



Cell phone-induced ostracism threatens fundamental needs

Andrew H. Hales^a, Maayan Dvir^b, Eric D. Wesselmann^c, Daniel J. Kruger^d,
and Catrin Finkenauer^e

^aUniversity of Virginia; ^bPurdue University, West Lafayette, USA; ^cIllinois State University; ^dUniversity of Michigan; ^eUtrecht University

ABSTRACT

Cell phones are useful tools with both practical and social benefits. However, using them in the context of face-to-face conversations may be problematic. We consider this behavior a form of ostracism and test its effects on the satisfaction of basic psychological needs for belonging, self-esteem, control, and meaningful existence. In Study 1 participants who recalled a time in which a friend was checking a cell phone during a serious conversation reported feeling more ostracized (ignored and excluded), greater pain, and threat to basic needs than participants recalling a conversation without a cell phone interruption or a control event. Study 2 replicated and extended this effect: Cell phone-induced ostracism's effects were partially mediated by decreased feelings of relational evaluation, and threatened basic needs both in serious and casual conversation contexts. Findings from both studies also indicated that cell phone-induced ostracism hurts women more so than men.

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People have a fundamental need to belong (Baumeister & Leary, 1995). Emerging communication technologies are revolutionizing the ways in which people form, maintain, and even terminate relationships (Okdie et al., 2014; Valkenburg & Peter, 2009). Although these technologies provide exciting opportunities to initiate and maintain relationships remotely, they may also have the potential to compromise immediate face-to-face relationships. The purpose of the current research is to test whether people feel ostracized when a conversation partner begins checking a cell phone during a face-to-face conversation.

Cell phone use is quickly becoming ubiquitous in industrialized countries. For example, polling shows that 64% of all U.S. adults own a smartphone, and 85% of those aged 18 to 29 own a smartphone (Pew Research Center, 2015). People report using their phones frequently, typically to send text messages, make phone calls, and access the Internet. However, people also widely agree that using cell phones in social settings can hurt conversations (Rainie & Zickuhr, 2015).

Cell phone use offers numerous benefits, many of them social in nature (Campbell & Kwak, 2011a). Cell phone use can keep individuals connected to close others (Jin & Park, 2010; Licoppe, 2004), connect individuals to a global community (Campbell & Kwak, 2011b), and also help individuals navigate daily hassles or even save lives in an emergency (Chapman & Schofield, 1998). However, connecting with one's virtual social network may interfere with non-virtual socialization. Observational research shows that people often use their cell phone in public areas (Kruger et al., 2017), even in the presence of companions (Finkel & Kruger, 2012). In fact, 47% of those aged 18 to 29 reported sometimes using their phone specifically to avoid others around them (Pew Research Center, 2015). Of course, avoiding someone likely is not the only motivation for using a cell phone in the presence of others, and there may be many times when checking a cell phone is

innocuous. Regardless of the motive, we ask, how do others feel when someone begins using a cell phone during a social interaction, such as a face-to-face conversation? We hypothesize that individuals will feel ostracized (i.e., ignored and excluded; Williams, 2009) when a conversation partner begins using a cell phone during the interaction. Further, we hypothesize that individuals experiencing cell phone-induced ostracism will experience the same psychological outcomes as from other forms of ostracism: emotional pain and threat to four fundamental psychological needs (i.e., belonging, self-esteem, control, and meaningful existence; Williams, 2009).

Temporal need-threat model of ostracism

According to the temporal need-threat model of ostracism (Williams, 2009), individuals respond to ostracism in three sequential stages. Individuals first enter the *reflexive* stage, once they detect ostracism, quickly feeling pain and threat to the four fundamental psychological needs (e.g., Eisenberger, Lieberman, & Williams, 2003). People subsequently begin recovery as they make attributions for the ostracism and seek to fortify their threatened needs in the *reflective* stage (e.g., Zadro, Boland, & Richardson, 2006). Finally, if individuals are unable to fortify their threatened needs, they enter the *resignation stage* and experience alienation, unworthiness, helplessness, and depression (Riva, Montali, Wirth, Curioni, & Williams, 2017).

In the current study, we focus primarily on the reflexive responses to ostracism. Researchers theorize that individuals should detect ostracism quickly and crudely for evolutionary reasons (Williams, 2009). Ostracism represents a critical threat to one's survival and reproductive fitness, so failing to detect a true instance of ostracism (a miss) is a costlier error than over-detecting ostracism in situations where it is not occurring (a false alarm). Therefore, humans likely evolved to over-respond to potential cases of ostracism (MacDonald & Leary, 2005; Shilling & Brown, 2016; Wesselmann, Nairne, & Williams, 2012).

In line with this theorizing, research demonstrates that ostracism threatens basic needs in various circumstances under which one would logically expect ostracism not to hurt. For example, ostracism threatens basic needs even when it is delivered by strangers on the Internet (Williams, Cheung, & Choi, 2000), when it is delivered by members of a despised outgroup (Fayant, Muller, Hubertus Joseph Hartgerink, & Lantian, 2014; Gonsalkorale & Williams, 2007), and when being ostracized is financially beneficial or advantageous in a game (van Beest & Williams, 2006; van Beest, Williams, & van Dijk, 2011).

