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Brandon T. McDaniel PhD

Michelle Drouin

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Daily Technology Interruptions and Emotional and Relational Well-Being

Brandon T. McDaniel,
Illinois State University

Michelle Drouin
Purdue University Fort Wayne

Abstract

The current abundance of technology in daily life creates opportunities for interruptions in couple interactions, termed *technoference* or *phubbing*. The current study examined reports from both partners in 173 romantic relationships who completed daily surveys on technoference and relational well-being measures across 14 days. By using daily diary data, we were able to examine within-person associations and more closely approximate everyday life. Utilizing multilevel modeling, we found that on days when participants rated more technoference than usual, they felt worse about their relationship, perceived more conflict over technology use, rated their face-to-face interactions as less positive, and experienced more negative mood. These relationships existed even after controlling for general feelings of relationship dissatisfaction, depression, and attachment anxiety, and there were no significant differences between women and men in these associations. This suggests that regardless of an individual's or a couple's current level of well-being, if individuals perceive technology use as interfering in their interactions with their partner, these perceptions may affect their daily assessments of their relationship and mood.

Keywords

Technoference; phubbing; relationship satisfaction; problematic phone use; depression; couple conflict

1. Introduction

The majority of U.S. adults (95%) own and use cell phones, as well as other devices like computers and tablets (Pew Research Center, 2018). This abundance of technology creates opportunities for technological interruptions in couple interactions, termed *technoference*

*Corresponding Author: Dr. Brandon T. McDaniel, Campus Box 5060, Normal, IL 61790. btmcdaniel.phd@gmail.com. Phone: 309-438-5802. Fax: 309-438-5659.

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(McDaniel & Coyne, 2016a) or *phubbing*, a portmanteau of "phone" and "snubbing" (Roberts & David, 2016). Recently, a number of researchers have examined technoference among couples and found that technoference is common within romantic relationships, and higher rates of technoference are related to conflict, jealousy, and lower levels of relationship satisfaction, intimacy, and relational closeness/cohesion (Amichai-Hamburger & Etgar, 2016; Halpern & Katz, 2017; Krasnova et al., 2016; McDaniel & Coyne, 2016a; McDaniel, Galovan, Cravens, & Drouin, 2018; Roberts & David, 2016; Wang et al., 2017). Hence, technology use within the context of couple interactions has the potential to disrupt positive interactions and spur negative feelings and conflict, and conflict and anger have the potential to contribute to relationship dissolution (Gottman & Levenson, 2002). However, most of these previous studies have been cross-sectional and focused on individual-level (rather than couple-level) data. The current study expands this work by examining reports from both partners in romantic relationships who completed daily surveys on technoference and emotional and relational well-being measures across 14 days. By using daily diary data, we were able to examine within-person associations and more closely approximate life as it is lived (Bolger, Davis, & Rafaeli, 2003).

1.1. Previous Research on Technology Interference in Couple Relationships

The empirical research on technology interference in couple relationships spans only a few years. In the earliest studies on this phenomenon, researchers found that technoference or partner phubbing among U.S. participants in committed relationships was related to greater levels of conflict over technology (McDaniel & Coyne, 2016a; Roberts & David, 2016). In turn, this conflict predicted lower relationship satisfaction, which was negatively related to depression and positively related to life satisfaction. Similarly, Wang et al. (2017) found that married Chinese adults who reported greater amounts of partner phubbing had lower levels of relationship satisfaction and higher levels of depression. Meanwhile, Amichai-Hamburger and Etgar (2016) found that college students who reported that their partners engaged in higher rates of smartphone multitasking, especially private multitasking, had lower levels of intimacy with their partners. Additionally, Krasnova et al. (2016) found that partner's smartphone use predicted jealousy, and this predicted lower relational cohesion. Notably, none of these groups of researchers reported on dyadic couple data, and they all measured technology interference, as well as the other outcome variables, at a single time point. With regard to their samples, Roberts and David (2016) recruited adults in relationships from Amazon's Mechanical Turk sample, Wang et al. (2017) recruited married Chinese adults through online forums and chat groups, Amichai-Hamburger and Etgar (2016) and Krasnova et al. (2016) recruited college students in romantic relationships through Facebook groups in Israel and Germany, respectively, and McDaniel and Coyne (2016a) recruited married/cohabiting individuals from the local community, but their sample included only women.

