

Are Close Friends the Enemy? Online Social Networks, Self-Esteem, and Self-Control

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Online social networks are used by hundreds of millions of people every day, but little is known about their effect on behavior. In five experiments, the authors demonstrate that social network use enhances self-esteem in users who are focused on close friends (i.e., strong ties) while browsing their social network. This momentary increase in self-esteem reduces self-control, leading those focused on strong ties to display less self-control after browsing a social network. Additionally, the authors present evidence suggesting that greater social network use is associated with a higher body mass index and higher levels of credit card debt for individuals with strong ties to their social network. This research extends previous findings by demonstrating that social networks primarily enhance self-esteem for those focused on strong ties during social network use. Additionally, this research has implications for policy makers because self-control is an important mechanism for maintaining social order and well-being.

Online social networks are having a fundamental and important influence on society. Facebook, the world's largest online social network, had over 1 billion active users by the end of 2012, with over 80% from outside the United States (Smith, Segall, and Cowley 2012). The success of social networks, however, is based not only on the number of active users but also on the amount of time users spend on these websites. Online social network use accounts for nearly 23% of time spent online in the United States, which is approximately double the time spent on any other online activity (Nielsen Wire 2010). Despite this growing popularity and increasingly frequent usage, a systematic under-

standing of how social network use affects consumer behavior remains elusive. Does social network use, for instance, affect the choices consumers make in their daily lives? If so, what effect does network use have on consumers' well-being?

People use social networks to fulfill a variety of social needs, including self-expression and self-presentation (Back et al. 2010; Gosling, Gaddis, and Vazire 2007). Consequently, using a social network can enhance self-esteem and positively affect well-being (Gonzales and Hancock 2011; Valkenburg, Peter, and Schouten 2006). We propose that while social network use does make people feel better about themselves, these increased feelings of self-worth can have a detrimental effect on behavior. We argue that, because people care about the image they present to close friends on social networks, social network use enhances self-esteem in users who are focused on close friends (i.e., strong ties) while browsing their social network. This momentary increase in self-esteem reduces self-control, leading those focused on strong ties to display less self-control after browsing a social network compared to not browsing a social network.

This research makes a number of contributions. While previous research finds that social network use can increase self-esteem (Gonzales and Hancock 2011), our findings show that this effect primarily emerges when people are focused on strong ties while browsing their social network. Importantly, when focused on strong ties, people are more aware that the images they are presenting on social networks

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are being observed by their close friends. Additionally, to the best of our knowledge, this is the first research to demonstrate that using online social networks can influence self-control. This research also has important implications for policy makers because self-control is one of the most powerful mechanisms for maintaining social order and well-being (Tangney, Baumeister, and Boone 2004). Given the ubiquity of online social networks, their ability to lower users' self-control could have widespread impact. This may be particularly true for the current generation of adolescents and young adults who are the heaviest users of social networks.

SELF-PRESENTATION ON SOCIAL NETWORKS

The Psychology of Social Network Use

Online social networks are used by hundreds of millions of people every day to communicate and share experiences with others. They have become a vital tool for connecting people and sharing information. Social networks let people create profiles containing information about themselves (e.g., pictures, interests, and personal information) and connect to others in order to expand their personal networks. They have become an important tool for building friendships and maintaining family relationships by allowing people to easily share personal thoughts, pictures, and accomplishments. Additionally, "status updates" and "tweets" let people share glimpses into their daily lives with others (Worhan 2011).

From a motivational perspective, people use social networks to fulfill a variety of social needs, including affiliation, self-expression, and self-presentation (Back et al. 2010; Gosling et al. 2007; Toubia and Stephen 2012). Thus, social network use can have a positive effect on how people feel about themselves and their well-being. When adolescents receive positive feedback on their social network profile, it enhances their self-esteem and well-being (Valkenburg et al. 2006). People who are typically low in life satisfaction enjoy a number of positive social benefits from using social networks (Ellison, Steinfield, and Lampe 2007), such as increased social capital. Emotionally unstable individuals rely on social networks for social support and to repair well-being after negative emotional experiences (Buechel and Berger 2012).

Importantly, people tend to share mostly positive information about themselves to others on social networks (Gonzales and Hancock 2011). Although not all information about users is positive, social networks offer a number of features that allow users to control what information is shared with their network. For instance, if an unflattering picture is posted on Facebook, a user can hide the picture from his or her network. Similarly, users can delete "status updates" that they have second thoughts about (e.g., pictures from a wild night out). This does not necessarily mean that people present a false impression of themselves on social networks. Facebook profiles have been shown to reflect ac-

tual characteristics as opposed to idealized characteristics that do not represent one's actual personality (Back et al. 2010). However, social networks allow people to selectively present what they want others to see. Thus, while users may be presenting valid information about themselves on social networks (Back et al. 2010), they often filter out the negative information to present a positive self-view to others (Gonzales and Hancock 2011). Consequently, simply browsing a social network has been shown to momentarily increase users' self-esteem (Gonzales and Hancock 2011). In contrast, this effect is not observed when people look at themselves in a mirror. We propose that the extent to which social network use increases self-esteem will depend on whom users are focused while browsing their social network.

Self-Presentation and Tie Strength

Social networks differ in terms of the strength of users' connections to their friends on the network, which is often referred to as tie strength (Granovetter 1973). More generally, the concept of tie strength captures the degree to which one is more or less involved in a given social relation, feels close to that person, and values that relation. Strong ties are typically friends with whom people share a personal connection, whereas weak ties are acquaintances with whom people have more distant relationships (Ryu and Feick 2007). Accordingly, strong ties are closer social relations than weak ties. Although social networks make it easier to connect with both weak and strong ties, information flow within any given social network (offline or online) often depends less on the number of ties (i.e., the number of friends) than on the strength of those ties (Frenzen and Nakamoto 1993). For instance, people with a small number of strong ties can transmit information more effectively than can people with a high number of weak ties (Granovetter 1973).

One important characteristic of strong ties is that they have greater influence over their network of friends than weak ties (Brown and Reingen 1987). Not surprisingly, people are more highly involved with and more actively attend to friends who are strong ties. Consequently, individuals tend to be more concerned about the image they present to strong ties (Sudman et al. 1994). Additionally, they are more sensitive to disclosing the negative aspects of themselves to strong ties than to weak ties (Bargh, McKenna, and Fitzsimons 2002). Thus, since they are more concerned about the opinion of strong ties, in social interactions people care more about presenting a positive self-view to strong ties than to weak ties.

Interestingly, despite being more concerned about the opinion of strong ties, people tend to be less self-enhancing toward them in offline social interactions (Tice et al. 1995). Although there are social benefits to highlighting positive characteristics about the self, repeating such facts too often may be perceived as arrogant, which is a negative trait (Schlenker and Leary 1982). For example, people may be impressed the first time a person mentions that he went to a prestigious school. The more often he mentions the fact,

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it will likely lead to the perception that he is conceited. Consistent with this view, research finds that people are less boastful and self-enhancing with friends, who already know about their positive qualities, than they are with strangers (Tice et al. 1995).