Further, even minimal cues of exclusion can be sufficient to trigger feelings of ostracism (e.g., threat to basic needs). For example, simply being denied eye contact can lead people to feel disconnected and induce feelings of ostracism (Böckler, Hömke, & Sebanz, 2014; Wesselmann, Cardoso, Slater, & Williams, 2012; Wirth, Sacco, Hugenberg, & Williams, 2010). Additionally, uncomfortable pauses in conversations can also threaten individuals' feelings of social connection (Koudenburg, Postmes, & Gordijn, 2011). Using one's cell phone necessarily requires breaking eye contact and potential pauses in conversation, thus it likely reduces the conversation partner's feelings of social connection, and causes them to feel that their partner has *disengaged*: a signal that triggers feelings of social exclusion (Kerr & Levine, 2008).

Relational evaluation

According to the sociometer theory of self-esteem, individuals are sensitive to cues that indicate the possibility of rejection, and these cues momentarily deflate their self-esteem (Leary, 1999; Leary & Baumeister, 2000; Leary & Downs, 1995). Specifically, individuals are responsive to social information that is relevant to their *relational evaluation*: "the degree to which other people regard their relationships with the individual to be valuable, important, or close" (Leary & Baumeister, 2000, p. 9). Leary (1990) argued that relational evaluation is an important mechanism in understanding the degree to which interpersonal rejection and other forms of social exclusion cause individuals to

experience psychological harm (see also Wesselmann et al., 2016). Thus, we consider relational evaluation as a potential mediator of the effect of cell phone-induced ostracism on basic psychological needs.

Using a cell phone during face-to-face conversations is likely to cause one's conversation partner to feel relationally devalued. As mentioned above, using a cell phone requires breaking eye contact with a conversation partner. Targets who withhold eye contact are seen as less likeable (Mason, Tatkov, & Macrae, 2005), and withholding eye contact is reported as a common behavior one does to administer the silent treatment (Williams, Shore, & Grahe, 1998). Research on face-to-face communication also shows that people are adept at noticing when a listener is distracted (Bavelas, Coates, & Johnson, 2000). Further, research on cell phone use during conversations (also referred to as "phubbing," from *phone* and *snubbing*; Roberts & David, 2016), is suggestive of the possibility that such behavior would threaten one's sense of relational valuation. Correlational research shows that people who report more experiences in general of being ignored by their romantic partner attending to a phone, also report both decreased relationship satisfaction and decreased life satisfaction (McDaniel & Coyne, 2016; Roberts & David, 2016). Further, experience-sampling research shows that using phones during face-to-face conversations is associated with decreased social connection (Kushlev and Heintzelman (2017). Also, following conversations in coffee shops, the dyads who used cell phones during the conversation reported less connection with and empathic concern for their partner (Misra, Cheng, Genevie, & Yuan, 2016).

Finally, experimental work manipulating the use of cell phones for texting in front of a face-to-face partner has found that the experience causes individuals to rate their partner as less polite and attentive, and decreases the quality of the interaction (Vanden Abeele, Antheunis, & Schouten, 2016). Merely having a cell phone visibly present, but unused, is sufficient to cause similar outcomes (Przybylski & Weinstein, 2013). Additionally, Gonzales and Wu (2016) tested the effects of cell-phone-induced ostracism by having confederates operate cellphones in front of participants and found that this behavior threatened basic needs for those who tend to be easily stressed by technology. In addition to providing a conceptual replication, we expand on this work by testing (1) whether the effect of cell phone-induced ostracism depends on the gender of the target and/or the seriousness of a conversation, and (2) whether the effect is mediated by relational evaluation. We predicted that cell phone-induced ostracism would cause feelings of relational devaluation, and thereby threaten basic psychological needs.

Potential gender differences

There is compelling theory and research to suggest that women would be more sensitive to cell phone-induced ostracism. Because of processes of socialization, men and women learn from young age that the expectations from them are different. Whereas men are taught to pursue agentic goals, to be self-reliant and to value independence; women are taught to be communal, to prioritize their close relationships, and to rely on others when in need (Cyranowski, Frank, Young, & Shear, 2000; Eagly, 2009; Swim, 1994). In fact, women demonstrate greater relationship concerns and greater attention to their relationship partners (Cross & Madson, 1997). Further, women's self-esteem is entwined with important relationships and they often enhance their self-esteem by strengthening their close relationships (Murray, Bellavia, Feeney, Holmes, & Rose, 2001). Pertinent to the current investigation, research has found that, relative to men, women can more quickly detect cues indicating social exclusion, and experience higher heart rate in response to social exclusion (Benenson et al., 2013). The significance that women find in their relationships, as well as the elevated attention they pay to their relationship partners, may cause greater distress from cell phone-induced ostracism relative to men.

