

Can Burdensome Facebook “Friends” Cause You Pain? Self-Reported Pain as a Motivation for Exclusion

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People need positive social connections, which Facebook can fulfill. However, some Facebook “friends” are poor social exchange partners due to inhibiting a Facebook user’s ability to socially connect online. Poor partners may be burdensome and a Facebook user may distance oneself from the burdensome person. We contend pain is a physical signal that motivates exclusionary behaviors towards burdensome others. We manipulated burden by having participants recall (Study 2) or, in Studies 1 and 3, read and think about a Facebook friend who was burdensome, neutral, or rewarding. When recalling or thinking about a burdensome, compared to rewarding or neutral, Facebook friend, participants self-reported more pain, increased negative affect, and indicated they would do more exclusionary Facebook behaviors. Moreover, physical and affective components of self-reported pain mediated the relation between burden and exclusionary behavior. Interactions on Facebook with poor exchange partners (i.e., burdensome) can cause both self-reported physical and psychological distress.

Keywords: Pain, Exclusion, Sources of Exclusion, Burden, Facebook, Media.

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Social networking sites, like Facebook, serve as an easily accessible and always available means to socially connect. People now have perpetual access to a large number of the individuals that comprise their social world; connecting with others is now as easy as reaching for a mobile phone and opening a social media app. Using social media to fulfill one’s social needs (e.g., belonging) means that one need not be physically close to others or even ensure that others are available for interaction (see McKenna & Bargh, 2000 for discussion). This easy access to others through mediated social interaction is important because people have a fundamental need for positive social interactions with others (Baumeister & Leary, 1995) and people are increasingly turning to social media to satisfy this social need (Knowles, Haycock, & Shaikh, 2015; Okdie & Ewoldsen, 2018; Sheldon, Abad, & Hinsch, 2011). In fact, Facebook is such a part of daily life that merely thinking about being disconnected from a social networking site causes distress in some users, as limiting its use effectively limits people’s ability

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to socially connect with others, which may be harmful (Chiou, Lee, & Liao, 2015). People may also use mediated technology as a social surrogate for more meaningful face-to-face interactions. However, being on Facebook is not always socially satisfying.

We will demonstrate that people can have such an aversive response when their efforts to connect with others are thwarted by a burdensome Facebook “friend,” that Facebook users may have a physiological response: self-reported pain. Our research goes beyond affect, behavioral, and cognitive reactions to mediated communication by examining physiological reactions.

Research supports the contention that not all mediated social interactions are beneficial. In fact, negative experiences on social media positively correlated with increased depressive symptoms (Primack et al., 2018). For instance, Facebook use can lower self-esteem (Vogel, Rose, Okdie, Eckles, & Franz, 2015) and prolong feelings of misery following a break up (Tran & Joorman, 2015). Although researchers have studied the social costs of Facebook use, none have extended these costs to feelings of pain. We examined whether interacting with burdensome others (Wirth, Turchan, Zimmerman, & Bernstein, 2014) on Facebook might cause pain and prompt the exclusion of the burdensome other. The current research will expand on the use of mediated interaction to satisfy social needs by indicating that the aversive outcomes of Facebook use go beyond the psychological distress described above to also include self-reported physical pain.

Painful Facebook friends

Facebook friends can be beneficial unless they are burdensome. We conceptualize burdensome others as those who are poor social exchange partners—those individuals whose costs outweigh their benefits (adapted from Kurzban & Leary, 2001). To minimize these unpleasant interactions Kurzban and Leary (2001) argue that humans have developed cognitive adaptations to avoid poor social exchange partners. Support for this argument can be seen in Social Exchange Theory which posits that individuals are motivated to maximize benefits and minimize costs in social relationships (Thibaut & Kelley, 1959). Thus, people are motivated to be in equitable relationships and when there is inequity, such as interacting with burdensome others, people will be motivated to distance themselves from the relationship (Hatfield, Traupmann, Sprecher, Utne, & Hay, 1985). In the case of the current set of studies, we argue that interacting with Facebook friends whose costs outweigh their benefits (i.e., they are burdensome), triggers existing cognitive adaptations that lead to withdrawal in the form of exclusionary behaviors. That is, Facebook friends who post excessively and engage in other disruptive behavior inhibit social connection and are more likely to be excluded, compared to rewarding Facebook friends. For example, a Facebook friend who posts status updates constantly prohibits their friends from effectively meeting their social needs by clogging their news feed making it unlikely their friends can see other posts and socially connect with people. Research suggests that we may exclude burdensome Facebook friends, someone who is disdained, rather than enduring an unpleasant interaction (Ciarocco, Sommer, & Baumeister, 2001). Supporting this thinking, when a group member delayed the completion of a ball-toss game, participants deemed the group member burdensome and remediated the burden by ostracizing (excluding and ignoring) the group member (Wesselmann, Wirth, Pryor, Reeder, & Williams, 2013).

We contend that in addition to cognitive adaptations, individuals may have developed a physical adaptation to motivate action—pain—triggered by classes of negative environmental stimuli. Burdensome individuals are possibly one of the many classes of negative stimuli that trigger the pain system and motivate avoidance behavior. In the case of burdensome others, pain likely motivates ostracizing burdensome individuals. The proposition of burdensome individuals causing pain is

similar to that of Cosmides (1989; Cosmides & Tooby, 1992) who put forth that subsystems exist to detect cheaters, those who take benefits without proper repayment. After detecting a cheater, individuals are motivated to exclude them from further interactions as punishment.