There are, however, a number of reasons to expect people to be less concerned about modesty when interacting with strong ties in an online social networking environment. Because self-presentation online is inherently impersonal, people are less likely to notice if their self-presentation attempts are being rejected or criticized (Miller and Arnold 2001). Thus, people may be less sensitive to how their self-presentation attempts are being received by strong ties. In other words, since people are less likely to receive immediate social feedback in response to their online self-presentation attempts, they may not be as concerned about modesty when interacting with strong ties. Additionally, online social networks are designed to encourage self-presentation (Boyd and Ellison 2008), so the same social norm that dictates modesty in offline social interactions may either not be present or be suppressed in online social networks. Consequently, strong ties may be less likely to perceive people as arrogant or boastful when they are self-enhancing via online social networks, and because of this, people may not be as modest in online social networks as they are offline. Finally, while offline self-presentation is contextual (Goffman 1959), online self-presentation is more static in nature. That is, in offline social interactions, people can adapt their self-presentation strategies to specific audiences (Schau and Gilly 2003), whereas with online social networks people have less ability to tailor their message to specific receivers. Consequently, it is difficult for users to temper their self-presentation attempts to strong ties without doing so to their entire network.

Thus, when users post positive information about themselves on an online social network, the information is shared with both strong ties and weak ties. However, because they care more about the opinion of strong ties, they should feel better about themselves when this positive information is received by strong ties than by weak ties. Hence, the extent to which browsing a social network enhances self-esteem should depend on how aware people are that the image they are presenting on the network is being observed by strong ties; that is, the effect should be more pronounced when people are focused on strong ties while browsing the network. Consequently, we predict that social network use will enhance self-esteem primarily for those focused on strong ties while they are browsing the network. We do not expect social network use to influence those focused on weak ties because they should care less about the image they are presenting to others in their network (i.e., the people they are presenting themselves to are less important to them). Next, we discuss the relationship between enhanced self-esteem and self-control to understand how social network use affects behavior.

SOCIAL NETWORKS AND SELF-CONTROL

Although high levels of self-esteem are associated with a number of positive social behaviors (Bushman and Baumeister 1998), we contend that the enhanced self-esteem from using a social network can have a detrimental effect on behavior. We base this prediction on research documenting a relationship between an enhanced self-concept, activated by situational factors, and self-control. For instance, alcohol leads people to rate themselves higher on a number of traits after its consumption (Banaji and Steele 1989; Diamond and Wilsnack 1978); alcohol consumption has been linked to a number of impulsive behaviors including aggression and poor self-control (Bushman and Cooper 1990; Steele and Josephs 1990). Additionally, consumer research has demonstrated that elevated feelings of self-worth can lead to more impulsive or indulgent behavior. Khan and Dhar (2006) find that a prior virtuous act can momentarily boost the self-concept, which leads to more self-indulgence in unrelated decisions. Similarly, Wilcox, Kramer, and Sen (2011) show that increased feelings of pride, which are associated with greater self-esteem, result in more indulgent choices in subsequent tasks that are unrelated to the source of pride. However, these studies did not examine the direct relationship between consumers' situational self-esteem and their self-control.

Thus, we propose that the enhanced self-esteem from browsing a social network will momentarily lower self-control, leading people to display less self-control after browsing a social network compared to those who did not browse a social network. However, since people care more about the image they are presenting to strong ties, this effect will emerge primarily in those focused on strong ties while browsing a social network. We expect social network use to have little effect on the self-control of those focused on weak ties while browsing a social network.

Next we discuss the results of five studies conducted to test our predictions. In study 1, we show that simply browsing a social network enhances self-esteem for individuals focused on strong ties while browsing their social network. Study 2 replicates this finding but shows that the effect only emerges when individuals are focused on the information they are sharing with their network (i.e., self-presentation). Studies 3 and 4 show that social network use lowers self-control for individuals focused on strong ties while browsing their social network and that the effect of social network use on self-control is mediated by self-esteem. Finally, study 5 reports the results of an online field study examining the relationship between online social network use and offline behaviors associated with poor self-control. The results suggest that greater social network use is associated with a higher body mass index, increased binge eating, a lower credit score, and higher levels of credit card debt for individuals with strong ties to their social network.

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STUDY 1

The primary purpose of study 1 was to show that social network use increases self-esteem primarily for those focused on strong ties while browsing the network. Specifically, we had people browse a social network before having them complete a measure of self-esteem. We expected those focused on strong ties to report higher levels of self-esteem after browsing a social network. We did not expect browsing a social network to affect the self-esteem of those focused on weak ties.

Method

Participants and Design. One hundred Facebook users from a US panel participated in the study ($M_{\text{age}} = 32.30$; 57% female). Participants were randomly assigned to one of four conditions in the 2 (browsing: Facebook vs. no Facebook) by 2 (tie strength: strong vs. weak) between-subjects design.

Procedure. The study was conducted in three parts that were disguised as unrelated studies. The first part was designed to assess Internet use. After answering several general questions about their Internet use, participants indicated how many friends they had on Facebook. Participants were then given a name-listing task, which served as a manipulation of tie strength. In the strong tie strength condition, participants were asked to list the names of five friends they have on Facebook who they considered to be close friends. For each friend, they were then asked to indicate how much the person's opinion mattered to them (1 = "opinion does not matter at all," 7 = "opinion matters a lot"). In the weak tie strength condition, participants were asked to list the names of five friends on Facebook who they considered to be distant friends and, for each friend, to indicate how much the person's opinion mattered to them.

Next, participants were administered a Facebook task. In the no-Facebook condition, participants wrote for 5 minutes about the experience of browsing Facebook. In the Facebook condition, participants then browsed Facebook for 5 minutes. They were instructed to avoid interacting with their friends or posting content (e.g., "status updates"). Rather, they were instructed to just read their "news feed" while logged into Facebook. This allows for a cleaner comparison between the Facebook and no-Facebook groups since participants either browsed or wrote about browsing Facebook. Afterward, participants completed a three-item reduced version of the Rosenberg (1989) self-esteem scale ("I have a positive attitude toward myself," "At times I think I am no good at all," "I certainly feel useless at times"; $\alpha = .74$). Participants then indicated how focused they were on close friends during the Facebook task ("I thought about my close friends," "I thought about friends whose opinions matter," "I thought about friends who are influential to me"; $\alpha = .95$). Finally, they were asked to indicate the extent to which they agreed (1 = "strongly disagree," 7 = "strongly agree") that they were focused on Facebook during the study.

Results

Manipulation Checks. We examined how focused people were on close friends using an ANOVA with browsing and tie strength as the factors and number of Facebook friends as a covariate. As expected, there was a main effect of tie strength and no significant interaction ($F(1, 95) = .01$, NS). As intended, those in the strong tie condition were more focused on close friends compared to those in the weak tie condition ($M_{\text{strong}} = 5.46$; $M_{\text{weak}} = 4.86$; $F(1, 95) = 5.48$, $p < .05$). We examined how focused participants were on Facebook using the same model. The main effects of tie strength ($F(1, 95) = .57$, NS), browsing ($F(1, 95) = .32$, NS), and their interaction ($F(1, 95) = .20$, NS) were insignificant. Thus, there is no evidence that the participants who browsed Facebook were more focused on Facebook than were those who merely wrote about browsing Facebook in the control condition.