Halpern and Katz (2017) addressed one of the limitations of previous work by conducting a longitudinal study on texting and relationship quality. In their study of Chilean adults who had been in a romantic relationship for more than six months, they found, similar to previous research on the topic (e.g., McDaniel & Coyne, 2016a; Roberts & David, 2016), that perceived partner phubbing was related to greater conflict over the phone and lower intimacy. In turn, this conflict and lack of intimacy predicted lower perceived relationship

quality. When they examined the cross-lagged relationships between variables, they found that individuals' texting frequency predicted lower perceived relationship quality one year later, but relationship quality did not predict later texting frequency. More recently, McDaniel et al. (2018) addressed another limitation of previous research by examining technology interference within couples, including dyadic data (reports from both partners). In their two-part study of 183 married/cohabiting couples in the U.S. with at least one child (study 1) and 239 U.S. and Canadian couples with at least one child (study 2), these authors found that technoference predicted conflict, which in turn predicted relationship satisfaction and coparenting quality. Combined these studies suggest technology use and/or interference among couples predicts conflict and relationship satisfaction; however, there have not yet been any studies that have examined dyadic couple-level data with measures of technoference and relationship satisfaction spanning multiple micro-level time points (such as across days). This is an oversight as individuals' and couples' daily lived experiences likely hold meaning for broader changes in relationships and well-being.

1.2. Theoretical Background

According to researchers who have examined technoference in couple relationships, the presence of technology has the potential to negatively affect relationships via a number of routes. Social exchange models provide one theoretical lens for interpreting these potential negative effects. Social exchange models suggest that couples examine the costs and benefits of relationships and are continually working to have their needs met within a relationship while also minimizing costs (Thibault & Kelley, 1959). Applied to the concept of technoference, if a partner has an expectation of undivided attention, which romantic partners sometimes do (Miller-Ott & Kelly, 2015), they may react negatively when a partner uses technology in their presence. In support of this proposition, researchers (Krasnova et al., 2016) found that the majority of their 286 German college students (62%) experienced negative feelings (e.g., sadness, boredom, anger) in response to their partner's smartphone use, and Chotpitayasunondh and Douglas (2018) found that phubbing produced negative affect (e.g., distressed and upset feelings) in experimental dyadic interactions with 153 British undergraduates. In terms of social exchange, these negative emotions may register as relational costs, increasing conflict or jealousy in romantic relationships (Halpern & Katz, 2017; McDaniel & Coyne, 2016a; 2016b; McDaniel et al., 2018; Roberts & David, 2016). Alternatively (or additionally), a partner's technoference behaviors might translate as a loss of relationship rewards (e.g., time or attention), shifting the balance of the social exchange so that the 'phubbed' partner feels excluded and experiences less relationship satisfaction, closeness, or intimacy (Hales et al., 2018; Halpern & Katz, 2017; Krasnova et al., 2016; McDaniel & Coyne, 2016a; McDaniel & Drouin, 2018; Van Lange & Rusbult, 2012).

Additionally, some relationship researchers (e.g., Halpern & Katz, 2017; Juhasz & Bradford, 2016) have proposed that the sociological theory of symbolic interactionism (Denzin, 1992) may help explain the effects of technology use on relationships. Symbolic interactionism suggests that people communicate using symbols, and through their interpretation of symbols, they infer the meaning of their relationships and roles with others (Denzen, 1992). Although there are different schools of thought related to the present-day interpretation of symbolic interactionism (i.e., the Chicago School, Iowa School, and Indiana school—see

Carter & Fuller, 2016 for more detail), the basic principles of symbolic interactionism include the idea that symbols and interactions are meaningful, the meanings of these symbols are derived from interactions with others, and this is a continuous process that individuals engage in during social interactions (Carter & Fuller, 2016). With regard to the use of technology in relationships, when individuals use technology to keep in touch with their partners at a distance (e.g., through calls or text messages), it may be perceived as a symbol of social connectedness (Juhasz & Bradford, 2016); however, if a romantic partner is using their phone or checking updates or alerts instead of attending to a conversation, it may be interpreted as a symbol of disconnection or disinterest. As a partner experiences these interactions over time, the symbol (in this case, technoference or partner phubbing) might affect an individual's sense of self and their perceptions of their role in the interpersonal relationship (Denzin, 1992).

This shift in perception may be especially pronounced when the technoference or phubbing behavior violates one's expectations in the relationship. According to the expectancy violation communication theory (Burgoon, 1978), individuals have expectations of others' behaviors during interpersonal interactions, and if an individual perceives that someone is violating those expectations, this can prompt negative reactions. Indeed, technoference research has shown that perceived partner phubbing or technoference can lead to negative affect (Chotpitayasunondh & Douglas, 2018; Halpern & Katz, 2017; McDaniel & Coyne, 2016a) and feelings of exclusion (Hales et al., 2018; McDaniel & Drouin, 2018). However, Chotpitayasunondh and Douglas (2018) also found that perceived social norms of phubbing did not moderate the relationship between phubbing intensity and negative affect. As their study was conducted with interaction partners who were not friends or relationship partners, it is unknown whether social norm expectations intensify or attenuate reactions to technoference within the context of romantic relationships, and the theoretical lens of expectancy violation theory still provides some basis for interpreting the negative affect and/or conflict that results from technoference.

