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Facebook and people's state self-esteem: The impact of the number of other users' Facebook friends



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ABSTRACT

The present two experimental studies examined the extent to which upward and downward comparison processes on Facebook influence people's state self-esteem. Participants were exposed to mock-up Facebook profiles of female and male targets with many or few Facebook friends. Participant sex was also included in the experimental design. In Study 1, a 2 (number of Facebook friends) \times 2 (profile owner sex) \times 2 (participant sex) experimental design was employed. Unexpectedly, the manipulation had no significant impact on people's state self-esteem. In Study 2, it was examined whether there would be a curvilinear relationship between the number of other's Facebook friends and participant's self-esteem, in that exposure to others with many or few Facebook friends increases self-esteem compared to others with a moderate number of Facebook friends. Hence, Study 2 employed a 3 (number of Facebook friends) \times 2 (profile owner sex) \times 2 (participant sex) between-participants experimental design. However, there was neither a linear nor a curvilinear impact of the number of other's Facebook friends on participant's level of state self-esteem. Both studies also revealed that the effects were not more pronounced when participants were exposed to same-sex rather than other-sex Facebook profiles.

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1. Introduction

The use of social networking services has become an important part in most people's daily lives. A nationally representative survey of U.S. adults shows that as of January 2014, 74% of online adults use social networking sites (PewResearchCenter, 2015). The world's most popular online social network is Facebook, with about 936 million daily active users on average (Facebook, 2015). The main motivation to use Facebook is to facilitate social relationships, such as forming new relationships and maintaining existing friendship networks (Cheung, Chiu, & Lee, 2011; Muscanell & Guadagno, 2012). Facebook users can add friends to their profile by initiating requests for friendship to other registered users. If the other user accepts the invitation, their friendship is displayed in the network of friends. Social networks communication may thus satisfy but also thwart the powerful need to belong (Baumeister & Leary, 1995). In fact, whereas the acceptance of a Facebook friendship request makes people proud (Lewis & West, 2009), rejection is associated with emotional numbness (Filipkowski & Smyth, 2012) and being unfriended on Facebook leads to rumination and

negative emotions (Bevan, Pfyl, & Barclay, 2012). Overall, there is a positive association between the number of people's Facebook friends and subjective well-being (Kim & Lee, 2011).

Hence, it appears that one's own Facebook friends may have an impact on people's emotional well-being. The present research addresses whether people are also influenced by other user's Facebook friends. Concretely, it was examined whether the number of other's Facebook friends would affect people's state self-esteem. It was proposed that participants exposed to profile owners with many Facebook friends would have a lower state self-esteem than participants exposed to profile owners with few Facebook friends. To the best of my knowledge, this hypothesis has never been empirically tested, although it receives indirect support from past research.

2. Literature review

According to social comparison theory (Festinger, 1954), individuals have an intrinsic tendency to compare themselves to others to learn where they stand and that these comparisons can have an impact on the individual's subjective well-being. In fact, social comparisons are a crucial determinant how people judge themselves (e.g., Wayment & Taylor, 1995). Depending on whether

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people compare themselves with others who are better off (upward comparison) or worse off (downward comparison), these comparisons make oneself feel good or bad (Gibbons & Gerrard, 1989; Wills, 1981). For example, one study revealed that people who are in the presence of socially undesirable others report higher self-esteem, whereas when in the presence of socially desirable others self-esteem decreases (Morse & Gergen, 1970). Likewise, comparing oneself to others who are inadequate compared to oneself raises self-esteem (Crocker, 1993), whereas other's superiority lowers self-esteem (Major, Sciacchitano, & Crocker, 1993).

Hence, it was reasoned that exposure to Facebook profile owners that are better off than oneself would have a negative impact on one's self-worth compared to exposure to Facebook profile owners that are worse off than oneself. Previous research has shown that the number of Facebook friends has consequences how the profile owner is perceived by others. For example, one study employed mock-up Facebook profiles and varied the number of the profile owner's friends (Kleck, Reese, Behnken, & Sundar, 2007). Results showed that profile owners with many friends (261) were perceived as being more popular than profile owners with few friends (15 or 82). Subsequent research replicated this finding, in that a profile owner was perceived as more popular when she had 382 friends than when she had 82 friends (Utz, 2010). Overall, it appears that profile owners with many Facebook friends are perceived more favorably than profile owners with few Facebook friends. That is, exposure to Facebook profile owners with many friends would constitute an upward comparison, whereas exposure to Facebook profile owners with few friends would constitute a downward comparison. Hence, it was reasoned that exposure to profile owners with many Facebook friends would decrease participant's self-esteem compared to exposure to profile owners with few Facebook friends (cf. Gibbons & Gerrard, 1989; Morse & Gergen, 1970; Wills, 1981).