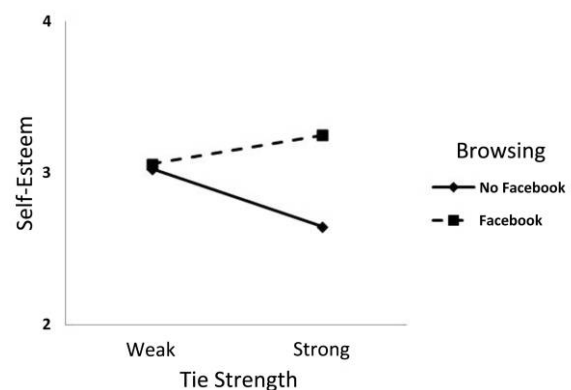
Facebook Use and Self-Esteem. We examined self-esteem using an ANOVA with browsing and tie strength as the factors and number of Facebook friends as a covariate. The browsing by tie strength interaction was significant ($F(1, 95) = 5.18$, $p < .05$; see fig. 1). As expected, those in the strong tie condition reported higher levels of self-esteem after browsing Facebook compared to those that did not browse Facebook ($M_{\text{FB}} = 3.25$; $M_{\text{no FB}} = 2.64$; $F(1, 95) = 11.34$, $p = .001$). There was no difference in self-esteem between browsing conditions for those in the weak tie condition ($M_{\text{FB}} = 3.06$; $M_{\text{no FB}} = 3.03$; $F(1, 95) = .03$, NS).

Discussion

The findings of study 1 provide support for our theory. Specifically, the results show that browsing a social network enhances self-esteem for participants focused on strong ties while browsing Facebook. Social network use did not significantly affect self-esteem for those focused on weak ties

FIGURE 1

STUDY 1: EFFECT OF FACEBOOK ON SELF-ESTEEM



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while browsing Facebook. Importantly, the results rule out priming as a potential explanation, as there was no significant difference in how much participants thought about Facebook when they wrote about browsing Facebook compared to when they actually browsed Facebook. In the next study, we demonstrate that the effect of social network use on self-esteem is due to self-presentation.

STUDY 2

The primary purpose of study 2 was to show that using a social network enhances self-esteem for people focused on strong ties due to concerns about the image they are presenting to others in their social network. To demonstrate this, we had people browse a social network while focusing on either the information they are presenting to people in their network (i.e., self-presentation) or the information people in their network are presenting to them (i.e., other presentation). We expected those focused on self-presentation to report higher levels of self-esteem than those focused on other presentation. Importantly, we expected this effect to only emerge in individuals focused on strong ties while browsing their social network. Additionally, instead of manipulating tie strength, we measured the extent to which people were focused on strong versus weak ties while browsing Facebook.

Method

Participants and Design. One hundred eight Facebook users from a US panel participated in the study ($M_{\text{age}} = 32.25$; 53% female). Participants were randomly assigned to one of two conditions (presentation focus: self vs. other) in the between-subjects design.

Procedure. The study was conducted in three parts that were disguised as unrelated studies. The first part was designed to assess Internet use. After answering several general questions about their Internet use, participants indicated how many friends they had on Facebook and how close they were to their Facebook friends, which served as a measure of how focused they are on close friends during the browsing experience. Specifically, they indicated the percentage of their Facebook friends they considered to be very close friends, somewhat close friends, acquaintances, distant acquaintances, and strangers (i.e., people they did not know offline at all). We added the percentage of friends considered to be very close and somewhat close to create a measure of tie strength. Thus, higher numbers corresponded to people with a Facebook network composed of a higher proportion of strong-tie friends. This means that participants with higher scores on this variable would necessarily be more focused on strong ties friends when browsing Facebook. We selected this tie strength measure as opposed to alternatives (e.g., total number of close friends) for four reasons. First, recording the percentage of close friends is a standard way to measure the strength of people's connections to their social networks (Marsden and Campbell 1984). Second, when peo-

ple browse Facebook, the website is populated with information about both strong and weak ties. How much of this information will be related to close friends should be determined by the proportion of close friends in a users' network. Third, due to algorithms determining how Facebook (and similar social networks) displays information, in any given browsing session it is highly unlikely that a user will be exposed to all of his or her network. Thus, the number of close friends one has or a related network size measure is not appropriate. Instead, the proportion of one's contacts who are deemed to be close or very close is more appropriate because it does not depend on how Facebook's algorithms display friend information at any given point in time. Finally, we validated our measure with a pretest (see below).

Next, participants were instructed that they would be browsing Facebook for 5 minutes. They were instructed to avoid interacting with their friends or posting content. In the self-presentation-focus condition, participants were told that they would be browsing Facebook and were given the following instructions: "While you are browsing we would like you to pay attention to the information that you are sharing with people in your network." In the other-presentation-focus condition, participants were told that they would be browsing Facebook and were given the following instructions: "While you are browsing we would like you to pay attention to the information that people in your network are sharing with you." All participants then browsed Facebook for 5 minutes. Afterward, participants completed the same three-item reduced self-esteem scale from the previous study ($\alpha = .76$). As a check for the self-versus-other-presentation-focus manipulation, participants indicated the extent to which they agreed (1 = "strongly disagree," 7 = "strongly agree") that they were focused on the information they were sharing with others while browsing Facebook.

Results

Pretest. Fifty-three Facebook users from the same panel as the main study participated in a pretest designed to validate our measure of tie strength. Specifically, we sought to show that people with a higher proportion of strong ties in their network would be more focused on strong ties during their browsing experience. First, participants completed the same Internet survey from the main study, which allowed us to measure the number of Facebook friends and tie strength. All participants then browsed Facebook for 5 minutes. Afterward, they indicated the extent to which they agreed (1 = "strongly disagree," 7 = "strongly agree") with three statements about the browsing task that were averaged together to form a measure of closeness ("I thought about my close friends," "I thought about friends whose opinions matter," "I thought about friends who are influential to me"; $\alpha = .83$). The correlation between number of friends and tie strength was insignificant ($r = -.21$, NS). We examined the relationship between tie strength and closeness using regression with closeness as the dependent variable and tie strength, number of Facebook friends, and their interaction as independent variables. As expected, tie strength

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was a significant predictor of closeness ($\beta = .02$, $t(49) = 2.87$, $p < .01$). Those with a higher proportion of strong ties in their network were more focused on close friends while browsing Facebook. The effects of number of Facebook friends ($\beta = .01$, $t(49) = 1.02$, NS) and the friends by tie strength interaction ($\beta = .01$, $t(49) = .92$, NS) were not significant.

Manipulation Check. We examined how focused people were on the information they were sharing with others while browsing Facebook, using regression with presentation focus (self = 1, other = -1), mean-centered tie strength, their interaction, and number of Facebook friends as the independent variables. As expected, the effect of presentation focus was significant ($\beta = .01$, $t(103) = .95$, $p < .001$); those in the self-presentation focus condition indicated that they were more focused on the information they were sharing with others than were those in the other-presentation focus condition. The effects of tie strength ($\beta = -.01$, $t(103) = -.13$, NS) and the tie strength by presentation focus interaction ($\beta = -.01$, $t(103) = -.24$, NS) were insignificant.