Applying these theoretical frameworks to the current inquiry, when one uses technology instead of attending to a partner, it may send a signal that technology use is more important than the current face-to-face interaction (symbolic interactionism theory) and/or violate one's expectations of how this couple time should be spent (expectancy violation theory). This may result in individuals feeling like the social exchange in their relationship is unbalanced (i.e., greater costs and/or fewer benefits), which may spur negative mood, couple conflict, perceptions of lower quality day-to-day interactions, and more negative assessments of the quality of the relationship. This aligns with the cross-sectional data to date which has found: (1) technoference among couples exists, (2) it begets relational costs, like negative emotions, conflict over technology use, and jealousy, and (3) this increase in relational costs and decrease in rewards (social exchange theory), in turn, is related to lower levels of relationship satisfaction, closeness, and intimacy (Amichai-Hamburger & Etgar, 2016; Krasnova et al., 2016; McDaniel & Coyne, 2016a; 2016b; Roberts & David, 2016; Wang et al., 2017). Although this model has been explored only cross-sectionally, with contemporaneous, general measures of technoference and relationship satisfaction, closeness, and intimacy, we believed that these same relationships would exist in the more

proximal experiences of couples' daily lives together. Building upon the previous empirical literature on the topic, we expected that on a daily basis:

H1: Greater amounts of perceived daily technoference would predict lower ratings of daily relationship quality, more frequent daily couple conflict, lower perceived quality of daily face-to-face interactions, and greater daily negative mood.

1.3. Technoference, Relationship Satisfaction, and Individual Characteristics

In addition to these associations, we also expected that there would be individual characteristics, like depression and attachment anxiety, that may be related to technoference, relationship satisfaction, or both. With regard to the role of depression, seminal works on this topic (McDaniel & Coyne, 2016a; 2016b; Roberts & David, 2016; Wang et al., 2017) showed that technoference or partner phubbing predicted relationship satisfaction, which was, in turn, predictive of depression. Other researchers (e.g., Harwood, Dooley, Scott, & Joiner, 2014) have also shown that a high amount of smartphone involvement is related to depression, suggesting that mobile phone involvement on behalf of the user (not just perceived partner phubbing) is associated with mental health. Recent findings from McDaniel et al. (2018) support this assertion. In their sample of couples, depression was significantly related to technoference among men, and depression was also significantly related to relationship satisfaction among both men and women. Meanwhile, Newsham, Drouin, and McDaniel (2018) found that depression among mothers was predictive of both technoference in parenting and problematic phone use. Finally, Meyer, Kemper-Damm, Parola, & Salas (2019) showed that, among men, higher levels of depression predicted lower relationship satisfaction. As each of these studies were cross-sectional, the directionality of these influences is unknown, but it is likely that depression is related to both technoference and perceived relationship quality, as there is a bidirectional relationship between depression and marital discord (Whisman & Uebelacker, 2009), which may affect both perceived (or actual) relationship quality and technoference in the relationship.

Regarding attachment anxiety, the theoretical literature has suggested that those with high levels of attachment anxiety have a need for reassurance in a relationship, and they also may be more likely to interpret their partner's behaviors in a negative way (Shaver & Mikulincer, 2006). In line with this, Roberts and David (2016) found that attachment anxiety moderated the relationship between perceived partner phubbing and relationship conflict. Additionally, McDaniel et al. (2018) showed that attachment anxiety, but not attachment avoidance, was a significant predictor of perceived technoference, which predicted couple conflict and, in turn, relationship satisfaction. Therefore, based on the previous empirical and theoretical work on this topic, we expected:

H2: Depression and attachment anxiety would be related to technoference and relationship satisfaction.

In addition to exploring the zero-order relationships between these variables, we also wanted to examine whether daily technoference was predictive of daily relationship satisfaction and our other daily variables after controlling for depression and attachment anxiety, since (as

stated above) depression and attachment anxiety may influence perceptions of technoference and relationship satisfaction.

Finally, to better understand the trends of daily technoference, we also examined:

(*RQ1*) What is the overall prevalence of technoference in the daily life of U.S. couples?