We used previous research linking social interactions to physical pain as the basis for our proposition that pain could alert individuals to burdensome others and also be a motivation for exclusion. Existing literature suggests physical and psychological pain systems overlap (see Eisenberger & Lieberman, 2004; MacDonald & Leary, 2005 for discussions of theoretical reasons for this overlap). For instance, the μ -opioid receptor gene was related to increased neural response to rejection in brain regions associated with physical pain (Way, Taylor, & Eisenberger, 2009). When researchers (Kross, Berman, Mischel, Smith, & Wager, 2011) manipulated physical pain and social rejection experimentally, they found both experiences activated brain areas associated with physical pain. Imaging studies demonstrate social exclusion experiences, such as ostracism, activate brain areas associated with physical pain (Eisenberger, Lieberman, & Williams, 2003; Onoda et al., 2010). Moreover, physical pain relievers reduced psychological pain. For example, a common physical pain reliever (acetaminophen) reduced hurt feelings and activation in areas of the brain, such as the dorsal anterior cingulate cortex, related to pain following being socially excluded (DeWall et al., 2010). Likewise, opiates relieved distress caused by separation (Panksepp, Herman, Conner, Bishop, & Scott, 1978). As an additional analgesic, the social connection caused by being shown a picture of a loved one resulted in reduced physical pain (Master et al., 2009). Thus, there is a number of studies demonstrating that social interactions can cause physical pain. Therefore, it is likely that burdensome encounters on Facebook could result in pain that motivates the exclusion of burdensome Facebook friends.

Given the importance of addressing social threats, pain may be an appropriate alert mechanism to a burdensome individual because pain is an evolved mechanism designed to limit the harm caused by aversive events (Crombez, Baeyens, Vansteenwegen, & Eelen, 1997). Pain signals danger to an individual (Eccleston & Crombez, 1999) and alerts the individual to take action (see MacDonald & Jensen-Campbell, 2011 for discussion). Additionally, pain may be a more direct and clear signal given that responses, such as negative affect, can be misattributed (Dutton & Aron, 1974). Pain that signals threat could consist of both sensory (physical) and affective components (Melzack, 1987). The sensory component of pain highlights physical pain properties such as spatial, pressure, and thermal while the affective component of pain highlights emotional properties such as tension and fear. Assessing both properties of pain is important as one can experience sensory aspects of pain while also experiencing the negative affect stemming from the pain. General negative affect appears to be driven by a mood disposition (Watson & Clark, 1984) while pain is driven by an unpleasant sensory and emotional experience (Melzack, 1987). While individuals may have a multitude of reactions to burdensome others, many of them likely stem from the initial pain (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). Thus, we chose to examine pain as one potential intervening variable between burden and exclusion. Additionally, we examine whether these evolutionary processes still hold in modern technology-mediated environments such as Facebook.

Overview

Increasing numbers of people are turning to social media to satisfy their social needs, but instead may encounter burdensome others that limit social connection. Research suggests people want to avoid poor social exchange partners (those who are burdensome) and this avoidance may stem from activation of the pain system. Consequently, we hypothesized that participants are more likely to experience pain, increased negative affect, and exclude a burdensome Facebook friend, compared to Facebook

friends who are rewarding or neutral. Moreover, we hypothesized that self-reported pain (sensory and affective) would mediate the relation between burden and exclusion on Facebook. We began testing these hypotheses in Study 1.

To supplement our current studies and analyses, we posted information on an Open Science Framework (OSF) page: <https://osf.io/g2mes/>. The supplementary materials include methods and results of a pilot study, which demonstrated individuals do engage in exclusionary behaviors on Facebook and are more likely to exclude burdensome Facebook friends. In the interest of brevity, and because inclusionary behaviors were not central to our hypothesis, discussion of the inclusionary behavior results for all studies can also be found in supplemental materials. Results tables include statistics for inclusionary behaviors.

Study 1

Methods

Participants

We collected data from a total of 253 participants but removed 13 participants because they did not have sufficient data for analyses. The remaining 240 participants had an active Facebook account (82 Females; 1 Transgender person; $M_{\text{age}} = 35.88$, $SD_{\text{age}} = 11.97$) who were recruited through Mechanical Turk and paid \$.50 for their participation. To qualify for Studies 1, 2, and 3, Mechanical Turk users had to have a human intelligence tasks (HIT) approval rating greater than or equal to 98% (i.e., the percentage of assignments submitted that have been approved for payment) and have greater than 100 HITs approved in the past. We recalculated all analyses in each study with the fastest 5% of participants removed as they are likely to have experienced a weaker manipulation (e.g., Simpson, Herman, Lehtman, & Fuller, 2016). Removing participants (Study 1 $n = 13$, Study 2 $n = 7$, Study 3 $n = 6$) does not change the pattern of results. Ethnicity was self-reported and 77% of participants identified as Caucasian, 8% Black or African American, 8% Asian, 1% American Indian or Alaskan Native, and 6% as Other. Participation in each study took less than 25 minutes.

In Study 1, we intended to collect 140 participants—approximately 30 per condition—with some additional participants to account for attrition. A post hoc power analysis indicated that 28 participants per cell would be needed to detect a large effect at 90% power. Due to an error running Study 1, we collected more participants than intended, but we returned to our original sample size goal for Studies 2 and 3.