Self-Presentation and Self-Esteem. We examined self-esteem using regression with presentation focus, mean-centered tie strength, their interaction, and number of Facebook friends as the dependent variables. The presentation focus by tie strength interaction was marginally significant ($t(103) = 1.70$, $p < .10$; see fig. 2). As expected, those with strong ties reported higher levels of self-esteem when they focused on self-presentation compared to other presentation while browsing Facebook ($\beta = .20$, $t(103) = 2.26$, $p < .05$). There was no difference in self-esteem between presentation focus conditions for those with weak ties ($\beta = -.01$, $t(103) = -.15$, NS).

Discussion

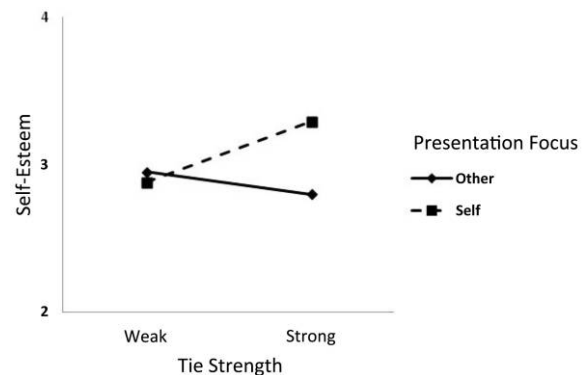
The results of study 2 provide additional support for our theory. They show that the social network use enhances self-esteem due to a focus on self-presentation concerns. Specifically, the results show that social network use only enhances self-esteem for those focused on strong ties when they were cued to think about the information they are presenting to others while browsing a social network. No effect was observed when those with strong ties were told to focus on the information that others were sharing with them while browsing a social network. In the next study, we examine the relationship between social network use, self-esteem, and self-control.

STUDY 3

In study 3, we investigated the relationship between social network use and self-control in the eating domain. Specifically, we examined how browsing Facebook influences the likelihood of making an unhealthy food choice. Additionally, we measured self-esteem to demonstrate that browsing a social network lowers self-control by increasing self-es-

FIGURE 2

STUDY 2: EFFECT OF SELF-PRESENTATION ON SELF-ESTEEM



teem. Finally, we tested an alternative explanation for the findings. Previous research demonstrates that greater emotional arousal can result in depletion (Fedorikhin and Patrick 2010). It is possible that browsing a social network may lower self-control via depletion rather than by increasing self-esteem as we propose. Consequently, we measured arousal after people made their choice, to rule this out as a possibility.

Method

Participants and Design. Eighty-four Facebook users from a US panel participated in the study ($M_{age} = 34.67$; 58% female). Participants were randomly assigned to one of two conditions (browsing: Facebook vs. no Facebook) in a between-subjects design.

Procedure. The study was conducted in three parts that were disguised as unrelated studies. The first part used the same Internet use survey as study 2, which allowed us to measure tie strength. Next, participants were administered a website-viewing task. In the Facebook condition, participants logged into their personal Facebook accounts and browsed the website for 5 minutes. They were instructed to avoid interacting with their friends or posting content to allow for a cleaner comparison between the Facebook and the no-Facebook groups since participants in both conditions simply browsed a website. In the no-Facebook condition, participants browsed the popular news website CNN.com for 5 minutes. All participants were instructed that they would be asked questions about the task later in the session to ensure that they were sufficiently engaged. After 5 minutes, a button appeared on the screen that allowed them to continue to the next purportedly unrelated study. There was no significant difference in the amount of time spent browsing between conditions.

The final part was a consumer products study that involved various consumer choices. The first decision was a

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food choice that served as a measure of self-control. Specifically, participants were asked to choose between two pretested snack alternatives: a healthy option (a granola bar) and an unhealthy option (chocolate chip cookies). They were instructed that each option costs the same amount of money. We recorded preference for the unhealthy cookies as a measure of self-control, with greater preference for the cookies corresponding to lower self-control. After making their choice, participants completed the same three-item reduced version of the Rosenberg (1989) self-esteem scale ($\alpha = .72$) as previous studies. Additionally, they completed a two-item arousal scale (1 = "not aroused," 7 = "aroused"; 1 = "not stimulated," 7 = "stimulated"; $r = .70$). The presentation order of the self-esteem and arousal scales was counterbalanced. Finally, participants indicated how healthy they perceived the two food options to be (1 = "very unhealthy," 7 = "very healthy").

Results

Choice Set Validation. As anticipated, participants perceived the granola bar to be a significantly healthier option than the bag of cookies ($M_{\text{gran}} = 4.81$; $M_{\text{cook}} = 2.17$; $t(83) = 15.48$, $p < .001$).

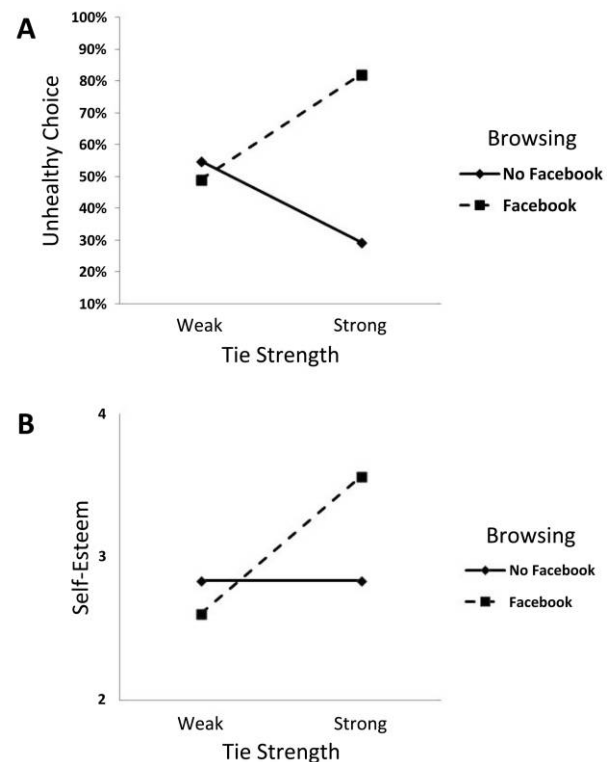
Effect of Social Network Use on Unhealthy Choice. Logistic regression was used to test our key predictions. The dependent variable was unhealthy choice, coded as 1 if a participant selected the cookies and 0 if they selected the granola bar. Browsing was coded using contrast coding equivalent to 1 if the participant browsed Facebook and -1 if the participant browsed CNN.com. Browsing, mean-centered tie strength, and the interaction between browsing and tie strength were included as predictors. Number of Facebook friends was included as a covariate but did not significantly affect unhealthy choice ($\beta = .01$, $\chi^2(1) = .01$, NS).

The tie strength by browsing interaction was significant ($\beta = .04$, $\chi^2(1) = 6.07$, $p < .05$). To explore the interaction, we examined the effect of browsing on those with strong ties and weak ties by centering tie strength at 1 standard deviation above and below the mean (Aiken and West 1991). As depicted in figure 3A, browsing Facebook increased the likelihood of making an unhealthy choice for those with strong ties ($\beta = 1.35$, $\chi^2(1) = 9.06$, $p < .01$). In contrast, browsing Facebook did not significantly affect the likelihood of making an unhealthy choice for those with weak ties ($\beta = -.08$, $\chi^2(1) = .10$, NS).

