .05$.

scores were associated with technology use and well-being variables in the expected directions (convergent and divergent validity). Results also revealed the measure to be useful, as scores predicted parenting-related variables over and above other technology use variables (predictive validity), and the DISRUPT functioned as a mediator in the conceptual model predicting parenting quality.

As the DISRUPT is meant to capture issues related to the cognitive salience surrounding the device, it would be expected that having one's mind frequently wandering to the device would create greater distraction from high quality parenting than simply using the device on occasion around one's child. This aligns well with what some other researchers have defined as "absorption" (Radesky et al., 2014), where greater impacts on parenting behavior, missed child cues, and child outcomes are seen for those parents that are more cognitively absorbed in the device use (Linder et al., 2021; Radesky et al., 2014). Indeed, this is what the results revealed, as DISRUPT scores were more strongly associated with parenting quality than the general frequency of phone use or phone use around the child.

Additionally, the DISRUPT proved to be useful over and above a general measure of problematic phone use at predicting parenting-related variables. This was expected if the measure was functioning properly, as DISRUPT scores should represent the degree to which problematic cognitive and behavioral struggles with device use have permeated parent–child time. In other words, the DISRUPT although related to general problematic use should be more proximal and more closely tied to parenting-related outcomes as compared with general problematic use. For example, it is possible that some individuals struggle with device use outside of the parenting context but do not struggle with device use during parenting or time spent with their child (or vice versa). The DISRUPT therefore better captures those parents who struggle with their device use and thoughts of their device specifically during parenting.

Moreover, the conceptual model of depression and parenting stress feeding into problematic phone use around their child which would then impact parenting quality was supported. The DISRUPT acted as a mediator between depression and parenting stress and the outcome of parenting quality, as results revealed significant indirect effects via the DISRUPT. Overall, all the paths in this model are supported by prior research. Depression has been linked with greater device use and greater problematic device use (Augner & Hacker, 2012; Demirci et al., 2015; Elhai et al., 2017; Newsham et al., 2018; Takao et al., 2009) and greater parent device use during parent–child time (McDaniel, 2021; McDaniel & Coyne, 2016b; McDaniel & Radesky, 2018a, 2018b; Newsham et al., 2018). Parenting stress has been linked with parent device use and greater technoference, or technological interruptions, during parent–child time (McDaniel & Radesky, 2018b; Oduor et al., 2016; Radesky et al., 2016, 2018), and some initial research has shown links with greater device use during parenting and more negative parenting behavior or altogether missed child cues and needs (McDaniel, 2019). This conceptual model should be further tested in more diverse samples of parents as well as longitudinally to better understand the micro (moment-to-moment) and macro (months, years) processes and

changes that take place in parent well-being, phone use, and parenting over time. Yet, understanding that parents who struggle with depression or who are particularly stressed in parenting or by their children are also more at risk of potentially developing problematic phone use habits around their children suggests that interventions designed around improving technology habits in the parenting context should understand that many parents utilize their devices to cope with the stresses of parenting. Additionally, the fact that parenting quality was worse among those with greater DISRUPT scores suggests that parenting interventions cannot ignore the potential impacts of parent device use and should teach effective coping strategies both on and off screens and how to manage their use around their children to both accomplish their parental needs for connection, information, and coping while simultaneously remembering the emotional needs of their children.

The current results lend further weight to previous research and suggest that children whose parents struggle with the cognitive salience of their device during parent–child time may also be those children who experience poorer parenting quality. This is concerning as device distractions have become commonplace during parenting and family relationships (McDaniel, 2019), and strong device habits and tendencies could develop over time which could potentially become problematic unless parents are mindful of their use; it is possible that even those who are mindful of their use could also fall into problematic use, where the device becomes a salient part of their thoughts. Indeed, many individuals express feeling they could not live without their device or feeling anxious without their device (Bragazzi & Del Puente, 2014; Smith, 2015; Yildirim & Correia, 2015). Parents have expressed feeling very connected to their device and utilizing their device to manage their emotions and stressors during parenting situations (Radesky et al., 2016). This use may at times be helpful (McDaniel, 2020; Radesky et al., 2016; Wolfers, 2021), but if there becomes an overreliance on the device it could lead to distracted or disrupted parenting (McDaniel, 2020).

This work is not without limitations. Although the proper associations appeared, the current work is correlational in nature and may also contain single-reporter bias. Due to the cross-sectional and correlational nature of the current work, it is also possible that those parents who engage in more overreactive behaviors may also be those who are more likely to struggle with phone use around their child, as opposed to distraction with phone use causing worse parenting quality. More than likely this process is bidirectional (McDaniel & Radesky, 2018b). Struggling parents (e.g., those with greater depression, stress, less sensitivity to child needs) may be more likely to engage in phone use around their child; yet, due to the possible disruptions and distractions frequent phone use can produce during parent–child time I would also expect phone use to influence parenting quality, at least in small ways, even among high-functioning parents. The DISRUPT was intended to be a brief measure that could easily fit into most studies, but this brevity also means that the DISRUPT does not measure all aspects of parent device use and struggles. As the data was self-report, it also is not known how the measure connects to actual phone use or behaviors in real-time. Future work

with passively measured phone use (via an app on the parent's phone) or video-recorded naturalistic observations of home life could help to better understand how the measure performs compared to actual use and behavior. However, the DISRUPT does not purport to measure the frequency of use. Instead, it assesses attitudes and cognitions. In the current study, the measure was associated with self-reports of greater phone use. Finally, it is likely that mothers and fathers differ in terms of their overall involvement with children (as mothers are often the primary caregivers in the United States). Yet, the DISRUPT measure focuses specifically on those times when a parent is around their child. In other words, it should be tested in the future whether the prevalence of parent phone use might have different implications for children's well-being depending on the overall level of parent involvement.

In conclusion, the results provide initial support for the DISRUPT as a valid and reliable measure of parent problematic tendencies with their phone or mobile devices during time they spend with their children. Results also revealed the measure to be useful, as scores predicted parenting-related variables over and above other technology use variables (i.e., predictive validity) and the DISRUPT functioned as a mediator in the conceptual model predicting parenting quality. The DISRUPT shows promise for being used in future research on parents, mobile device use, and distraction from parenting and parent–child interactions.

CONFLICT OF INTEREST

The author declares no potential conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this work cannot be shared with the public due to our protection of human subjects agreements with participants.

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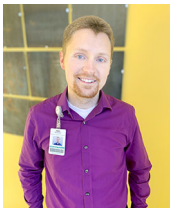
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APPENDIX: Distraction In Social Relations and Use of Parent Technology (DISRUPT)

Please rate your level of agreement with the following statements

Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6

During time I spend with my child…

1. … I find myself thinking about what I could be doing on or messages/notifications I might receive on my phone or mobile device.
2. … I find it difficult to stay away from checking my phone or mobile device.
3. … I feel like I use my phone or other mobile device too much.
4. … there are times that I could play with or interact with my child, but I am on my phone or mobile device instead.