2. Method

2.1. Participants

Participants were part of the *Project Name Maskedfor Review*, a longitudinal study of family life from 2014 to 2016, recruited through a database of families (in a Northeastern U.S. state) and through announcements in the local community and on websites. Heterosexual couples (N = 183 couples) had to be living together in the U.S. and have a child age 5 or younger (child, M = 2.88 years, SD = 1.34; 53% female). Both partners completed online surveys at various time points. In the current study, we utilized data on 173 couples who completed the baseline survey and the daily diary portion of the study, in which we had data from 173 women and 171 men within these couples; there were 22 participants who dropped out prior to the daily surveys or who did not complete any daily surveys. These families resided in the following U.S. regions: 53% Northeast, 17% West, 15% South, and 15% Midwest. The majority (92%) of couples were in a relationship of 5 years or longer (M = 9.83 years, SD = 4.01). Most were Caucasian (93% for women, 90% for men) and married (95%). On average, women were 31.46 years old (SD = 4.47; range 20 to 42), men were 33.31 (SD = 5.04; range 22 to 52), and median yearly household income was approximately $69,000 ($M$ = $73,336, SD = $38,263), but ranged extensively from no income to $250,000; 72% had a Bachelor's degree or higher.

2.2. Procedure

Participants completed informed consent and an online baseline survey that included baseline demographics (e.g., age, income, etc.) and a number of individual and relational wellbeing measures. Then, over 14 consecutive days, participants completed a daily survey online. Participants (n = 344) completed an average of 11.74 days (SD = 2.95 days) of surveys, with 87% completing 10 or more days, for a total of 4039 days of data. The daily surveys contained the following measures. Where appropriate the reliability of measures at assessing within-person change was calculated (R_c; Shrout & Lane, 2012), and all daily measures showed moderate to good reliability. Participants also rated how many hours they were with their partner each day.

2.3. Measures

2.3.1. Daily Technoference.—We adapted the *Technology Device Interference Scale* (TDIS; McDaniel & Coyne, 2016a) to the daily context to measure daily technoference. Similar to the TDIS, participants rated how often each of 4 devices (cellphone/smartphone, television, computer, and tablet) interrupted a conversation or activity they were engaged in with their partner. We adapted the scaling from a general frequency scale (i.e., *Never* to *All the time*) to a 7-point frequency scale more appropriate for daily reports (0 = *none*, 6 = *more*

than 20 times). This was also done to avoid vague scale point meanings (i.e., "sometimes" could mean very different frequencies to different participants) and in order to obtain a better estimate of individuals' perceptions of the actual frequency of technoference. Prior work (e.g., McDaniel et al., 2018) has shown that, according to individuals' perceptions, various episodes of technoference (such as a partner getting on their phone during a conversation) occur once a day or more often in about 17 to 22% of participants. However, these are cross-sectional reports and it was not known how often individuals might perceive technoference on a daily basis. Therefore, the end-point of "more than 20 times" was chosen in order to not accidentally restrict the range of responses individuals could provide. We found that interruptions due to television, computers, and tablets were perceived fairly rarely (only occurring on about 8%, 6%, and 4% of days respectively); thus, in the current study we focused on technoference due to cellphones which occurred more frequently (i.e., on about 21.5% of days).

2.3.2. Daily Relationship Quality.—Participants completed 6 items measuring feelings about the couple relationship (e.g., love, conflict, satisfaction). These items have been used successfully to measure relationship quality in a variety of daily survey studies (e.g., Curran, McDaniel, Pollitt, & Totenhagen, 2015; McDaniel, Teti, & Feinberg, 2018; Totenhagen, Serido, Curran, & Butler, 2012), and in the current study scores on this measure correlated highly (as one would expect) with an established measure of relationship satisfaction (r = .69, p < .001). Participants responded on a 7-point Likert scale (1 = *not very much or just a little*, 7 = *very much or a lot*). Items were averaged to produce an overall score each day (R_C = .87).

2.3.3. Daily Conflict over Technology Use.—Participants indicated whether they experienced an argument or disagreement that day over 10 uses of technology (e.g., "time spent on internet" and "time spent texting"). Participants' responses were coded as 1 or 0 based on whether they did or did not, respectively, experience an argument over that technology use. Items came from or were adapted from the Conflict over Technology Use scale, which has been used in various forms to measure couple conflict over technology use in cross-sectional studies (McDaniel & Coyne, 2016a; McDaniel et al., 2018). Items were summed to produce an overall score each day (R_C = .90).