Facebook Use and Self-Esteem. We analyzed self-esteem using regression with browsing, mean-centered tie strength, and the interaction between browsing and tie strength as the independent predictors. Number of Facebook friends was included as a covariate but did not significantly affect self-esteem ($\beta = .01$, $t(79) = -.38$, NS). The tie strength by browsing interaction on self-esteem was significant ($\beta = .01$, $t(79) = 3.73$, $p < .001$; see fig. 3B). To examine the effect of browsing on the self-esteem of those

FIGURE 3

STUDY 3: EFFECT OF FACEBOOK ON UNHEALTHY CHOICE (A) AND SELF-ESTEEM (B)



with strong ties, we reran the above analysis with tie strength centered at 1 standard deviation above the mean. Browsing Facebook increased self-esteem for those with strong ties compared to browsing CNN.com ($\beta = .34$, $t(79) = 3.72$, $p < .001$). Browsing Facebook did not significantly affect self-esteem for those with weak ties ($\beta = -.16$, $t(79) = -1.62$, NS).

Facebook Use and Arousal. The arousal measure was regressed on browsing, mean-centered tie strength, and their interaction. Number of Facebook friends ($\beta = -.01$, $t(79) = -1.12$, NS) was included as a covariate. However, the effects of browsing ($\beta = .11$, $t(79) = .75$, NS), tie strength ($\beta = .01$, $t(79) = .53$, NS), and their interactions ($\beta = .01$, $t(79) = .18$, NS) were not significant. Thus, browsing Facebook affects self-esteem but not arousal.

Mediation. We tested whether self-esteem mediates the effect of browsing on the likelihood of making an unhealthy choice in a moderated mediation analysis proposed by Preacher, Rucker, and Hayes (2007, model 2). First, we assigned self-esteem as the mediator, browsing as the independent variable, and number of Facebook friends as a covariate. To test whether self-esteem mediated for those with strong ties, we centered tie strength at 1 standard deviation

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above the mean and included tie strength and the tie strength by browsing interaction as covariates. The effect of browsing on self-esteem was significant ($\beta = .44$, $t(78) = 3.72$, $p < .001$). Additionally, self-esteem predicted unhealthy choice ($\beta = .85$, $\chi^2(1) = 5.15$, $p < .05$). The direct effect of browsing on unhealthy choice was reduced ($\beta = 1.07$, $\chi^2(1) = 4.91$, $p < .05$) from the total effect of browsing on unhealthy choice ($\beta = 1.35$, $\chi^2(1) = 3.01$, $p < .01$). Importantly, the bootstrap analysis shows that the indirect effect of browsing on unhealthy choice was positive and significant (95% confidence interval [CI] excluded zero; indirect effect = .37; 95% CI: .03 to .86), which supports mediation for those with strong ties. For those with weak ties, we reran the above analysis with tie strength centered at 1 standard deviation below the mean. The indirect effect of browsing on unhealthy choice was negative and insignificant (95% CI included zero; indirect effect = $-.16$; 95% CI: $-.56$ to $.04$) and therefore does not support mediation for those with weak ties.

Discussion

The results of study 3 support our theory that social network use can decrease self-control by enhancing self-esteem. Specifically, the results show that for those focused on strong ties while browsing Facebook, social network use enhanced self-esteem, making them more likely to make an unhealthy food choice compared to those who did not browse Facebook. However, the differences in self-esteem or self-control were not observed for those focused on weak ties while browsing the network.

STUDY 4

The previous study demonstrates that Facebook use can lead people to engage in more indulgent or impulsive behavior. However, self-control is associated both with greater inhibition over unwanted impulses and greater persistence in challenging tasks (Vohs and Heatherton 2000). To rule out the possibility that Facebook use simply makes people more impulsive rather than lowering their self-control as we propose, we examined how Facebook use influences performance in a mentally challenging task in study 4. We expected that people with strong ties would show less persistence at the task after browsing Facebook compared to those that did not browse Facebook. Additionally, we wanted to test another alternative explanation. When people use social networks they spend a significant amount of time reading postings (i.e., status updates) that contain other people's feelings, thoughts, and activities (Worthan 2011). Thus, by focusing users on others, and away from the self, browsing a social network may reduce self-awareness, which would also lower self-control. Additionally, this effect would likely be strongest for people that have a close connection to the "others" in their network since they are expected to pay more attention to them and be generally more interested in their lives documented in the social network.

Thus, we also measured self-awareness to rule this out as a possibility.

Method

Participants and Design. Eighty-eight undergraduates at Babson College ($M_{\text{age}} = 19.52$; 56% female) participated in the study. Participants were randomly assigned to one of the two conditions (browsing: Facebook vs. no Facebook) in the between-subjects design.

Procedure. The study was conducted in a behavioral lab with a procedure that was nearly identical to study 3, with a few notable exceptions. First, after completing the Internet use survey that measured tie strength (before the website browsing task), participants were administered an unrelated filler study that lasted approximately 20 minutes. This was done to minimize the possibility that our measurement of tie strength influenced how people responded to browsing Facebook. Additionally, after the browsing task, participants were administered a block of 10 anagrams to solve, as part of an unrelated pretest for the future study, of which 90% were unsolvable. Consistent with prior research (Vohs and Heatherton 2000), we recorded persistence with the task, measured by how long it took before people gave up (in seconds), as a measure of self-control, with longer times corresponding to greater self-control.

After the anagram task, participants completed the Situational Self-Awareness Scale (Govern and Marsch 2001), which contains a three-item public self-awareness subscale ($\alpha = .76$), a three-item private self-awareness subscale ($\alpha = .81$), and a three-item environmental self-awareness subscale ($\alpha = .76$). Additionally, they completed the same three-item reduced version of the Rosenberg (1989) self-esteem scale from previous studies ($\alpha = .73$).

Results

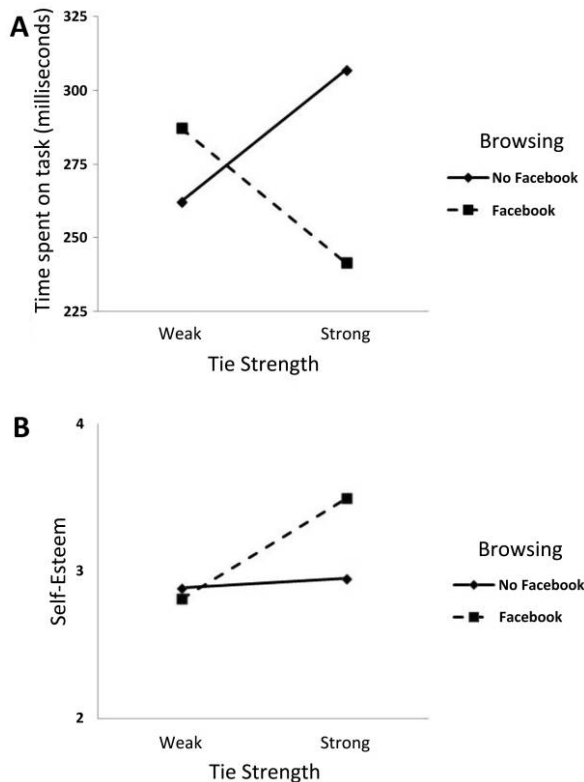
Regression was used to test our predictions. The key dependent variable was task persistence, which was measured as the length of time before people gave up on the task. Browsing was coded using contrast coding equivalent to 1 if the participant browsed Facebook and -1 if the participant browsed CNN.com. Browsing, mean-centered tie strength, and the interaction between browsing and tie strength were included as independent predictors. Number of Facebook friends was included as a covariate but did not significantly affect task persistence ($\beta = -.02$, $t(83) = -.94$, NS).