Overview

In Study 1 we tested the effects of cell phone-induced ostracism by asking participants to recall a time when they experienced cell phone-induced ostracism during a serious conversation. In Study 2, we sought to replicate and extend the results of Study 1 by testing whether the observed effects also occur when participants are directed to relive a time when they experienced cell phone-induced ostracism during a *casual* conversation. In both studies, we explored whether the effects of cell phone-induced ostracism are greater for women compared to men.

Study 1

Method

Participants and design

Participants were 151 individuals recruited online from Amazon Mechanical Turk (73 Women, 78 Men, $M_{\text{age}} = 32.28$, $SD_{\text{age}} = 10.17$). Sample size was determined using a heuristic of 50 participants per cell, and results were not analyzed until all responses were collected. According to a post-hoc power analysis, this provided sufficient power on the primary dependent variable (basic needs; post hoc power > .99). All participants had to be located in the United States, have completed at least 50 approved assignments (HITs), and have an 80% or greater approval rating. We titled the study “social relationships” and used the following keywords: relationships, social life, psychology, friends, work, family. We paid each participant .50 United States dollars as compensation. One participant who did not provide a valid response to the writing prompt was not included in analyses, leaving 150 in the final sample. Participants were randomly assigned to one of three conditions: (1) control, (2) inclusion, or (3) cell phone-induced ostracism. Materials for Study 1 and Study 2 are available online at <https://osf.io/ujcb8>, and data are available from the first author upon request.

Procedure

Participants completed an autobiographical reliving paradigm commonly employed to study rejection and social exclusion (Pickett, Gardner, & Knowles, 2004). Participants were given the same general prompt, but the specific instructions varied by condition. They were asked to “Please describe, in as much detail as possible, a time where [insert specific event]. What were you feeling at that time? Again, please describe this in as much detail as you can remember; really try to relive that experience.” The conditions were as follows:

- (1) “... you were eating breakfast by yourself.” (control condition)
- (2) “...you were having a serious conversation with a friend and while you were talking, s/he gave you their full attention.” (inclusion condition).
- (3) “... you were having a serious conversation with a friend and while you were talking, s/he began checking their smart-phone during the conversation.” (cell phone-induced ostracism condition)

Importantly, we chose not to use the words “ignored,” “excluded,” or “ostracized” in the prompts because we wanted to first establish that individuals construe having their conversation interpreted by their partner using a cell phone as ostracism.

Measures

Immediately after the reliving exercise, participants responded to the 20-item basic needs satisfaction scale commonly used in ostracism research (Williams, 2009). Participants rated their agreement on a scale from 1 (*not at all*) to 5 (*extremely*) for items assessing each of the four needs: belonging (i.e., “I felt like I belonged”), self-esteem (i.e. “I felt good about myself”), control (i.e., “I felt like everything

was decided for me,” reversed), and meaningful existence (i.e., “I felt meaningless,” reversed). Items were averaged together to form a reliable composite index ($\alpha = .96$). The items were scored such that higher numbers indicated more need satisfaction.

Next, participants responded to two items assessing how ostracized they felt *at the time of the event*: “I felt ignored,” and “I felt excluded,” which were averaged together to form a measure of recalled feelings of ostracism (Spearman-Brown $r = .89$).

Following this measure, participants reported their levels of pain by rating their agreement with the statement “This experience was painful.” Finally, participants responded to the two ostracism items, this time assessing how they felt at the moment (i.e., *right now*). These items were averaged together to form a measure of current feelings of ostracism (Spearman-Brown $r = .93$). We added these last two items because some research suggests ostracism events can cause individuals to relive their negative experience (Chen, Williams, Fitness, & Newton, 2008) and we wanted to explore that possibility in the cell phone context.

Results

Primary analyses

A set of one-way analyses of variance comparing the three conditions revealed significant omnibus effects on participants’ basic needs satisfaction, pain, recalled and current feelings of ostracism (see Table 1 for means and omnibus tests). Post hoc comparisons (Tukey Honestly Significant Difference) revealed that, relative to the inclusion condition, cell phone-induced ostracism decreased basic needs satisfaction, and increased pain, and also increased recalled and current feelings of ostracism (weakest $t(147) = 3.21, p = .005, d = .64$). Additionally, relative to the control condition, cell phone-induced ostracism also decreased basic needs satisfaction, and increased pain and recalled feelings of ostracism (weakest $t(147) = 6.10, p < .001, d = 1.55$). It did not significantly increase current feelings of ostracism, $t(147) = 2.19, p = .076, d = .44$.¹

Exploring potential gender effects

The effect of condition on needs satisfaction was qualified by an interaction with gender, $F(2, 144) = 4.28, p = .016, \eta_p^2 = .06$, such that cell phone-induced ostracism was more threatening to women than to men (see Figure 1). Women reported lower need satisfaction than men, but only in the cell phone-induced ostracism condition, $t(147) = -3.04, p = .003, d = -.66$, and not in the control condition, $t(147) = .004, p = .994, d < .01$, or inclusion condition, $t(147) = -.94, p = .346, d = -.26$.