Procedure

Participants were randomly assigned to form an impression of a Facebook friend who we described as burdensome, neutral, or rewarding based on the friend’s behavior. The vignettes were created from participants in a pilot study who described burdensome, neutral, or rewarding Facebook friends. A burdensome Facebook friend was described as bombarding participants’ newsfeed with volatile, extraneous posts and acting in ways that made interactions unpleasant. For example, participants read that a burdensome Facebook friend would “constantly post sayings, pictures, results from quizzes, and information about celebrities making it so you can barely see posts from others on your news feed.” Conversely, a rewarding Facebook friend was described as having a moderate rate of enjoyable posts and engaged the participant in a positive way. For example, a rewarding Facebook friend, “shares just the right amount of information about themselves. They share nice pictures of their family and are open about their hobbies.” The neutral Facebook friend was at neither of these extremes. See supplemental material for all study materials.

Dependent measures

Facebook behaviors Participants rated how tempted they were to do 10 inclusionary (e.g., "accept a friend request," "tag someone in a post on Facebook"; $\alpha = .95$) and seven exclusionary (e.g., "deny a friend request," "ignore a message from a Facebook friend"; $\alpha = .95$) Facebook behaviors towards the friend described in the vignette. Participants indicated their temptations on a 9-point scale (1 = *Not at tempted*; 9 = *Very tempted*). The behaviors used in the scale items were created through consultation with a small group of Facebook users.

Burden scale To assess how burdensome participants perceived the Facebook friend to be, they completed a modified version of the burden subscale of the Interpersonal Needs Questionnaire (INQ) (e.g., "I believe this person would be a burden to my Facebook experience"; Van Orden, Witte, Gordon, Bender, & Joiner, 2008). One item did not translate well and was removed, leaving eight items ($\alpha = .90$) rated on a 7-point scale (1 = *Not at all true*; 7 = *Very true*).

Pain index and negative affect We adopted a previous conceptualization of pain as having both sensory (e.g., physical, spatial, pressure, thermal responses) and affective components (e.g., tension, fear; Melzack, 1987). To assess sensory pain, we adapted the commonly implemented Numeric Rating Scale (NRS-11) pain measure (0 = *No pain*; 10 = *Worst pain imaginable*; Hartrick, Kovan, & Shapiro, 2003) in which participants reported how much pain they "experienced while forming their impression of the person described earlier." The NRS-11 pain measure is valid and reliable assessment of pain (Jensen, 2003) and is responsive to changes in physical pain (Herr, Mobily, & Richardson, 1998). Additionally, we used the Pain Faces Scale which consists of a series of faces ranging from 0 = *No Hurt* to 10 = *Hurts Worse*; Wong & Baker, 1988). The Pain Faces Scale correlates strongly with other established pain measures (Gharaibeh & Abu-Saad, 2002) and it is an effective means of measuring pain in Intensive Care Units (Terai, Yukioka, & Asada, 1998). The Pain Faces Scale is also used in medical settings (Garra et al., 2010) to assess pain in domains such as cancer treatment (Broome, Lillis, McGahee, & Bates, 1994; Jensen, 2003) and pain management (Gedaly-Duff & Burns, 1992). We averaged the highly-correlated measures ($r = .79, p < .001$) together to create a pain index (Spearman-Brown Coefficient = .88).

To assess negative affect (that may stem from the pain), participants completed a 10-item Positive (e.g., Alert, Determined, Inspired) and Negative (e.g., Scared, Upset, Nervous) Affect Schedule (PANAS) (Mackinnon et al., 1999; 1 = *Very slightly to not at all*; 5 = *Extremely*) scored so higher values indicated more negative affect ($\alpha = .74$).

Manipulation check Participants reported how pleasant they found the Facebook friend on an 8-point (0 = *Unpleasant*; 7 = *Pleasant*) scale.

Results

Manipulation check

Demonstrating our manipulation was successful, post hoc tests (all post hoc tests are Bonferroni adjusted) following a significant one-way ANOVA indicated that participants differed significantly in how pleasant they found the Facebook friend (see Table 1 for complete inferential and descriptive statistics). A burdensome Facebook friend was less pleasant than a rewarding or neutral Facebook friend ($ps < .001, ds \geq 2.43$), and a neutral Facebook friend was less pleasant than a rewarding Facebook friend, $p < .001, d = 1.95$.

Facebook behaviors

To examine Facebook behaviors, we conducted a mixed-design factorial ANOVA with Facebook Behavior (inclusionary vs. exclusionary) as a within-participants factor and Facebook Friend (burden vs. neutral vs. rewarding) as a between-participants factor. Participants were more tempted to use inclusionary ($M = 4.36, SD = 2.57$) compared to exclusionary ($M = 3.96, SD = 2.87$) behaviors,

Table 1 Inferential and Descriptive Statistics for Dependent Variables in Study 1