Facebook Use and Task Persistence. Consistent with previous studies, the tie strength by Facebook interaction was significant ($\beta = -.95$, $t(83) = -2.41$, $p < .05$). To examine the effect of browsing on persistence for those with strong ties, we reran the above analysis with tie strength centered at 1 standard deviation above the mean. As depicted in figure 4A, browsing Facebook decreased persistence for those with strong ties compared to browsing CNN.com ($\beta = -32.74$, $t(83) = -2.43$, $p < .05$). An equivalent analysis with tie strength centered at 1 standard deviation below the

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FIGURE 4

STUDY 4: EFFECT OF FACEBOOK ON TASK PERSISTENCE (A) AND SELF-ESTEEM (B)



mean found that browsing Facebook did not significantly affect task persistence compared to browsing CNN.com for those with weak ties ($\beta = 12.43$, $t(83) = 1.02$, NS). Thus, the results are consistent with previous studies using a more general measure of self-control.

Facebook Use and Self-Esteem. We analyzed self-esteem using regression with browsing, mean-centered tie strength, and the interaction between browsing and tie strength as the independent predictors. Number of Facebook friends was included as a covariate but did not significantly affect self-esteem ($\beta = -.08$, $t(83) = 1.09$, NS). The tie strength by browsing interaction on self-esteem was significant ($\beta = .01$, $t(83) = -2.24$, $p < .05$; see fig. 4B). To examine the effect of browsing on the self-esteem of those with strong ties, we reran the above analysis with tie strength centered at 1 standard deviation above the mean. Browsing Facebook increased self-esteem for those with strong ties compared to browsing CNN.com ($\beta = .25$, $t(83) = 2.26$, $p < .05$). An equivalent analysis with tie strength centered at 1 standard deviation below the mean found that browsing Facebook did not significantly affect task persistence com-

pared to browsing CNN.com for those with weak ties ($\beta = -.09$, $t(83) = -.93$, NS).

Facebook Use and Self-Awareness. The three self-awareness measures were each regressed on browsing, mean-centered tie strength, and their interaction. However, the effects of browsing, tie strength, and their interactions in each model did not reach significance. Thus, it appears that browsing Facebook affects self-esteem, but it does not influence self-awareness.

Mediation. We tested for moderated mediation analysis following the procedure proposed by Preacher et al. (2007, model 2). The analysis shows that the browsing by tie strength interaction predicted self-esteem ($\beta = .01$, $p < .05$). When self-esteem was added to the dependent variable model, it significantly predicted task persistence ($\beta = -49.64$, $p < .001$), while the browsing by tie strength interaction did not ($\beta = -.53$, NS). Conditional indirect effects analyses using a bootstrap method supported our theory. Specifically, the analyses revealed that self-esteem mediated the effect of browsing when participants had strong ties to their friends ($z = 0.97$, $p < .05$), but self-esteem did not mediate the effect of browsing when participants had weak ties to their friends ($z = .84$, NS).

Discussion

The results of study 4 provide additional support for the finding that social networks decrease self-control by enhancing self-esteem for those focused on strong ties while browsing the network. One limitation of our findings is that we have used the same control group (i.e., browsing CNN.com) in all of our studies on self-control. Thus, it is possible that there is something about browsing CNN.com that could affect self-control. To rule this out as a possibility, we reran the anagram task with a different control condition. Specifically, we had people browse Facebook or browse TMZ.com, a celebrity news and gossip website that is more social than CNN.com but not a social network in the sense of Facebook. The results of this follow-up study fully replicate the self-control findings of study 4.

STUDY 5

In study 5, we conducted an online field study to examine the relationship between Facebook usage and behaviors associated with poor self-control in health and personal finances. If just 5 minutes of Facebook usage lowers self-control, then we would expect to be able to detect a positive relationship between the amount of time a person spends using Facebook and behaviors associated with poor self-control. However, we would only expect this relationship to emerge in individuals who had a relatively high proportion of strong-tie friends in social networks.

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Method

Participants and Procedure. Five hundred forty-one Facebook users from a US panel participated in the study ($M_{\text{age}} = 32.06$; 61% female). Participants were recruited purportedly to participate in a survey on Internet use. As part of the survey, they were asked several questions about their Internet and Facebook use, as well as questions about their offline behavior including their finances, health, and offline social behavior. The order of the offline behavioral measures was randomized. Finally, participants were asked several demographic questions.

Measures. The Internet use measures included questions asking how many hours participants spend online each day, what percent of their time online is spent on social networking sites, the frequency with which they go on Facebook (1 = “never” to 8 = “multiple times per day”), how many friends they have on Facebook, and how close they are to their Facebook friends, which served as a measure of tie strength. Poor self-control is associated with making unhealthier food choices and a greater likelihood of engaging in binge eating (Tangney et al. 2004). Thus, poor self-control is associated with higher body fat. Therefore, we asked participants their height and weight so that we could calculate their body mass index (BMI), which is a widely used proxy for human body fat (Mills 2008). Additionally, we asked them to indicate how often they engaged in binge eating (1 = “never” to 8 = “multiple times per day”).

Previous research on consumer financial decision making (Wilcox, Block, and Eisenstein 2011) has found that poor self-control is associated with a having a lower credit score and being more likely to incur credit card debt. Consequently, we asked participants to indicate how many credit cards they owned and how much credit card debt they had accumulated on those credit cards. Additionally, we asked them to indicate their credit score in one of five standard credit score categories (1 = “risky—619 or lower” to 5 = “excellent—750 and above”). Measures also were taken of participants’ offline social behavior, including how many hours each week they spend socializing with friends offline (i.e., on the phone or in person) and how many friends they have offline, as well as demographic variables including age, gender, and annual household income (1 = “under \$14,999” to 7 = “\$100,000 and over”).

Results

Relationship between Facebook Use and Physical Health. To examine BMI and binge eating, we first removed outliers by eliminating the two extreme categories of BMI, those considered to be underweight (BMI < 18.5) and severely overweight (BMI > 40; World Health Organization 2011), leaving us with a subsample of 490 participants. Our rationale is that underweight consumers often suffer from issues related to body image distortion, which leads them to excessively control their food intake (Mohr et al. 2010). In addition, people who are severely overweight generally start

having weight problems early on in childhood, and there are both genetic and nongenetic components to their weight problems (Han, Lawlor, and Kimm 2010). We then analyzed BMI and binge eating by separately regressing them on the frequency of Facebook use (mean centered), tie strength (mean centered), and the interaction between frequency and tie strength. Age, gender, and number of Facebook friends were included as covariates.