A similar pattern was observed with respect to recalled feelings of ostracism and pain. Gender also moderated the effect of condition on recalled feelings of ostracism, $F(2, 144) = 6.80, p = .002, \eta_p^2 = .09$, with women reporting greater feelings of ostracism than men in the cell phone-induced ostracism condition, $t(147) = 4.01, p < .001, d = .75$, but not other conditions, largest effect: $t(147) = -.83, p = .406, d = -.28$. Likewise, gender moderated the effect of condition on pain, $F(2, 144) = 3.44, p = .035, \eta_p^2 = .05$, with women reporting greater pain than men in the cell phone-

Table 1. Means and standard deviations for conditions in Study 1.

| | Condition | | | $F(2, 147)$ | p | η_p^2 |
|--------------------------------|---------------------------|---------------------------|--|-------------|--------|------------|
| | Control ($N = 48$) | Inclusion ($N = 50$) | Cell phone-induced ostracism ($N = 52$) | | | |
| Dependent Variable: | | | | | | |
| Basic needs satisfaction | 3.59 (.66) _a | 4.05 (.69) _b | 2.53 (.79) _c | 60.85 | < .001 | .45 |
| Recalled feelings of ostracism | 1.50 (.88) _a | 1.21 (.59) _a | 3.52 (1.30) _b | 84.83 | < .001 | .54 |
| Pain | 1.44 (.82) _a | 1.54 (.91) _a | 2.71 (1.32) _b | 23.28 | < .001 | .24 |
| Current Feelings of ostracism | 1.56 (1.01) _{ab} | 1.36 (.69) _a | 2.01 (1.27) _b | 5.42 | .005 | .07 |

Note. Agreement was reported on a scale from 1 (*Not at all*) to 5 (*Extremely*). Means within row not sharing a subscript are significantly different, Tukey post hoc, $p < .05$.

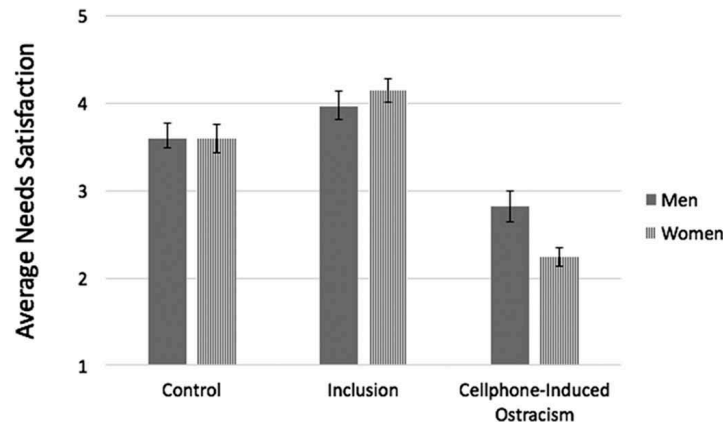


Figure 1. Basic needs satisfaction for men and women in Study 1 ($N = 150$), interaction, $F(2, 144) = 4.28, p = .016, \eta_p^2 = .06$. Error bars represent ± 1 standard error of the mean.

induced ostracism condition, $t(147) = 2.56, p = .012, d = .52$, but not other conditions, largest $t(147) = -1.02, p = .310, d = -.34$. Gender did not moderate the effect of condition on current feelings of ostracism, $F(2, 144) = .26, p = .774, \eta_p^2 < .01$.²

Discussion

Study 1 provided initial support for our hypothesis that the experience of someone using his or her cell phone during a conversation can be experienced as ostracism by the conversation partner. Further, the results suggest that this effect is stronger for women than for men. Not only did participants report greater feelings of ostracism during the event, they also reported greater feelings of ostracism at the time of the experiment, just after having recalled the event, relative to the inclusion condition. This finding is consistent with research showing that social pain, unlike physical pain, can be relived (Chen et al., 2008; see also Harrison & Cantor, 1999).

A limiting feature of Study 1 is that participants were directed to recall not just any conversation, but a *serious* conversation. It is plausible that cell phone use causes a greater threat to relational evaluation in the context of serious conversations rather than casual conversations. Indeed, prior research shows that the presence of a cell phone damages interaction quality, but only during meaningful conversations, not casual ones (Przybylski & Weinstein, 2013). We hypothesized that effects of cell phone-induced ostracism would be reduced when participants are directed to think of a *casual* rather than serious conversation in which their conversational partner's attention was shared with a cellphone. However, given the large literature documenting that immediate responses to ostracism are large and resistant to moderation (Williams, 2009), we expected the effects to be reduced, but not eliminated, in casual contexts. Additionally, Study 2 included a measure of relational evaluation to test whether relational evaluation mediates the effect of cell phone-induced ostracism on basic needs satisfaction.

Study 2

Method

Participants and design

We aimed for power to detect effect sizes heuristically considered to be medium. An a priori power analysis indicated that 256 participants are necessary for 80% power to detect a medium-sized

interaction effect ($\eta_p^2 = .03$) or a medium-sized simple effect ($d = .50$). Anticipating exclusions, we aimed to collect 280 responses.