Research on social comparison has shown that individuals are particularly likely to compare themselves with others who are similar to them (Wood, 1989) and who are viewed as relevant to the self (Lockwood & Kunda, 1997). Hence, it was further examined whether exposure to same-sex Facebook profiles would have a larger impact on participant's state-self-esteem than other-sex profiles.

3. Study 1

Study 1 provides a first test of the idea that the number of other user's Facebook friends influences people's state-self-esteem. Participants were randomly exposed to either profile owners with many Facebook friends or profile owners with few Facebook friends. Because it was also addressed whether exposure to same-sex Facebook profiles would have a larger impact on participant's state-self-esteem than other-sex profiles, participants were either exposed to same-sex or other-sex Facebook profiles.

3.1. Method

Participants were 509 students of an Austrian university (354 female participants, 151 male participants, four participants did not indicate their gender; mean age = 23.0, $SD = 4.5$). Only individuals who had a Facebook account were allowed to participate. All participants were randomly assigned to one of four experimental conditions. One-hundred and twenty-five participants were exposed to female profile owners with many Facebook friends, 119 participants were exposed to male profile owners with many Facebook friends, 136 participants were exposed to female profile owners with few Facebook friends, and 129 participants were exposed to male profile owners with few Facebook friends. Because

participant sex was also included in the experimental design, a 2 (number of Facebook friends: many vs. few) \times 2 (profile owner sex) \times 2 (participant sex) experimental design was employed. At the onset, participants learned that they would take part in two unrelated studies. All participants responded to an online questionnaire.

After participants provided their demographic data (i.e., sex, age), they were asked to report their number of Facebook friends ($M = 266$, range = 0–900). Then, they were exposed to 3 mock-up Facebook profiles. (Participants were exposed to more than one profile to strengthen the experimental manipulation.) Among other information (e.g., photo of profile owner,¹ favorite music), the profiles contained information about the number of Facebook friends. In the condition many Facebook friends, the targets had 753, 623, and 545 friends. In the condition few Facebook friends, the targets had 42, 38, and 29 friends. Previous work (Sagioglou & Greitemeyer, 2014) employing a similar participants' pool revealed that participants had on average 352 friends, so we added to and reduced from, respectively, this number several hundred friends to create the many and few number of Facebook friends experimental conditions. Apart from the number of friends, the profiles were identical across experimental conditions. Participants were either exposed to 3 female or 3 male profiles. Among other items, participants were asked how attractive and how popular, respectively, they perceive each profile owner. Both items were assessed on a scale from 1 (very unattractive and very unpopular, respectively) to 5 (very attractive and very popular, respectively). These items were then averaged into a perceived popularity scale ($\alpha = .66$).

To assess participant's state self-esteem, participants filled out a well-established 20-item scale (Heatherton & Polivy, 1991) ($\alpha = .90$). Sample item: "I feel inferior to others at this moment" (recoded). Items were averaged using the mean. (Measures of positive and negative mood and some filler items were also employed; however, there were no significant effects for these measures so they are not considered further). As a manipulation check, participants were asked to indicate how many Facebook friends the profile owners had on average. The scale for all items was from 1 (not at all) to 5 (extremely). Afterwards, participants were asked what they thought this study was examining. None of the participants noted the correct assumption about the purpose of the study, although some were relatively close (e.g., effect of Facebook profiles on self-ratings). When those participants were excluded, the pattern of findings was very similar so they were kept in all of the following analyses. The same applies to Study 2. After the study was over, all participants were thanked and thoroughly debriefed.