The tie strength by frequency interaction effect on BMI was significant ($\beta = .01$, $t(483) = 2.08$, $p < .05$; see fig. 5A). To examine the relationship between frequency of Facebook use and BMI for those with strong ties, we reran the above analysis with tie strength centered at 1 standard deviation above the mean (Aiken and West 1991). Frequency was positively associated with BMI for participants with strong ties, such that the more time they spend on Facebook, the higher their BMI ($\beta = .43$, $t(483) = 2.04$, $p < .05$). An equivalent analysis with tie strength centered at 1 standard deviation below the mean found that frequency was not significantly associated with BMI for those with weak ties ($\beta = -.20$, $t(483) = -.81$, NS).

Additionally, the tie strength by frequency interaction effect on binge eating was significant ($\beta = .01$, $t(483) = 2.82$, $p < .01$; see fig. 5B). To examine the relationship, we reran the analysis with tie strength centered at 1 standard deviation above the mean. Frequency was positively associated with binge eating for participants with strong ties, such that the more time they spend on Facebook, the more likely they were to engage in binge eating ($\beta = .10$, $t(483) = 1.94$, $p = .05$). An equivalent analysis with tie strength centered at 1 standard deviation below the mean found that frequency was negatively associated with binge eating, but the difference was only marginally significant ($\beta = -.11$, $t(483) = 0.83$, $p = .10$).

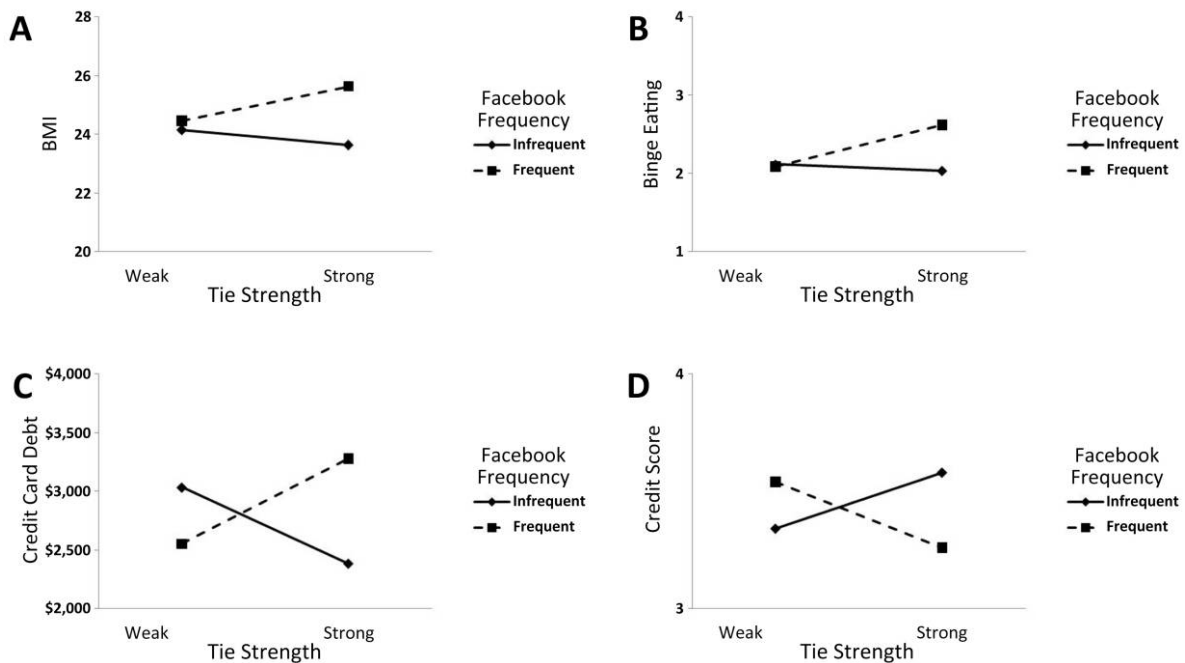
Relationship between Facebook Use and Financial Well-Being. To examine the relationship between Facebook use and one’s credit score and the amount of credit card debt owed, we looked only at those individuals who owned a credit card since having a credit card is important for establishing credit (Vlasenko 2009) and a prerequisite for incurring credit card debt. This left us with a subsample of 399 participants. We analyzed both variables by separately regressing them on the frequency of Facebook use (mean centered), tie strength (mean centered), and the interaction between frequency and tie strength. Age, gender, number of Facebook friends, number of credit cards owned, and income were included as covariates.

The tie strength by frequency interaction on credit score was significant ($\beta = -.01$, $t(390) = -2.32$, $p < .05$; see fig. 5D). We examined the relationship by rerunning the analysis with tie strength centered at 1 standard deviation above and below the mean. Frequency was negatively associated with credit score for those with strong ties, such that the more often they used Facebook, the lower their credit score ($\beta = -.13$, $t(390) = -2.30$, $p < .05$). Frequency was not significantly associated with credit score for those with weak ties ($\beta = .05$, $t(390) = .85$, NS).

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FIGURE 5

STUDY 5: RELATIONSHIP BETWEEN FACEBOOK USE AND BEHAVIOR



The tie strength by frequency interaction on credit card debt also was significant ($\beta = 13.58$, $t(390) = 2.29$, $p < .05$; see fig. 5C). We examined the relationship by rerunning the analysis with tie strength centered at 1 standard deviation above and below the mean. Frequency was positively associated with credit card debt for those with strong ties, such that the more often they used Facebook, the greater their credit card debt ($\beta = 500.64$, $t(390) = 2.13$, $p < .05$). Frequency was not significantly associated with credit card debt for those with weak ties ($\beta = -270.00$, $t(390) = 0.08$, NS).

Analysis of Internet and Offline Social Behavior. We also examined the relationship between tie strength and participants' Internet and offline social behavior to rule out the possibility that there was something unique about people with strong ties to their Facebook friends that could explain our findings. For instance, it is possible that people with strong ties to their friends spend an inordinate amount of time online or on social networking sites, instead of exercising or socializing with offline friends, which could offer an alternative explanation for our findings. Tie strength was not significantly correlated with the amount of time spent online ($r = -.02$), the percent of online time spent on social networks ($r = -.07$), the amount of time spent socializing with offline friends ($r = -.05$), or the total number of offline friends participants had ($r = .01$). Thus, there does not

appear to be anything unique about participants' Internet or offline social behavior that could explain our findings.

Discussion

This fifth study demonstrates that, for those with strong ties, Facebook use is a significant predictor of a range of behaviors that are consistent with poor self-control. While we acknowledge that the data in this study are correlational, the findings are consistent with those in the experiments in which Facebook use was manipulated and reduce the concern that the previous studies' results are artifacts of the particular browsing manipulation that we used.

GENERAL DISCUSSION

Using online social networks such as Facebook has become part of the daily routines of hundreds of millions of people around the world. As prior research has shown, a number of psychological benefits can indeed be derived from using online social networks. However, across five studies we demonstrated that using the currently most popular and prominent social network (Facebook) may have a detrimental effect on consumers' self-control. We found that greater Facebook use is associated with poor self-control in a number of important domains: health (studies 3 and 5), mental persistence (study 4), and spending/finances (study

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5). Importantly, we demonstrate that these results are due to enhanced self-esteem produced by self-presentation on social networks. Specifically, we show that social networks only increase self-esteem in individuals focused on strong ties while browsing Facebook (studies 1–4).