Participants were 284 individuals recruited online from Amazon Mechanical Turk (171 Women, 110 Men, 3 gender not reported; $M_{\text{age}} = 36.28$, $SD_{\text{age}} = 12.64$). All participants had to be located in the United States, without limitations based on previously approved assignments, or approval rating percentage. We titled the study “Human memory of experiences,” with no additional keywords. We paid each participant .35 United States dollars as compensation. Thirteen participants who either did not provide a valid response to the writing prompt ($n = 8$), or failed an attention check ($n = 5$) were not included in analyses,³ leaving 271 in the final sample. Hypotheses, stopping rule, and analysis plan were preregistered and are available at <https://osf.io/7tt6w>.

Participants were randomly assigned to a condition in a 2 (conversation type: serious v. casual) \times 2 (partner behavior: cell phone-induced ostracism v. inclusion) between-subjects design.

Procedure

As in Study 1, participants were asked to complete an autobiographical recall measure. In the *serious conversation* conditions the writing task instructions were identical to the prompts used in Study 1. In the *casual conversation* conditions the instructions were also identical, except that the word “serious” was replaced with the word “casual.”

Measures

Immediately following the reliving task, participants responded to a 3-item measure of relational evaluation by rating their agreement with the statements, “I felt valuable to the other person,” “I felt close to the other person,” and “I felt important to the other person” ($\alpha = .98$). This measure is based on Leary’s definition of relational evaluation, and has been used in prior research (Leary, 1999; Wirth et al., 2010). After completing this measure, participants responded to the same need satisfaction measure ($\alpha = .96$), recalled feelings of ostracism (Spearman-Brown $r = .93$), and pain measures used in Study 1. Finally, as a manipulation check, participants rated their agreement with the statements “This conversation was serious,” and “This conversation was important” (Spearman-Brown $r = .89$). Responses on all items were made on a scale from 1 (*Not at all*) to 5 (*extremely*).

Results

Manipulation check

A 2 \times 2 analysis of variance on the conversational seriousness manipulation check revealed a main effect of conversation seriousness, $F(1, 267) = 24.00$, $p < .001$, $\eta_p^2 = .08$, with those in the serious conversation ($M = 3.93$, $SD = 1.26$) reporting higher seriousness than those in the casual condition ($M = 3.16$, $SD = 1.31$). There was also a main effect of partner behavior, with participants who recalled an experience of texting-induced ostracism reporting less conversational seriousness ($M = 2.99$, $SD = 1.36$) than those who recalled an inclusion experience ($M = 4.03$, $SD = 1.09$), $F(1, 267) = 46.39$, $p < .001$, $\eta_p^2 = .15$. The interaction was not significant, $F(1, 267) = 1.33$, $p = .250$, $\eta_p^2 < .01$.

Primary analyses

A 2 \times 2 analysis of variance on feelings of ostracism revealed a main effect of partner behavior, $F(1, 267) = 362.02$, $p < .001$, $\eta_p^2 = .58$, such that those in the cell phone-induced ostracism conditions ($M = 3.74$, $SD = 1.25$) reported feeling more ostracized than those in the inclusion conditions ($M = 1.37$, $SD = .77$). There was also an unpredicted main effect of conversation type on ratings of ostracism, such that those in the serious conditions reported ($M = 2.65$, $SD = 1.61$) feeling more ostracized than those in the casual conditions ($M = 2.48$, $SD = 1.55$), $F(1, 267) = 6.62$, $p = .011$, $\eta_p^2 = .02$. The interaction was not significant, $F(1, 267) = .14$, $p = .704$, $\eta_p^2 < .01$.

Table 2. Means and standard deviations for conditions in Study 2.

| | Partner Behavior Condition | | Simple effect, $t(267)$ | p | d |
|--------------------------------|----------------------------|---|-------------------------|--------|-------|
| | Inclusion ($n = 135$) | Cell phone-induced ostracism ($n = 136$) | | | |
| Conversation Type Condition | | | | | |
| Serious Conversation: | | | | | |
| Relational Evaluation | 4.47 (.67) | 1.90 (1.08) | -14.96 | < .001 | -2.37 |
| Basic needs Satisfaction | 3.85 (.65) | 2.36 (.75) | -11.56 | < .001 | -1.98 |
| Recalled feelings of ostracism | 1.51 (.91) | 3.95 (1.19) | 13.19 | < .001 | 2.04 |
| Pain | 2.20 (1.35) | 3.19 (1.30) | 4.30 | < .001 | .73 |
| Casual Conversation: | | | | | |
| Relational Evaluation | 4.52 (1.08) | 2.18 (1.28) | -14.79 | < .001 | -1.83 |
| Needs Satisfaction | 4.12 (.61) | 2.58 (.81) | -12.99 | < .001 | -1.88 |
| Recalled feelings of ostracism | 1.23 (.58) | 3.58 (1.28) | 13.79 | < .001 | 1.84 |
| Pain | 1.61 (1.03) | 2.94 (1.40) | 6.26 | < .001 | .94 |

Note. Agreement was reported on a scale from 1 (*Not at all*) to 5 (*Extremely*). Standard deviations appear in parentheses.