Dependent Variables	Burden		Condition Neutral		Rewarding		Burden vs. Rewarding	95% CI Confidence Intervals	
	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)		Burden vs. Neutral	Rewarding vs. Neutral
Manipulation Check	1.59 _a	(1.15)	4.45 _b	(1.21)	6.52 _c	(.91)	[4.53, 5.33]	[−3.28, −2.43]	[1.64, 2.51]
<i>F</i> (2,236) = 441.24, <i>p</i> < .001, η_p^2 = .78									
Exclusionary Facebook Behaviors	7.09 _a	(1.64)	2.40 _b	(1.71)	1.83 _b	(1.21)	[4.69, 5.81]	[4.09, 5.28]	[−1.17, .03]
<i>F</i> (2,237) = 302.21, <i>p</i> < .001, η_p^2 = .71									
Inclusionary Facebook Behaviors	2.01 _a	(1.41)	4.73 _b	(1.67)	6.63 _c	(1.88)	[−5.23, −4.01]	[−2.08, −3.36]	[1.24, 2.55]
<i>F</i> (2,237) = 169.07, <i>p</i> < .001, η_p^2 = .58									
Burden	5.39 _a	(1.07)	2.19 _b	(.87)	2.13 _b	(.79)	[2.91, 3.60]	[2.84, 3.56]	[−.42, .31]
<i>F</i> (2,236) = 337.57, <i>p</i> < .001, η_p^2 = .74									
Pain Index	3.02 _a	(2.17)	1.47 _b	(1.04)	1.39 _b	(1.11)	[1.04, 2.20]	[.93, 2.16]	[−.70, .55]
<i>F</i> (2,237) = 28.38, <i>p</i> < .001, η_p^2 = .19									
Negative Affect	2.79 _a	(.49)	2.57 _b	(.42)	2.01 _c	(.50)	[.60, .96]	[.03, .40]	[−.75, −.37]
<i>F</i> (2, 237) = 59.09, <i>p</i> < .001, η_p^2 = .33									

Note: Means with differing subscripts within a row are significantly different from one another at $p \leq .05$ using Bonferroni post hoc tests. Differences in degrees of freedom are due to participants' ability to skip questions.

$F(1,237) = 14.05, p < .001, \eta_p^2 = .05$. We also found a significant main effect of Facebook Friend, $F(2,237) = 32.70, p < .001, \eta_p^2 = .21$; however, these main effects were qualified by our hypothesized Facebook Behavior \times Facebook Friend interaction, $F(2,237) = 288.31, p < .001, \eta_p^2 = .70$.

Breaking down the significant two-way interaction, post-hoc tests from a significant one-way ANOVA indicated participants were significantly more tempted to engage in exclusionary behaviors towards a burdensome Facebook friend compared to a rewarding or neutral Facebook friend, $ps < .001, ds \geq 2.80$.

Burden, pain, and negative affect

Post hoc tests following significant one-way ANOVAs indicated participants perceived the burdensome Facebook friend as more burdensome ($ds > 3.21$), painful ($ds > .87$), and also causing more negative affect ($ds > .46$) compared to a rewarding or neutral friend, $ps < .001$. The participants' perceptions of burdensomeness ($d = .06$) and the amount of pain ($d = .06$) they reported did not differ between rewarding and neutral Facebook friends, $ps = 1.00$. However, participants reported that a neutral Facebook friend produced significantly more negative affect compared to a rewarding Facebook friend, $p < .001, d = 1.19$.

Mediation of exclusionary Facebook behavior

To examine whether self-reported pain (sensory and affective) mediated the relation between burden and exclusionary or inclusionary Facebook behaviors, we conducted mediational analyses testing both mediators simultaneously using the PROCESS macro (Hayes, 2013). Because we tested a mediation model containing a multicategorical independent variable, we dummy coded our independent variable into two binary variables (Hayes & Preacher, 2014). To create the Burden variable, the Burden condition was coded as 1 and the neutral and rewarding conditions were coded as 0. To create the Rewarding variable, the Rewarding condition was coded as 1 and the Burden and Neutral conditions were coded as 0. We ran separate mediational analyses using the Burden dummy-coded variable as the predictor while controlling for the Rewarding dummy-coded independent variable (Hayes & Preacher, 2014); we did this separately for inclusionary and exclusionary behaviors. The mediation analyses produced confidence intervals bootstrapped with 5,000 iterations.

Consistent with our hypothesis, self-reported pain ($b = .19; 95\%C.I. = [.006, .44]$) and negative affect ($b = .14; 95\%C.I. = [.04, .32]$) significantly mediated the relation between burden and exclusionary behaviors. See supplemental materials for complete mediation statistics for all mediational analyses.

Study 1: Conclusion

Consistent with our first hypothesis, participants perceived burdensome Facebook friends as more burdensome, caused more self-reported pain, and increased negative affect compared to rewarding or neutral friends. Supporting our second hypothesis, mediation testing revealed that both self-reported pain and negative affect motivated greater exclusionary Facebook behavior. We designed Study 2 to replicate the findings in Study 1 using a recall paradigm and to include refined measures of sensory and affective pain.

Study 2

Methods

Participants

U.S. Mechanical Turk participants (131; 85 Females, 1 Transgender person; $M_{\text{age}} = 35.24, SD = 11.26$; 84% Caucasian), with active Facebook accounts were paid \$.50 for their participation. This approach

resulted in a sample of participants that self-identified as 75% Caucasian, 6% Black or African American, 8% Asian, and 11% as Other.