2.3.4. Daily Positive Face-to-Face Interactions.—Participants indicated on a single item the proportion of their face-to-face (in person) communications with their partner that were positive that day using a 5-point scale (1 = *all negative*, 5 = *all positive*). This measure is significantly related, in the expected directions, with all of the daily measures (e.g., relationship quality, conflict, etc.), lending some initial evidence of the validity of this measure.

2.3.5. Daily Negative Mood.—We adapted the POMS-15 (Cranford et al., 2006) to a daily context and asked participants to rate how often they felt three emotion items (i.e., "anxious," "angry or annoyed," and "discouraged or sad") that day. Participants used a 5-point scale (0 = *none of the time*, 4 = *all of the time*). Items were averaged to produce daily scores (R_C = .63). Scores on this daily measure correlated strongly (r = .65, p < .001) on

average with an established measure of depressed mood (CES-D), lending some validity to the daily measure.

2.3.6. Baseline control variables.—Besides demographics (e.g., income, ethnicity, education, relationship length, etc.), participants also responded on the baseline online survey to established and well-validated measures of depressive symptoms (20 items, CES-D; Radloff, 1977), relationship satisfaction (6 items, QMI; Norton, 1983), and attachment anxiety towards the relationship partner (5 items, ECR-S; Wei, Russell, Mallinckrodt, & Vogel, 2007). All baseline measures had good reliability (Cronbach's alphas of .89, .95, and .74 respectively).

3. Results

We first (R1) examined the frequency of technoference due to cellphones. Overall, we found that 56.1% of participants said that technoference from phones happened at least two to three days (or more often) out of the two-week period. Specifically, 27.6% of participants said that technoference from phones never happened during the 14 days, 16.3% said it occurred on one day, 20% on two to three days, 20.4% on four to six days, and 15.7% on seven or more days (or half or more of the 14 days). Additionally, overall means and between-person (average) correlations between our main study variables across all days of data are reported in Table 1. On days when technoference occurred, most participants (53.9%) indicated that technoference occurred only once; however, 36.4% indicated it occurred two to three times, 7% indicated it occurred four to five times, 2% stated it occurred six to 10 times, and 0.7% indicated it occurred more than 11 times per day. For between-person correlations, those who reported more frequent daily technoference from phones on average also tended to report poorer daily relationship quality ($r = -.18$, $p < .001$), greater daily conflict over technology use ($r = .27$, $p < .001$), less positive daily face-to-face interactions ($r = -.20$, $p < .001$), and greater daily negative mood ($r = .29$, $p < .001$) on average. Additionally, in support of our hypothesis (H2), technoference was significantly related to depression ($r = .23$, $p < .001$) and attachment anxiety ($r = .22$, $p < .001$), and relationship satisfaction was also related to depression ($r = -.34$, $p < .001$) and attachment anxiety ($r = -.25$, $p < .001$).

We then utilized multilevel modeling (MLM) in SAS Proc Mixed to examine our models of daily technoference predicting our daily outcome variables. We used MLM to account for partners being nested within couples, to account for each participant completing multiple assessments across days, and to allow for an autoregressive structure to the residuals (i.e., that participant reports from one day to the next would be correlated); this type of modeling was important to not produce biased standard errors and significance tests. We ran four separate models, one for each daily outcome, including relationship quality, conflict over technology use, positive face-to-face interactions, and negative mood (see Table 2). Analyses included any participant who had at least one day of data. Missing data on any of these outcome variables were handled using restricted maximum likelihood estimation, while days that contained missing data on any predictor variables were dropped from the analyses. We also limited the models to examining only those days on which partners had some time together ($n = 3892$ days, 96% of days). We controlled for a variety of demographics and

individual characteristics (e.g., age, race, income, attachment anxiety) as well as baseline individual and relational well-being (e.g., depression, relationship satisfaction) where appropriate. Daily variables were split into between-person and within-person portions (as is standard in daily data).[25] This procedure produces two uncorrelated variables that are both entered into a model. With this split, the effect of the between-person daily variable indicates differences between people (e.g., those who report more technoference as compared to those who report less technoference on average), and the effect of the within-person daily variable indicates within-person processes (e.g., on days when participants report more technoference than their typical amount, do we see corresponding fluctuations in the daily outcomes?). We also tested for gender differences on the effects of technoference predictors.

We report the unstandardized estimates for our four models in Table 2. At the between-person level, we found a significant effect of average daily technoference on average daily conflict over technology use, positive face-to-face interactions, and negative mood (although in the proper direction, the between-person effect was not significant for average daily relationship quality). These results indicate that, even after controlling for many different demographic and individual characteristics, those who reported more technoference on average also reported more conflict over technology use ($b = 0.26$, $p < .001$), less positive face-to-face interactions ($b = -0.13$, $p < .01$), and greater negative mood ($b = 0.14$, $p = .01$) on average. No significant differences were found between women and men in these associations.