A 2×2 analysis of variance of condition showed a main effect of partner behavior on relational evaluation, $F(1, 267) = 440.57$, $p < .001$, $\eta_p^2 = .62$, with those who recalled an instance of cell phone-induced ostracism reporting lower relational evaluation ($M = 2.06$, $SD = 1.20$) than those who recalled an inclusion experience ($M = 4.49$, $SD = .62$). There was no significant main effect of conversational seriousness, $F(1, 267) = 1.99$, $p = .159$, $\eta_p^2 < .01$, nor an interaction, $F(1, 267) = 1.02$, $p = .315$, $\eta_p^2 < .01$ (means and standard deviations shown in Table 2).

The same analysis also revealed a main effect of partner behavior on basic needs satisfaction, $F(1, 267) = 299.99$, $p < .001$, $\eta_p^2 = .53$, with those in the cell phone-induced ostracism condition experiencing lower satisfaction ($M = 2.49$, $SD = .79$) than those in the inclusion condition ($M = 3.99$, $SD = .64$). There was also a main effect of conversation type, $F(1, 267) = 7.78$, $p = .006$, $\eta_p^2 = .03$, with those in the serious conversation condition reporting lower levels of basic need satisfaction ($M = 3.16$, $SD = 1.02$) than those in the casual conversation condition ($M = 3.30$, $SD = 1.05$). The interaction was not significant, $F(1, 267) = .06$, $p = .811$, $\eta_p^2 < .01$.

Finally, the same analysis performed on the pain measure showed that cell phone-induced ostracism increased pain ($M = 3.04$, $SD = 1.36$), relative to the inclusion condition ($M = 1.61$, $SD = 1.03$), $F(1, 267) = 54.89$, $p < .001$, $\eta_p^2 = .17$. There was also a main effect of conversation type, $F(1, 267) = 7.23$, $p = .008$, $\eta_p^2 = .03$, such that the serious conversation was reported as more painful ($M = 2.66$, $SD = 1.41$) than the casual conversation ($M = 2.31$, $SD = 1.40$). The interaction was not significant, $F(1, 267) = 1.14$, $p = .286$, $\eta_p^2 < .01$.⁴

Gender moderation

The effect of partner behavior on basic needs was qualified by an interaction with gender, $F(1, 260) = 6.96$, $p = .009$, $\eta_p^2 = .03$; such that the effect of cell phone-induced ostracism was greater for women than for men (see Figure 2). Women reported lower basic needs satisfaction than men in the cell phone-induced ostracism condition, $t(260) = -2.24$, $p = .025$, $d = -.35$, but not the inclusion condition, $t(260) = 1.49$, $p = .138$, $d = .23$. This interaction effect was not qualified by a three-way interaction with conversation type, $F(1, 260) = 1.89$, $p = .170$, $\eta_p^2 = .01$, nor did gender and conversation type interact, $F(1, 260) = .73$, $p = .395$, $\eta_p^2 < .01$.

A similar interaction pattern was observed with respect to relational evaluation, $F(1, 260) = 3.95$, $p = .048$, $\eta_p^2 = .02$, however simple effects of gender were not significant in either condition, strongest $t(260) = -1.62$, $p = .105$, $d = -.22$. Gender did not significantly moderate the effect of partner behavior on pain, $F(1, 260) = 3.02$, $p = .083$, $\eta_p^2 = .01$, or recalled ostracism $F(1, 260) = 2.49$, $p = .116$, $\eta_p^2 = .01$.

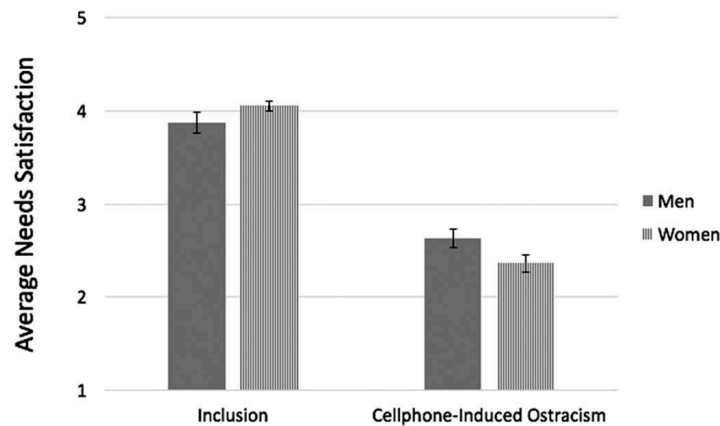


Figure 2. Basic needs satisfaction for men and women in Study 2 ($N = 268$), interaction, $F(1, 260) = 6.96$, $p = .009$, $\eta_p^2 = .03$. Error bars represent ± 1 standard error of the mean.