Procedure

Participants were randomly assigned to recall a burdensome, rewarding, or neutral Facebook friend and write about the things that made the Facebook friend they recalled fit the assigned condition. Specifically, participants were asked to “bring to mind and describe a time when you interacted with one of your Facebook friends, such as viewing their content, and they were [burdensome/neutral/rewarding]. Recall this occasion and list as many things as possible that made this interaction with your Facebook friend [burdensome/neutral/rewarding].” Participants answered the same dependent measures used in Study 1 and all measures had adequate reliability: Temptation to engage in inclusionary ($\alpha = .94$) and exclusionary behaviors ($\alpha = .94$), burdensomeness of imagined Facebook friend ($\alpha = .88$), negative affect (PANAS; $\alpha = .76$), and self-reported pain index (Spearman-Brown Coefficient = .87).

Additionally, to include a more sensitive assessment of sensory and affective pain, we added the Short-form McGill Pain Questionnaire (SF-MPQ) (Melzack, 1987), which is also a well-validated (Grafton, Foster, & Wright, 2005), commonly used (Gilron et al., 2005) measure of physical pain. The SF-MPQ is highly correlated with and derived from one of the most prevalent pain assessment tools (Melzack, 1987), The McGill Pain Scale. Participants were asked to “choose the number that best describes the intensity of each of the pain and related symptoms that you felt while thinking about your Facebook friend that fit the description.” The SF-MPQ assesses both sensory (e.g., stabbing, shooting, gnawing, hot-burning; 11 items; $\alpha = .93$) and affective (e.g., sickening, tiring-exhausting, fearful, punishing-cruel; 4 items; $\alpha = .83$) components of pain on a 11-point scale (0 = *No pain*; 10 = *Worst pain imaginable*). The SF-MPQ has good validity and reliability (Wright, Asmundson, & McCreary, 2001) and has been used to assess pain in many areas such as chronic cancer pain (Dudgeon, Raubertas, & Rosenthal, 1993) and fibromyalgia syndrome (Burckhardt, Archenholtz, Mannerkorpi, & Bjelle, 1993).

Results

Manipulation check

Following a significant one-way ANOVA, post hoc analyses indicated that our manipulation had the intended effect as participants indicated a burdensome Facebook friend was significantly less pleasant compared to a rewarding or neutral Facebook Friend, $ps \leq .001$, $ds \geq 1.55$ (see Table 2 for inferential and descriptive statistics). Also, as intended, a neutral Facebook friend was perceived as less pleasant than a rewarding Facebook friend, $p = .019$, $d = .68$.

Facebook behaviors

The mixed-design factorial ANOVA indicated that participants were more tempted to use inclusionary ($M = 4.74$, $SD = 2.56$) compared to exclusionary ($M = 2.73$, $SD = 2.42$) behaviors, $F(1,128) = 56.09$, $p < .001$, $\eta_p^2 = .30$. Additionally, we found a significant main effect of Facebook Friend, $F(2,128) = 4.91$, $p = .009$, $\eta_p^2 = .07$. These main effects were qualified by our predicted Facebook Behavior \times Facebook Friend interaction, $F(2,128) = 67.71$, $p < .001$, $\eta_p^2 = .51$.

Investigating the two-way interaction, a significant one-way ANOVA revealed that participants were significantly more tempted to engage in exclusionary behaviors towards a burdensome Facebook friend compared to a rewarding or neutral Facebook friend, $ps < .001$, $ds \geq 1.26$. There was no significant difference in exclusionary behavior between the neutral and rewarding Facebook friend, $p = .565$, $d = 0.43$.

Table 2 Inferential and Descriptive Statistics for Dependent Variables in Study 2

Dependent Variables							95% CI Confidence Intervals		
	Burden		Condition Neutral		Rewarding		Burden vs. Rewarding	Burden vs. Neutral	Rewarding vs. Neutral
	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)			
Manipulation Check $F(2,127) = 64.18, p < .001, \eta_p^2 = .50$	3.59 _a	(2.10)	6.42 _b	(1.46)	7.40 _c	(1.20)	[-4.67, -2.97]	[-3.70, -1.98]	[.12, 1.84]
Exclusionary Facebook Behaviors $F(2,128) = 40.88, p < .001, \eta_p^2 = .39$	4.83 _a	(2.75)	1.95 _b	(1.65)	1.40 _b	(.76)	[2.43, 4.41]	[1.89, 3.87]	[-1.53, .45]
Inclusionary Facebook Behaviors $F(2,128) = 48.54, p < .001, \eta_p^2 = .43$	2.71 _a	(1.79)	4.70 _b	(2.17)	6.81 _c	(1.86)	[-5.10, -3.08]	[.97, 3.00]	[1.09, 3.11]
Burden $F(2,128) = 64.39, p < .001, \eta_p^2 = .50$	4.19 _a	(1.52)	2.11 _b	(.89)	1.86 _b	(.43)	[1.77, 2.86]	[1.53, 2.62]	[-.78, .30]
Pain Index $F(2,128) = 60.36, p < .001, \eta_p^2 = .48$	4.55 _a	(2.29)	1.54 _b	(1.28)	1.25 _b	(.58)	[2.49, 4.10]	[2.20, 3.82]	[-1.09, .52]
Negative Affect $F(2,128) = 33.95, p < .001, \eta_p^2 = .34$	2.84 _a	(.50)	2.46 _b	(.49)	1.89 _c	(.61)	[.66, 1.22]	[.10, .66]	[-.84, -.28]
Sensory Pain $F(2,128) = 8.60, p < .001, \eta_p^2 = .11$	2.78 _a	(1.85)	1.71 _b	(1.67)	1.50 _b	(.99)	[.47, 2.08]	[.26, 1.87]	[-1.01, .60]
Affect Pain $F(2,128) = 31.76, p < .001, \eta_p^2 = .32$	4.16 _a	(2.25)	1.89 _b	(1.92)	1.34 _b	(.71)	[1.91, 3.73]	[1.35, 3.19]	[-1.46, .36]

Note: Means with differing subscripts within a row are significantly different from one another at $p \leq .05$ using Bonferroni post hoc tests. Differences in degrees of freedom are due to participants' ability to skip questions.