In terms of the within-person effects and in support of our hypothesis (H1), we found a significant effect of daily technoference on all four daily outcome variables. In other words, on days when participants rated more technoference than usual, they felt worse about their relationship ($b = -0.04$, $p = .02$), perceived more conflict over technology use ($b = 0.10$, $p < .001$), rated their face-to-face interactions as less positive ($b = -0.05$, $p < .001$), and experienced more negative mood ($b = 0.03$, $p = .02$). No significant differences were found between women and men in these associations.

4. Discussion

Heretofore, the literature has treated technoference and well-being variables in a trait-like manner (between-person effects), measuring them at a single time point (Amichai-Hamburger & Etgar, 2016; Krasnova et al., 2016; McDaniel & Coyne, 2016a; 2016b; McDaniel et al., 2018; Roberts & David, 2016; Wang et al., 2017) or more recently, two time points (Halpern & Katz, 2017). However, in our 14-day diary study, participants rated their experiences and feelings each day, giving us valuable information about their own and their partner's daily behaviors and emotional states.

Most couples (56.1%) indicated that they experienced technoference in their romantic relationship at least a few days during the 14-day study period. Moreover, 72.4% experienced technoference on at least one day of the 14-day period. This is unsurprising considering the high penetration rate of mobile phone ownership in the U.S. (Pew Research Center, 2018) and the growing numbers of individuals worldwide who report that their cell phone use is problematic or they have addictive tendencies towards their cell phones (Jenaro

et al., 2007; Jiang et al., 2016; Nagpal & Kaur, 2016). However, we had anticipated that some individuals might experience technoference with even greater frequency than this, as technoference has been conceptualized as "everyday intrusions and interruptions" (McDaniel & Coyne, 2016a). Thus, our finding that only 15.7% reported a cellphone as interrupting an interaction on seven or more days (or half or more of the 14 days) was somewhat surprising. This lower than anticipated rate of reported daily technoference may be due to the wording of our measure. It may be that participants experienced minor interruptions or distractions due to a cell phone, but they reported only instances when the device caused a more serious distraction. Therefore, our measure may not have been sensitive enough to capture more minor distractions. It may also be that individuals have different definitions of what they classify as an interruption. That said, our finding that so many reported this "interrupting" technoference even a few times a week suggests that technoference is beginning to have an impact on American couples' daily lives.

In support of our main study hypothesis, daily fluctuations in technoference (within-person effects) predicted conflict over technology use, quality of face-to-face interactions, negative mood, and daily assessments of relationship quality; and with the exception of relationship quality, these same significant relationships existed when we examined between-person effects of technoference. Moreover, these relationships were significant even after controlling for many individual and relationship characteristics (i.e., age, gender, depression, attachment anxiety, etc.) that have been shown to be significantly related to technoference and relationship well-being in prior work (Krasnova et al., 2016; McDaniel & Coyne, 2016a; 2016b; McDaniel et al., 2018; Roberts & David, 2016; Wang et al., 2017); depression and attachment anxiety were also found to be correlated with technoference and relationship satisfaction in the current study, suggesting that these variables should continue to be examined and controlled for, at the very least, in future work on technoference and phubbing. It is notable that *daily technoference* from a phone had a significant effect on mood, quality of interactions, perceptions of relationship quality, and couple conflict, above and beyond general relationship dissatisfaction and any feelings of depression or attachment anxiety. This suggests that regardless of an individual's or a couple's current level of well-being, as individuals perceive technology use as interfering in their interactions with their partner, these perceptions likely hold implications for their daily perceptions of their relationship and their mood.

Theoretical Implications

Researchers have proposed that technoference and phubbing affect relationships in a negative way because a partner may interpret attention to one's phone as a symbol that the partner is not the main priority, or it may be a violation of expectations within the relationship (Halpern & Katz, 2017; Krasnova et al., 2016; McDaniel & Coyne, 2016a; 2016b; McDaniel et al., 2018; Roberts & David, 2016). Our study adds a dimension to the existing empirical literature by demonstrating that within individuals, on a daily basis, perceived technoference contributes to greater conflict, less positive face-to-face interactions, negative mood, and lower relationship quality. Our ability to narrow these assessments to the daily level suggests that each of these potential routes from technoference to negative relationship outcomes has immediate (and possibly cumulative) effects. Further,

when considered within the larger frame of social exchange theory (Thibault & Kelley, 1959), our findings suggest that there is a relational cost (or lack of benefit) from interacting with technology in the presence of a romantic partner. More research is necessary to more precisely define the spectrum of technology-related behaviors individuals consider "interruptions," and the extent to which these interruptions are considered as such because of the expectancy violating nature of the particular behavior (e.g., responding to email while engaged in a conversation might be considered an interruption while quickly glancing at a phone may not) or whether the interpretations are largely person or couple-specific (e.g., people who use their phones more often within their dyadic couple may be less likely to consider technological behaviors as interruptions).

