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Case Report

Smartphone use undermines enjoyment of face-to-face social interactions[☆]Ryan Dwyer^{a,*}, Kostadin Kushlev^b, Elizabeth Dunn^a^a Department of Psychology, The University of British Columbia, 2136 West Mall, Vancouver, BC V6T 1Z4, Canada^b Department of Psychology, University of Virginia, 485 McCormick Road Gilmer Hall, Room 102, Charlottesville, VA 22903, United States

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ABSTRACT

Using a field experiment and experience sampling, we found the first evidence that phone use may undermine the enjoyment people derive from real world social interactions. In Study 1, we recruited over 300 community members and students to share a meal at a restaurant with friends or family. Participants were randomly assigned to keep their phones on the table or to put their phones away during the meal. When phones were present (vs. absent), participants felt more distracted, which reduced how much they enjoyed spending time with their friends/family. We found consistent results using experience sampling in Study 2; during in-person interactions, participants felt more distracted and reported lower enjoyment if they used their phones than if they did not. This research suggests that despite their ability to connect us to others across the globe, phones may undermine the benefits we derive from interacting with those across the table.

Decades of research on human happiness points to one central conclusion: Engaging in positive social interactions is critical for well-being (Baumeister & Leary, 1995; Epley & Schroeder, 2014; Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004; Sandstrom & Dunn, 2014). But the current technological revolution may be altering how and when we derive these benefits. Smartphones enable us to connect with friends and family throughout the day, potentially allowing us to reap the benefits of social interactions even when we are alone. Could these devices—with their ability to connect us with anyone, anywhere—distract us from enjoying interactions with the people sitting right next to us?

In a recent Pew study, almost 90% of cell phone owners reported using their phones during their most recent social activity (Pew Research Center, 2015). Multi-tasking by using phones may be a major source of distraction in daily life, leaving people unable to concentrate fully on their primary activity. For example, using phones while driving is comparable to driving drunk (Strayer, Drews, & Crouch, 2006), using phones in the classroom has been shown to impede learning (Wood et al., 2012), and frequent notifications via phones can increase symptoms of inattention associated with ADHD (Kushlev, Proulx, & Dunn, 2016). Theoretically, distraction should also reduce the ability to derive pleasure from positive experiences (Brown & Ryan, 2003; Quoidbach, Berry, Hansenne, & Mikolajczak, 2010). Several studies lend support to this contention (e.g., Csikszentmihalyi, 1990; LeBel & Dubé, 2001), although this idea has not been tested directly. In addition to increasing distraction, phones may compromise the benefits

of social interactions by increasing perceived opportunity costs; texting a romantic partner during lunch with friends or peeking at a work email during a family dinner may remind people of the other things they want or need to be doing. Thus, researchers have theorized that the mere presence of phones may orient people away from their immediate social environment, potentially decreasing enjoyment of social interactions (Przybylski & Weinstein, 2012; Srivastava, 2005). In sum, by increasing feelings of distraction or perceived opportunity costs, smartphone use may undermine the emotional benefits people derive from social interactions.

It is also possible, however, that phone use could play a positive role in social interactions. When a conversation lags or turns to dull topics, smartphones could provide reliable access to an array of brief engaging activities. Researchers have theorized that engaging one's attention with desired stimuli should decrease boredom, speed the passage of time, and promote a sense of agency (for a review, see Eastwood, Frischen, Fenske, & Smilek, 2012). By allowing us to engage our attention with an array of stimuli on demand, therefore, phones may decrease boredom, make time pass more quickly, and give us a greater sense of control.

There is abundant speculation about the possible effects of phones on social interactions (Turkle, 2012, 2015), but research examining how phone use shapes the benefits people derive from social interactions is in its infancy. Using correlational analyses, recent studies have documented a negative relationship between the presence of phones and the quality of social interactions (Brown, Manago, & Trimble, 2016;

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Table 1
Sample questionnaire items from Study 1.

Measure	α	Sample items	Source
Dependent variables			
Social connectedness	.77	I felt close to people.	Lee, Draper, & Lee, 2001
Affect: valence (mood)	.87	Pleasant.	Schimmack & Grob, 2000
Affect: tense arousal	.72	Jittery.	Schimmack & Grob, 2000
Affect: energetic	.90	Awake.	Schimmack & Grob, 2000
Interest and enjoyment	.69	I enjoyed this experience very much.	Ryan, 1982
Perceived control	.61	I felt I had control.	Bernstein & Claypool, 2012
Boredom	.83	I felt bored.	Fahlman et al., 2013
Time perception	.88	Time was dragging on.	Fahlman et al., 2013
Mediators			
Opportunity cost	–	Did you feel there were other things you wanted or needed to be doing?	Kushlev, 2011
Distraction	.54	I was easily distracted.	Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007

All items were measured on a scale from 1 (not at all) to 7 (very much), except social connectedness, perceived control, boredom, and time perception, which were measured on a scale from 1 (Strongly disagree) to 7 (Strongly agree).