Burden, pain, and negative affect

Post hoc tests following significant one-way ANOVAs confirmed that participants perceived burdensome Facebook friends as more burdensome ($ds \geq 1.66$), painful (pain index $ds \geq 1.61$, sensory pain $ds \geq .65$, affective pain $ds > 1.08$), as well as causing more negative affect ($ds > .76$) compared to rewarding or neutral friends, $ps < .006$. Participants' did not differ in their perceptions of burdensomeness ($d = .35$) and their reports of pain (pain index $d = .29$, sensory pain $d = .13$, affective pain $d = .38$) between rewarding and neutral Facebook friends, $ps \geq .446$. Yet, participants reported that a neutral Facebook friend produced significantly more negative affect compared to a rewarding friend, $p < .001$, $d = 1.02$.

Mediation of exclusionary Facebook behavior

Self-reported Pain (i.e., pain index) significantly mediated the relation between burden and exclusionary behaviors ($b = .90$; 95% C.I. = [.05, 1.66]) while negative affect (PANAS; $b = .20$; 95% C.I. = [−.02, .57]) did not. However, affective pain ($b = 1.01$; 95% C.I. = [.18, 2.12]) significantly mediated the relation between burden and exclusionary behaviors but sensory pain did not ($b = -.13$; 95% C.I. = [−.76, .31]).

Study 2: Conclusion

Replicating the Study 1 results, Study 2 results showed that participants recalling a burdensome Facebook friend reported feeling pain, negative affect, and were more inclined to do exclusionary Facebook behaviors. We found mixed support for negative affect and self-reported pain as mediators given that pain (i.e., pain index) and affective pain (i.e., affective McGill subscale) were significant mediators, but these measures were not within the same sets of measures. Study 3 sought to clarify sensory and affective pain as mediators of the link between burden and exclusionary behaviors.

Study 3**Methods***Participants*

Participants (144; 63 Females, 2 Unreported, 1 Transgender person; $M_{age} = 33.54$, $SD = 11.28$; 77% Caucasian) were U.S. Mechanical Turk workers with active Facebook accounts who were paid \$.50 for their participation. This approach produced a sample in which 83% of participants self-identified as Caucasian, 7% Black or African American, 4% Asian, and 6% as Other.

Procedure

The procedure for Study 3 was the same as Study 1; we randomly assigned participants to imagine interacting with a burdensome, rewarding, or neutral Facebook friend. However, in the current study, we asked participants to bring to mind a friend that fits the description we provided of the Facebook friend and to answer the subsequent questions based on that individual. Similar to Study 1, all measures had adequate reliability ($\alpha s \geq .80$). Additionally, as with Study 2, we included the McGill Pain Scale (sensory $\alpha = .95$; affect $\alpha = .86$).

Results*Manipulation check*

The Bonferroni post hoc analyses we conducted following a significant ANOVA demonstrated that participants perceived burdensome Facebook friends as less pleasant compared to rewarding or neutral Facebook friends, $ps < .001$, $ds \geq 1.56$ (see Table 3 for complete inferential and descriptive

Table 3 Inferential and Descriptive Statistics for Dependent Variables in Study 3

Dependent Variable	Condition						95% CI Confidence Intervals	
	Burden		Neutral		Rewarding		Burden vs. Neutral	Rewarding vs. Neutral
	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)		
Manipulation Check $F(2,141) = 83.45, p < .001, \eta_p^2 = .54$	2.97 _a	(2.16)	5.93 _b	(1.59)	7.27 _c	(1.04)	[-5.11, -3.46]	[.50, 2.15]
Exclusionary Facebook Behaviors $F(2,141) = 103.04, p < .001, \eta_p^2 = .59$	6.25 _a	(2.21)	2.10 _b	(1.70)	1.58 _b	(1.15)	[3.80, 5.52]	[-1.38, .34]
Inclusionary Facebook Behaviors $F(2,141) = 71.69, p < .001, \eta_p^2 = .50$	2.16 _a	(1.20)	4.86 _b	(1.76)	6.27 _c	(2.05)	[-4.95, -3.26]	[.56, 2.25]
Burden $F(2,141) = 88.68, p < .001, \eta_p^2 = .55$	4.68 _a	(1.41)	2.27 _b	(1.03)	2.06 _b	(.61)	[2.09, 3.14]	[-.74, .31]
Pain Index $F(2,141) = 38.99, p < .001, \eta_p^2 = .35$	4.87 _a	(2.85)	1.95 _b	(1.51)	1.61 _b	(1.19)	[2.28, 4.24]	[-1.33, .63]
Negative Affect $F(2,141) = 36.70, p < .001, \eta_p^2 = .34$	2.96 _a	(.51)	2.56 _b	(.52)	2.02 _c	(.58)	[.67, 1.21]	[-.81, -.28]
Sensory Pain $F(2,141) = 10.23, p < .001, \eta_p^2 = .12$	3.08 _a	(2.16)	1.79 _b	(1.64)	1.60 _b	(1.29)	[.61, 2.33]	[-1.05, .66]
Affect Pain $F(2,141) = 23.23, p < .001, \eta_p^2 = .24$	3.86 _a	(2.45)	1.68 _b	(1.50)	1.55 _b	(1.47)	[1.38, 3.23]	[-1.05, .79]

Note: Means with differing subscripts within a row are significantly different from one another at $p \leq .05$ using Bonferroni post hoc tests.

statistics). Additionally, as we designed, neutral Facebook friends were perceived as less pleasant than rewarding Facebook friends, $p < .001$, $d = .99$.