Practical Implications

Technology offers a convenient mechanism for individuals to communicate with others, both near and far. Texting has become so commonplace that it has even been explored as an avenue through which romantic partners might increase their relationship satisfaction. As an example, Luo and Tuney (2015) found that when college students sent their romantic partner a text message once a day over two weeks, they (the senders) reported slightly more relationship satisfaction at the end of the two weeks than those who did not send a text message. This effect emerged regardless of the content of the text message (Luo & Tuney, 2015). However, more recently, Ohani, Brown, Trub, and Rosenthal (2018), found that perceived partner similarity in texting practices (e.g., how often they initiated text message interchanges and the extent they used text messages to express certain feelings, like anger or affection) was related to greater relationship satisfaction. Combined these studies suggest a complex relationship between the use of technological communication and relationship satisfaction—rather than frequency of use, it appears to be perceived similarity between couples on their mobile phone behaviors that is most important for couple satisfaction. Moreover, when applied more broadly to mobile phone etiquette, it appears that internalized personal standards, rather than societal norms, and similarity between partners on their perceptions of public and private phone use norms are important predictors of relationship quality (Hall, Baym, & Miltner, 2014).

Considered alongside our current findings, this suggests that an act that might be considered a violation of expectations to one individual (or one couple), such as checking one's phone while watching TV with a partner, may not be considered a violation to another person (or another couple). Provided the individuals in the couple share perceptions of what is and is not a violation of expectations, technoference, even if it occurs once or twice a day, may not impact relationship satisfaction. However, incongruencies within couples on standards related to mobile phone etiquette may be problematic. Consequently, it is important for individuals and couples to contemplate and communicate their mobile phone etiquette standards with consideration for their own (and their partner's) daily technology-related behaviors, so that they can avoid conflict related to expectancy violations. Although our study focused on only romantic partners, research has shown that phubbing behaviors also affect friends (Karadağ et al., 2015), and that even those in experimental dyadic interactions can be affected negatively (in terms of their mood or perceived relationship quality) by phubbing (Chotpitayasunondh & Douglas, 2018) or even the mere presence of mobile

phones (Przybylski & Weinstein, 2013). Therefore, these recommendations extend to other types of dyadic conversation partners, as well, such as friends, work colleagues, and family members.

Future research should explore whether similarity within couples on mobile phone etiquette standards moderates the relationship between frequency of daily technoference and daily relationship satisfaction. Better understanding this process and the potential for expectancy violations could assist clinicians and educators in making more effective and evidence-based recommendations for individuals and couples. Additionally, future researchers should examine the cumulative (long-term) effects of these daily interruptions over time on overall relationship health in romantic and other types of dyadic relationships, as even seemingly small effects could change the overall course of relationships over long periods of time.

4.1. Limitations and Conclusion

In terms of limitations, our sample was only U.S. residents who had at least one child under the age of five. Although all U.S. regions and a broad range of socio-economic statuses were represented, the sample was fairly homogeneous in terms of race (mostly Caucasian) and we do not know how well these results would generalize to other ethnic groups and other countries (especially where cell phone penetration rates differ) or to couples without children. However, as technoference appears to be an issue in romantic relationships generally and not just within coparenting relationships (Halpern & Katz, 2017; Krasnova et al., 2016; McDaniel & Coyne, 2016a; McDaniel & Drouin, 2018; Roberts & David, 2016; Wang et al., 2017), we expect similar findings would emerge in the daily diaries of couples without children. We look to future research to explore this issue specifically in couples without children. However, other work has found that even when differences emerge in terms of the perceptions of technoference (for example, women tend to perceive technoference as occurring more often than men perceive it), when technoference is perceived the effect on relational and personal well-being is similar (e.g., McDaniel et al., 2018). Additionally, the current sample contained only heterosexual couples as the data came from a project originally designed to examine coparenting interactions between mothers and fathers; however, prior work has shown no significant differences, at least at the cross-sectional level, in these technoference processes by sexual orientation (McDaniel et al., 2018). Finally, we utilized a single item as our measure of technoference due to phones. In the future, we hope to expand on the current work to better examine the possibilities and impacts of more minor types of technological distractions from couple interactions, as opposed to only those times when a device interrupted a conversation or activity. Future work should also examine the sources of the interruptions (e.g., which partner is disengaging from the interaction) and severity/length of the interruptions. Finally, although we were better able to approximate daily life experiences with our daily survey data, the data can still suffer from common method bias. Future work would benefit from using multiple methods (i.e., surveys and naturalistic observations) to confirm that perceptions match behaviors and/or how perceptions and actual behaviors may play different roles in these processes. This work could also better examine the validity of self-report measures of technoference.