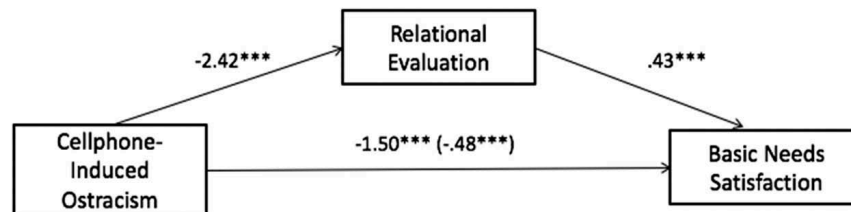


Figure 3. Indirect effect of partner behavior on basic needs satisfaction through relational evaluation in Study 2 ($N = 256$). Coefficient in parentheses is the direct effect of partner behavior, controlling for relational evaluation.

Relational evaluation mediation

We tested relational evaluation as a mediator of the effect of partner behavior on basic needs using Hayes's Process (2013; Model 4; see Figure 3). The indirect effect of relational evaluation was significant, 1.02, 5000 bootstrap 95% confidence interval $[-1.30, -.77]$. The mediation was partial; the direct effect of partner behavior remained significant after controlling for relational evaluation, $b = -.47$, $t(268) = -4.01$, $p < .001$.

We performed an additional exploratory analysis using Hayes's Process model 59 (2013) to test whether this indirect effect was moderated by either conversation type or gender. Results did not find evidence of moderated mediation (Hayes, 2015) by either conversation type (index of moderated mediation = .30, 95% confidence interval $[-.19, .80]$), or by gender (index of moderated mediation = $-.34$, 95% confidence interval $[-.90, .19]$).⁵

Discussion

Successfully replicating the results of Study 1, Study 2 found that individuals recall feeling ostracized when a conversation partner uses their cell phone during the interaction; and that these individuals also recall threatened basic needs and feelings of pain. Study 2 also replicated the finding that these negative effects are stronger for women. Additionally, this study extends the previous findings by demonstrating that cell-phone induced ostracism elicits feelings of relational devaluation; these feelings account for some, but not all, of the effect on basic needs satisfaction.

Interestingly, these results also suggest that people recall cell phone induced-ostracism as painful not only during serious conversations, but also during casual conversations. This finding is consistent with prior research on how cell phones can compromise the quality of conversations (Misra et al., 2016; Przybylski & Weinstein, 2013; Vanden Abeele et al., 2016). Further, this lack of

moderation by conversation type is consistent with the typical unmoderated *reflexive* effects in the ostracism literature (e.g., Gonsalkorale & Williams, 2007).

Surprisingly, people also tended to report more negative outcomes in the serious conditions than in the casual conditions. It is important to note that these effects sizes were smaller than those for the partner behavior factor. Reviewing the content of people's past experiences, it seemed many participants in the serious conversation selected topics relating to personal challenges or difficulties for which they were seeking support. It is likely that negative main effects of conversation seriousness were due to the topics that were selected.

General discussion

Cell phones are powerful tools that offer tremendous practical and social benefits. However, the present research suggests that using them in the context of face-to-face conversations can produce serious negative consequences, even in the context of casual conversations. These studies suggest that the effect of cellphone use on basic needs satisfaction is not just present, but meaningfully large, with effect sizes greater than a standard deviation. Given the ubiquity of cellphone use in the modern age, it is important to be mindful of the potential impact that they may have on the emotional state of one's in-person interaction partner. In this sense, the use of cell phones is similar to a number of other common behaviors that at first seem harmless, but can actually threaten basic psychological needs, such as using gender-exclusive language (Stout & Dasgupta, 2011), displaying religiously-exclusive decorations (Schmitt, Davies, Hung, & Wright, 2010), or speaking in a language not-understood by everyone present (Hitlan, Zárate, Kelly, & DeSoto, 2016).

People use cell phones predominantly for interpersonal reasons (Jin & Park, 2010). However, indiscriminate cell phone-use may paradoxically close people off from the most immediate and available sources of connection. In fact, observational research in public areas finds evidence of cell phone-contagion: When one person uses a cell phone, their companion is likely to do so shortly thereafter (Finkel & Kruger, 2012). Based on the current research, it is possible that when people respond to cell phone-induced ostracism by using a cell phone themselves, they are engaging in a process of "social snacking" (Gardner, Pickett, & Knowles, 2005) by seeking reminders of affiliation through their own cell phone.

Both studies found that women responded more strongly than men to being ignored for a cell phone. This finding is consistent with gender research and theory emphasizing gender differences in interdependence and communal orientation (e.g., Eagly, 2009), and also with polling showing that women are more likely to report that using phones in social gatherings hurts the group (Rainie & Zickuhr, 2015). Women tend to use cell phones more frequently in public than men (Finkel & Kruger, 2012; Wei & Lo, 2006), however the present findings suggest women respond more negatively when others do the same (or at least when they do so during a conversation).