This research advances our knowledge of social networks by demonstrating that social networks can have significant effects on consumer judgment and decision making, even in tasks that are unrelated to social network use or more general social behavior. Previous research has demonstrated that social networks can have a positive effect on how people feel about themselves and their well-being. For instance, social network use (or, more generally, online community activity) has been shown to enhance self-esteem (Gonzales and Hancock 2011; Valkenburg et al. 2006), increase social capital (Ellison et al. 2007), bolster emotional well-being (Buechel and Berger 2012), and lead to increased prosocial behaviors (Stephen and Galak 2012). In contrast, our research demonstrates that social network use may also have a detrimental effect on well-being by leading certain people to exhibit lower self-control.

Our research also complements existing findings on self-presentation to friends versus strangers, which has focused primarily on offline social interactions. Tice et al. (1995) find that in personal interactions people tend to be less self-enhancing with friends than they are with strangers to avoid being perceived as arrogant or boastful. We find that people experience greater self-esteem when they focus on the image they are presenting to strong ties in their social networks. Social network use has little effect on their self-esteem when they focus on the image they are presenting to weak ties in their social networks. This suggests that even though people are sharing the same positive information with strong ties and weak ties on social networks, they feel better about themselves when the information is received by strong ties than by weak ties. Additionally, this suggests that the same focus on being modest around strong ties may not manifest itself in online social network environments.

This research has important implications for the relationship between self-esteem and self-control. Although previous research has demonstrated that increased feelings of self-worth may lead to less self-control, much of this research is based on licensing effects whereby focusing on past accomplishments or behaviors makes people feel justified to indulge themselves (Fishbach and Dhar 2005; Khan and Dhar 2006; Wilcox et al. 2011). Our studies, however, demonstrate that people do not need to rely on past behaviors as a source of entitlement; momentarily increasing self-esteem in an incidental fashion, such as by browsing a social network, can lower self-control. Future research, however, should explore whether this effect is limited to social networks or whether any situational factor that incidentally increases self-esteem will lower self-control. For instance, can sharing favorable images with close friends online through various photo sites (e.g., Picasa) affect self-control? Would presenting an inflated self-image (e.g., an expert opinion) in an online community affect self-control?

This research also complements existing research on social relationships and self-control. For instance, Vohs, Ciarocco, and Baumeister (2005) find that when people engage in self-presentation under challenging conditions (e.g., a skeptical audience) or counter to normative patterns (e.g., being modest to strangers), they subsequently display less self-control. While the focus of their research is on how the physical effort associated with self-presentation depletes self-control resources, our research shows that even virtual self-presentation can affect self-regulation through enhanced feelings of self-worth. In related research, DeWall, Vohs, and Baumeister (2008) show that when people feel socially accepted, they perform worse at self-regulatory tasks that are purportedly diagnostic indicators of interpersonally attractive traits. However, socially excluded individuals performed worse at the tasks unless they were framed as indicators of being able to get along with others. On the basis of this related finding, one might argue that using social networks like Facebook can affect perceptions of social acceptance and social exclusion that influence ability to exert self-control.

The effect of social network use on individuals' abilities to exhibit self-control is concerning, given the increased time people are spending using social networks in part due to the worldwide proliferation of access to social networks anywhere anytime (e.g., via mobile smartphones, smart TVs, tablet computers). Even a small 5-minute "dose" of social network use in our studies was enough to significantly lower self-control in subsequent choices and tasks. Heavy users likely expose themselves to multiple doses of this effect a day. Given that self-control is important for maintaining social order and personal well-being, this subtle effect could have widespread impact. This is particularly true for adolescents and young adults who are the heaviest users of social networks and have grown up using social networks as a normal part of their daily lives. Because of these factors, our findings have important policy implications. It would be worthwhile for researchers and policy makers to further explore social network use in order to better understand which consumers may be particularly vulnerable to suffering negative psychological or social consequences.

The research is not without limitations, and we address two important ones here. The first relates to our Facebook-browsing manipulation. In studies 3 and 4 in the Facebook-browsing conditions, participants were asked to log into their Facebook accounts and browse the social network without posting content or interacting with other users in any way. While this is potentially less realistic than actual Facebook use, it is nevertheless ecologically valid given that a lot of time that people spend on Facebook does simply involve browsing and reading content. Allowing participants in the Facebook-browsing conditions in studies 3 and 4 to do more than just browse would have introduced a significant confound into our manipulation since the control condition (browsing CNN.com) did not facilitate anything other than browsing and reading content. A concern with this, however, may be that it was the control website (CNN.com or, in

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other tests, TMZ.com) that drove results and not Facebook. This appears unlikely since in study 1 we manipulated whether participants browsed Facebook or, in the control condition, simply thought about it and got the same pattern of results for self-esteem as in later studies.

The second potential limitation relates to how we measured tie strength in studies 2–5. A potential issue with our measure of tie strength is the use of a proportional measure instead of a count measure (e.g., percentage of one's Facebook friends who are strong ties vs. number of one's Facebook friends who are strong ties). The use of a proportional measure is standard in the sociological literatures on tie strength and has the advantage of being invariant to the size of a person's social network. Since someone's network size or "degree centrality" typically varies widely across people, it is more appropriate to use a normalized measure (i.e., a proportion). Nevertheless, in all studies we controlled for number of Facebook friends as a covariate (which never affected the results). A related issue is whether our proportional measure of tie strength was a valid measure of how focused people were on their close friends when browsing Facebook. The measure-validation pretest reported in study 2 verified this by showing that participants with a higher proportion of strong ties in their network were indeed more focused on close friends while browsing Facebook.

Our research points to several interesting areas for future research. For instance, it would be interesting to understand how Facebook use affects other consumer behaviors that are not related to self-control. Consumers use social networks to fulfill a variety of social needs including self-expression and self-presentation. Many of these same needs underlie the decision to purchase luxury brands and affect how consumers respond to messages promoting image versus quality. Consequently, future research may want to examine how browsing Facebook affects consumers' desire for luxury brands. Additionally, since we did not examine how social interactions on a social network influence behavior, it would be interesting to explore how different types of social interactions on social networks influence self-control and related behaviors. Does posting on a social network have the same effect on self-esteem and self-control as simply browsing the website? The findings of such research likely would depend on the nature of the interaction, but it would be interesting to see whether interacting with friends intensifies or mitigates the effect of simply browsing social networks. Relatedly, future research may want to examine the kinds of information people present to strong versus weak ties in offline versus online environments. Are people more likely to boast when they are instant messaging with close friends compared to when they are having similar one-to-one conversations offline? Finally, it would be interesting to explore the persistence of the effect of browsing Facebook over time. Although study 5 suggests that the effects of Facebook use on self-control are not merely ephemeral, a deeper examination of how long these effects last is an interesting avenue for future research. We hope these and related ideas en-

courage additional work on this nascent but increasingly important area of consumer research.

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