Many couples experience technoference from day-to-day. Though a common occurrence for some couples, it is not one without consequence—daily fluctuations in perceived technoference from one's phone affects mood, emotions, evaluations of interactions, and even assessments of relationship quality. Thus, partners should be mindful of their technology use while with a romantic partner to avoid the potential negative impacts of technoference. Moreover, clinicians should include discussions of technoference as a potential contributing factor to relationship dissatisfaction and decreases in interactional quality.

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Highlights

- Both partners in couples reported on technoference across 14 days of daily surveys
- More daily technoference was related to worse relationship quality
- More daily technoference was related to more conflict over technology
- More daily technoference was related to less positive face-to-face interactions
- More daily technoference was related to more negative mood

Table 1.

Descriptives and between-person correlations between study variables

	Daily Variables						*Baseline Variables*		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Daily Variables									
1. Technoference (phones)	--								
2. Relationship quality	−.18***	--							
3. Conflict over tech. use	.27***	−.25***	--						
4. Positive FtF interactions	−.20***	.60***	−.31***	--					
5. Negative mood	.29***	−.35***	.25***	−.38***	--				
6. Hours together	.08	.22***	.01	.09	−.01	--			
Baseline Variables									
7. Depression	.23***	−.34***	.24***	−.30***	.65***	.01	--		
8. Relationship satisfaction	−.07	.69***	−.15**	.44***	−.22***	.18***	−.37***	--	
9. Attachment anxiety	.22***	−.25***	.10	−.24***	.33***	−.01	.48***	−.22***	--
Mean	0.34	6.21	0.13	4.43	0.69	5.90	10.78	38.05	3.11
SD	0.75	0.92	0.85	0.68	0.66	4.41	8.59	7.05	1.19

Note.

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Tech = technology, FtF = face-to-face.

Table 2.

Unstandardized estimates for the multilevel models of daily technoference predicting daily relationship quality, conflict over technology, perceived face-to-face interactions, and negative mood

	Model 1: Daily Relationship Quality	Model 2: Daily Conflict over Technology Use	Model 3: Daily Positive Face-to-Face Interactions	Model 4: Daily Negative Mood
Fixed effects	***b***	***b***	***b***	***b***
Intercept	6.13***	0.05	4 41***	0.88***
Day	0.02***	−0.001	0.005	−0.01***
Gender	−0.11	0.03	−0.01	−0.10*
Control Variables				
Family income	−0.001	0.001	−0.001	−0.003***
Race/Ethnicity	0.01	0.08	−0.19*	−0.04
Not college graduate	0.08	0.18**	−0.05	−0.08
Multiple children	−0.13	−0.05	0.05	0.05
Relationship length	−0.02	0.002	−0.01	0.01
Marital status	−0.89**	0.25	0.08	0.36**
Age	0.001	−0.01	0.01	−0.004
Depression	−0.01**	0.003	−0.004	--
Relationship satisfaction	--	−0.001	0.02***	−0.01*
Attachment anxiety	−0.06	0.02	−0.04*	0.11***
Hours together with partner	0.01***	0.01*	−0.01**	−0.01***
Between-person (BP) portion of daily technoference predicting average daily outcome variable				
BP daily technoference	−0.10	0.26***	−0.13**	0.14*
BP daily technoference X gender	--	--	--	--
Within-person (WP) portion of daily technoference predicting daily fluctuations				
WP daily technoference	−0.04*	0.10***	−0.05***	0.03*
WP daily technoference X gender	--	--	--	--

Note:

*** p < .001,

** p < .01,

* p < .05.

Gender is coded 0 = female and 1 = male. Day is centered on day 1. Control variables were coded as follows: Race/Ethnicity (0 = Caucasian, 1 = other race), Not college graduate (0 = college grad., 1 = less education than college grad.), Multiple children (1 = multiple children, 0 = only one child in family), and marital status (1 = living together, not married, 0 = married). Except for the above mentioned controls, all other variables were grand mean centered. Family income was in $1,000 units. Technoference was split into trait-like (between-person) and state-like (within-person) portions and both portions were included in the model.