The current findings complement and expand on those of earlier studies. It appears that cell phone use during a conversation not only decreases conversation quality (Vanden Abeele et al., 2016), but also causes the other person to feel devalued and threatens their basic needs. Additionally, prior work has not found the effects of cell phone use to depend on whether the partner is a stranger or acquaintance (Vanden Abeele et al., 2016). The current study finds a similar lack of moderation by a situational factor; the effect was not greater in the context of serious conversation.

The current findings diverge slightly from earlier work, which did not find an overall effect of cell phone use on basic psychological needs (Gonzales & Wu, 2016). One key difference in methods that may account for the different findings is that this earlier work measured the effects of being ignored by a stranger one had just met, whereas in the current study participants recalled a time they were ignored by someone with whom they usually had an existing relationship. It is possible that the effects of cellphone induced ostracism are smaller when the source is unfamiliar to the target. It is also possible that this difference is due to the relatively smaller sample size used in this earlier work. Importantly, Gonzales and Wu (2016) did observe need-threat in individuals who tended to be

highly stressed by technology. Future work should continue to assess individual differences related to sensitive to cell phone-induced ostracism.

Limitations

The present research used an autobiographical recall method. This method has the advantage of capitalizing on participants' actual experiences, and has been effectively used to test hypotheses related to ostracism (e.g., Pickett et al., 2004), and also in studies examining the lingering effects of exposure to frightening media (e.g., Cantor, 1999). However, it is also limited in its psychological realism and can be subject to memory biases, which may explain why recall paradigms can have different (typically weaker) effects than in vivo manipulations (Godwin et al., 2014). Research should continue to test the possible outcomes of in-vivo experiences of cell phone-induced ostracism (as in Vanden Abeele et al., 2016).

Conclusion

To conclude, people have a fundamental need to belong (Baumeister & Leary, 1995). Emerging communication technologies can promote the satisfaction of this need. But if used indiscriminately, they may also interfere with the satisfaction of this need.

Notes

1. We conducted an exploratory/posthoc coding of the responses to probe possible of relationship to the conversation partner (inter-rater reliability = .99; Hayes & Krippendorff, 2007), and whether the topic of the conversation involved a hardship or challenge (reliability = .77). Relationships were categorized as either with a friend (44.7%), romantic partner (5.3%) or not specified/other (50%). Within the cellphone-induced ostracism condition, relationship type was not significantly related to basic needs satisfaction $F(2, 51) = 1.21, p = .307, \eta_p^2 = .05$. Conversation topics were categorized as either relating to a personal hardship/challenge (32.4%) other, such as gossip/social information (41.2%), or not specified (26.5%). Within the cellphone-induced ostracism condition, this factor was not significantly related to basic needs satisfaction $F < 1$.
2. We also measured whether participants used their phone or another device during the event. This did not moderate the effect of condition on need satisfaction, or perceptions of ostracism, largest $F(2, 144) = 1.39, p = .253, \eta_p^2 = .02$. It did moderate pain ratings, $F(2, 144) = 3.23, p = .043, \eta_p^2 = .04$, with people who used a device reporting less pain in the inclusion condition, $t(144) = -2.00, p = .047, d = -.60$, but not the control condition, $t(144) = .05, p = .958, d = .02$, or cell phone-induced ostracism condition, $t(144) = 1.56, p = .121, d = .45$.
3. Our preregistration did not specify that participants would be excluded for non-valid writing response. Including these participants does not meaningfully change the results.
4. As in Study 1 we coded responses for type relationship (reliability = .92) and conversation topic (reliability = .78). Relationships were categorized as either with a friend (59.4%), romantic partner (3.3%) or not specified/other (37.3%). This factor moderated the effect of cellphone-induced ostracism, $F(2, 259) = 4.37, p = .014, \eta_p^2 = .03$, such that the effect was greater for those who specified that the partner was their friend, $F(1, 259) = 239.10, p < .001, \eta_p^2 = .48$, than those who either did not specify or were talking to a relation other than friend, $F(1, 259) = 73.09, p < .001, \eta_p^2 = .22$, and smallest for those who specified a romantic partner, $F(1, 259) = 7.21, p = .008, \eta_p^2 = .03$. Conversation topics were categorized as either relating to a personal hardship/challenge (18.5%) other, such as gossip/social information (38.7%), or not specified (42.8%). Those in the serious conditions were more likely to discuss a hardship/challenge (25.8%) than those in the casual conditions (12.2%), $\chi^2 = 10.27, p = .006$. Overall, those who discussed a hardship/challenge reported lower basic needs, $F(1, 268) = 7.06, p = .001, \eta_p^2 = .05$.
5. As in Study 1, we also measured whether participants used a device during the event. This did not moderate the effect of cell phone-induced ostracism on relational evaluation, needs, or pain, largest $F(1, 263) = 2.53, p = .113, \eta_p^2 = .01$. It did moderate feelings of ostracism, $F(1, 263) = 6.64, p = .010, \eta_p^2 = .03$, with those who used their phone feeling less ostracized in the cell phone-induced ostracism condition, $t(263) = 1.98, p = .049, d = -.35$, but not significantly in the control condition, $t(263) = -1.71, p = .090, d = -.51$.

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