Facebook behaviors

A mixed-design factorial ANOVA revealed that participants were more tempted to use inclusionary ($M = 4.43$, $SD = 2.40$) compared to exclusionary ($M = 3.31$, $SD = 2.71$) behaviors, $F(1,141) = 21.18$, $p < .001$, $\eta_p^2 = .13$. Further, we found a significant Facebook Friend main effect, $F(2,141) = 7.38$, $p = .001$, $\eta_p^2 = .09$. Each of these main effects were qualified by our hypothesized Facebook Behavior \times Facebook Friend interaction, $F(2,141) = 120.61$, $p < .001$, $\eta_p^2 = .63$.

Examining the two-way interaction, post hoc tests from a significant one-way ANOVA indicated participants were significantly more tempted to engage in exclusionary behaviors toward a burdensome Facebook friend compared to a rewarding or neutral Facebook friend, $ps < .001$, $ds \geq 2.10$. No significant differences in exclusionary behavior between the neutral and rewarding Facebook friend emerged, $p = .444$, $d = .35$.

Burden, pain, and negative affect

Post hoc tests following significant one-way ANOVAs indicated that participants reported the burdensome Facebook friend as more burdensome ($ds \geq 1.95$), painful (pain index $ds \geq 1.28$, sensory pain $ds \geq .67$, affective pain $ds \geq 1.07$), as well as causing more negative affect ($ds \geq .77$) compared to rewarding or neutral friends, $ps \leq .001$. Highlighting the manipulation on sensory pain, we found significant differences between the burdensome versus neutral or rewarding conditions on eight of 11 sensory SF-MPQ pain items analyzed separately ($ps \leq .033$, $ds \geq .48$).

Participants perceived the rewarding and neutral Facebook friends as similarly burdensome ($d = .24$) and painful (pain index $d = .25$, sensory pain $d = .06$, affective pain $d = .08$), $ps = 1.00$. Although, participants indicated that a neutral Facebook friend caused significantly more negative affect compared a rewarding friend, $p < .001$, $d = .97$.

Mediation of exclusionary behavior

As hypothesized, self-reported pain (i.e., pain index; $b = 1.22$; 95%C.I. = [.74, 1.90]) and negative affect (PANAS; $b = .35$; 95%C.I. = [.16, .63]) significantly mediated the relation between burden and exclusionary behaviors. Moreover, both self-reported sensory ($b = -.38$; 95%C.I. = [-.85, -.09]) and affective pain ($b = 1.65$; 95%C.I. = [1.00, 2.43]), measured by the SF-MPQ, significantly mediated the relation between burden and exclusionary behaviors.

Study 3: Conclusion

We again found that participants indicated burdensome Facebook friends caused them to report pain, increased negative affect, and participants were more likely to indicate they would exclude the friend on Facebook. Additionally, we also found full support for our second hypothesis. Both self-reported pain and negative affect assessed together and the sensory and affective SF-MPQ measures of pain evaluated together were significant mediators of the relation between burdensome and exclusionary behaviors, suggesting part of the motivation to exclude others is due to both the sensory and affective components of pain.

General discussion

Burdensome Facebook friends *can* cause self-reported pain. We found support for this as participants reported feeling more pain, negative affect, and indicated they were more likely to exclude a burdensome friend compared to a rewarding or neutral Facebook friend. As stronger evidence, mediation analyses suggested self-reported pain and the negative affect derived from pain (both measured

multiple ways) mediated the relation between the burdensomeness of the Facebook friend and exclusion. These mediation analyses suggest pain is a unique signal in response to burdensome others and this signal acts independently of negative affect to promote exclusion evidenced by pain’s ability to predict a significant amount of unique variance in exclusionary behaviors. Collectively, our results indicate that in addition to psychological distress, Facebook can cause reports of physical pain (e.g., stabbing, hot-burning, cramping) as demonstrated by participants reporting the burdensome friend as painful on eight of the 11 sensory pain items.

On Facebook, we find that individuals act in the same fashion to a social threat (i.e., a burdensome person) as they do when they touch something hot (i.e., a physical threat)—they distanced themselves. This distancing reaction is supported by other research which finds adaptive forms of disengagement behavior in animals and humans who face uncontrollable social threats (Dickerson, Gruenewald, & Kemeny, 2004). Animals and humans essentially exclude others in socially threatening situations by demonstrating a “sickness behavior” which decreases social, sexual, aggressive, exploratory, and other behaviors (Kemeny, 2009). This behavior disengages a fight or flight response in favor of recuperation and conserving energy which could be used later for restorative processes (Dantzer, O’Connor, Freund, Johnson, & Kelley, 2008).