Misra, Cheng, Genevieve, & Yuan, 2014; Rotondi, Stanca, & Tomasuolo, 2017), and these studies are supported by similar findings in the lab (Przybylski & Weinstein, 2012; Vanden Abeele, Antheunis, & Schouten, 2016). However, no research has experimentally manipulated phone use in the real world, and research has yet to document the psychological mechanisms underlying the effects of phone use on the rewards derived from social interactions.

Thus, in Study 1, we conducted a field experiment in which we manipulated phone use during a central social activity—sharing a meal out with friends and family. In Study 2, we used experience sampling to capture the relationship between phone use and well-being across a wider range of social contexts over the course of a week. In both studies, we examined whether and how phone use affects the social and emotional benefits people reap during in-person social interactions. In line with current best practices, we pre-registered both studies, and we report all measures, conditions, and exclusions, as well as how sample sizes were determined.

1. Study 1

1.1. Method

1.1.1. Pre-registered power analysis

Based on a pilot study, we estimated an effect size of $d = 0.4$; using G*Power3, we calculated that we would need a sample size of $N = 200$ for 80% power, which we pre-registered on the Open Science Framework (OSF) at <http://tinyurl.com/hwmo9t6>. Given the high costs of this study, we planned and pre-registered three sequential analyses (at $N = 100, 200$, and 300); this technique allows for interim analyses by adjusting the critical alpha to control overall Type 1 error (see Lakens, 2014 for a primer on sequential analysis). At each analysis point, data collection can be stopped if results are significant at the adjusted alpha level. The results of our interim analyses led us to continue collecting data until we reached $N = 300$, with a pre-specified, adjusted alpha-level of 0.0278.

1.1.2. Participants

Because sessions were scheduled ahead of time, we slightly surpassed our target sample size, with 304 participants (64% females, ages = 19–69, $M = 29.9$ years, $SD = 10.6$). The sample included both university students (34%) and adults from the Vancouver, BC community (66%). An additional 2 participants did not have usable data due to a technical error that occurred while completing the survey. We required that all participants own a smartphone, ostensibly so that they could receive study-related reminders and survey questions.

1.1.3. Procedure and measures

Participants were invited to complete a “study investigating people’s experience dining out with friends.” Groups of 3–5 friends or family members participated in the study at a local café. After providing consent, each group was randomly assigned to the *phone* or *phoneless* condition. Specifically, to manipulate phone use without revealing the purpose of the study, we told participants in the *phone* condition that they would be asked to answer a survey question after ordering their food, and that the RA would text them this question; to ensure that they received the survey, they were told to set their phone on the table with the ringer or vibration on. In the *phoneless* condition, participants were also told that they would answer a survey question, which would be handed to them on paper; these participants were then instructed to turn their phones on silent and place them in a container on the table. To support our cover story, we asked participants to rate how they were feeling that day on a scale from 0 to 100 via text (*phone* condition) or paper (*phoneless* condition). Participants then ate their meal together without further interruption by the experimenter.

After their meal, all participants were given iPads to complete a questionnaire (thereby maximizing the privacy of their responses; for complete survey see <http://tinyurl.com/hwmo9t6>). This questionnaire included our key measures of social connectedness, affect, opportunity costs, interest/enjoyment, distraction, perceived control, time perception, and boredom, in that order (see Table 1 for details on all measures). Next, participants were asked to answer questions about their overall amount of phone use during the session (providing a manipulation check); we also included exploratory questions about the nature of their phone use (e.g., text messaging, social media, photos). Finally, participants were asked to indicate the nature of their relationship to each other person in the group (e.g., spouse, sibling, friend), and to provide demographics. After completing this survey, participants were asked to provide feedback about the study and to report how many notifications they received on their phones. In exchange for participating, each participant received up to \$20 to spend toward their group’s total bill. All sessions were videotaped using a small camera (GoPro Hero 4) positioned so that it was visible but unobtrusive. To minimize any potential for experimenter bias, research assistants were kept blind to our hypotheses. During the meal, research assistants sat at a separate table without observing participants.

1.1.4. Manipulation checks

We asked participants to report “During the dining experience today, how often did you use your mobile phone?” from *Not at all* (1) to *Constantly* (7). To capture phone use compared to participants’ normal behavior, we asked “How frequently did you use your phone as compared to how you would have normally used your phone in a restaurant with your friends/family?” from *Much less* (–3) to *Much more* (3). To

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