Implications

By investigating our research question in the context of Facebook, we wanted to expand on previous knowledge of social media and computer-mediated communication. We identified a new domain where individuals self-report pain. Individuals self-report pain when they are injured, excluded, and we have demonstrated that computer-mediated communication is not immune to causing individuals pain. Individuals going online to satisfy social needs may be especially harmed when instead of getting their needs satisfied, they encounter a burdensome Facebook friend who elicits pain prompting the exclusion of the burdensome person. Excluding the burdensome person might be likened to unexpectedly being excluded which is worse than when one anticipates forthcoming exclusion (Wesselmann, Wirth, & Bernstein, 2017). We also demonstrate that individuals’ will ostracize others online. While Facebook promotes inclusion, it also gives individuals the means to distance themselves from others (e.g., unfriend, unfollow). It is interesting to find individuals will ostracize burdensome others even though the impact of the burdensome individual may not be as immediate as a face-to-face interaction (Latané, 1981) and sources are still willing to experience the unpleasant feelings that occur when ostracizing others (e.g., guilt; Wesselmann & Wirth, 2015), even in a mediated environment. Additionally, the ease with which individuals become sources of ostracism may be enhanced because in a mediated environment a source does not need to be physically proximal to the target of the ostracism and will not see the target’s emotional distress. Collectively, from our research, we learned more about the motivations and psychological mechanisms behind those who exclude others online.

Our research also adds to what is known about sources of exclusion—individuals who exclude others. Social exclusion research is replete with findings for how individuals feel when they are excluded (see Williams, Forgas, & von Hippel, 2005); however, researchers are only now investigating systematically how individuals feel when they exclude others (Wesselmann & Wirth, 2015). Initial investigations find individuals who ostracized or excluded others felt less autonomy and relatedness, while experiencing greater amounts of negative affect (Legate, DeHaan, & Ryan, 2015), and less self-control (Ciarocco et al., 2001) compared to including others. Participants indicated in diary studies that when they ostracized others, they experienced less belonging (Nezlek, Wesselmann, Wheeler, & Williams, 2015). This suggests the effects of excluding a burdensome individual are compounding, current results suggest that individuals report pain and prior results indicate individuals feel less

belonging when ostracizing another individual. We advanced this burgeoning area by demonstrating a self-reported physiological response to a burdensome individual—pain—and its role in the exclusion of individuals. Overall, the current and previous research indicate that when social exclusion occurs, everybody hurts; sources feel pain excluding others and targets feel pain when they are ostracized.

Limitations

We are unable to rule out all alternative explanations for our results. Because individuals experience thwarted basic needs when they are breaking a social connection (Nezlek et al., 2015), we cannot rule out that the pain our participants reported was associated with this process. The warning system for social exclusion may be so sensitive (Spoor & Williams, 2007) that any situation where a social connection may be broken may trigger pain. However, in the scenario described above, pain results from being the victim, or potential victim, of exclusion. In contrast, our research suggests pain motivates being the perpetrator of exclusion, so participants are not likely to be experiencing the same pain as that resulting from being the victim of exclusion.

The methods we employed had two noteworthy limitations. First, we used scenario studies rather than *in vivo* studies. DeWall et al. (2011) found differences in emotional responses when individuals imagined acute rejection versus actually experiencing it; however, research involving recalling social exclusion produced similar responses as actually being excluded (e.g., Godwin et al., 2013; Riva, Wirth, & Williams, 2011). Second, the effects produced by imagined scenarios are likely to be weaker than effects produced through face-to-face contact. That said, an imagined scenario might not be problematic given that the magnitude of pain our participants reported would be likely to increase if participants were actively engaging with burdensome others on Facebook (rather than imagining or recalling). This potential result could occur because the burden would be more immediate in face-to-face contact compared to contact through Facebook (e.g., Latanc, 1980).

Future directions

The current set of studies suggest several future directions for investigating pain and the study of media by psychologists. One future direction is bolstering the current pain results with brain imaging data that identifies which parts of the brain may be active when interacting with a burdensome other. In the current study, we relied on self-reported pain assessment measures that are strongly correlated with physical pain measures (Wright et al., 2001). Thus, our results make a plausible case that participants were feeling physical pain. However, without imaging data (e.g., fMRI) produced with an *in vivo* pain manipulation we do not know whether our participants were feeling physical pain. We also relied on participants thinking about a burdensome Facebook friend, which we based on previously implemented recall studies (e.g., Riva et al., 2011). Additionally, future research should continue to examine other potential intervening variables affecting the relation between burden and exclusionary behavior. Lastly, future research should continue to explore the psychological benefits and consequences related to social media use and Internet use more broadly (see discussion in Okdie et al., 2014; see Kende, Ujhelyi, Joinson, & Greitemeyer, 2015). We demonstrated that the study of media can capture psychological processes and behavior that over 1 billion people (Facebook, 2015) may experience daily.

Conclusion

On Facebook, one could conceive it is the best idea to be friends with as many others as possible in order to satisfy belonging needs. However, individuals need to put the brakes on their sociality and distance themselves from poor-exchange partners (i.e., burdensome “friends”). It seems that

individuals report feeling pain when interacting with burdensome “friends” and this pain becomes an alert to avoid this person. Even though the interactions may be virtual, the reported pain is real.

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