3.2. Results

The manipulation check was successful in that profile owners with many Facebook friends were perceived as having more friends ($M = 4.55$, $SD = 0.69$) than profile owners with few Facebook friends ($M = 1.61$, $SD = 0.85$), $t(505) = 42.54$, $p < .001$, $d = 3.80$. State self-esteem ratings were subjected to a 2 (number of Facebook friends: many vs. few) \times 2 (profile owner sex) \times 2 (participant sex) analysis of variance (ANOVA). Participant's state self-esteem tended to be lower after they were exposed to a profile owner with many ($M = 3.77$, $SD = 0.59$) compared to few Facebook friends ($M = 3.86$, $SD = 0.57$), $F(1, 496) = 3.76$, $p = .053$, although the effect size was small, $\eta_p^2 = 0.01$. None of the interactions were significant (see

¹ To rule out the possibility that other cues such as the physical attractiveness of the profile owners or their Facebook friends overrule the "friend number cue", the photos were distorted.

Table 1

Means and standard deviations (in parentheses) for participant's level of self-esteem and perceived popularity as a function of experimental condition (study 1).

Dependent measure	Experimental condition			
	Female profile, many friends	Male profile, many friends	Female profile, few friends	Male profile, few friends
State self-esteem	3.84 (0.53)	3.69 (0.64)	3.84 (0.58)	3.89 (0.57)
Perceived popularity	3.62 (0.52)	3.25 (0.44)	3.29 (0.49)	2.86 (0.59)

Table 1). These findings were virtually the same when controlling for the number of participant's Facebook friends in an analysis of covariance (ANCOVA).

Ratings of perceived popularity of the profile owner were subjected to a 2 (number of Facebook friends) \times 2 (profile owner sex) \times 2 (participant sex) ANOVA. Most importantly, profile owners with many friends ($M = 3.44$, $SD = 0.51$) were perceived as more popular than profile owners with few friends ($M = 3.08$, $SD = 0.58$), $F(1, 497) = 67.65$, $p < .001$, $\eta_p^2 = 0.12$ (see Table 1).

3.3. Discussion

Although profile owners with many friends were perceived as more popular than profile owners with few friends, Study 1 provided only weak support for the hypothesis that the number of other's Facebook friends affects people's state self-esteem. There was also no support for the idea that same-sex Facebook profiles have a larger impact on participant's state-self-esteem than other-sex profiles. Moreover, the number of participants' Facebook friends did not affect how they responded to how many Facebook friends the profile owners had.

Overall, it appears that the impact of other user's Facebook friends on people's state self-esteem was small. Although research has documented a positive association between the number of other's Facebook friends and the perception of their social attractiveness (Kleck et al., 2007; Utz, 2010), at a certain point the positive impact may weaken or even reverse. In fact, subsequent research has shown that a profile owner with a moderate number of Facebook friends (302) receives higher ratings of social attractiveness than profile owners with either few (102) or a very large number of Facebook friends (902) (Tong, Van Der Heide, Langwell, & Walther, 2008). Hence, it appears that an abnormally high number of Facebook friends leads people to doubt the quality of those friendships.

Study 2 examined whether there might be a curvilinear (rather than a linear) relationship between the number of other's Facebook friends and participant's self-esteem, in that exposure to both profile owners with many and few Facebook friends increases self-esteem compared to profile owners with a moderate number of Facebook friends. Moreover, it was examined whether the number of the profile owner's Facebook friends had an impact on whether participants would doubt the authenticity of these friendships. To this end, for each Facebook profile, participants noted any thoughts concerning the profile owner they had. It was predicted that participants would be more likely to question the authenticity of the profile owners' friendships when this person had many Facebook friends.

4. Study 2

Study 2 extends Study 1 in some important ways. First, Study 2 employed an additional experimental condition where the profile owner had a moderate number of Facebook friends. That is, a 3 (number of Facebook friends: many vs. moderate vs. few) \times 2 (profile owner sex) \times 2 (participant sex) experimental design was employed. Second, after the presentation of each profile,

participants were asked to note any thoughts concerning the profile owner they had. It was coded whether participants listed any doubt concerning the authenticity of the profile owners' friendships. In addition to participant's state self-esteem, measures of trait self-esteem and trait narcissism were employed (before the manipulation), as well as measures of state anxiety and positive and negative mood (after the manipulation). However, number of Facebook friends had no significant impact on state anxiety and positive and negative mood, respectively. Moreover, when trait self-esteem and trait narcissism were used as covariates in an analysis of covariance, the pattern of findings was very similar to the analysis without those covariates (both covariates significantly influenced state self-esteem). For the sake of brevity, these variables are not considered further.

4.1. Method

Participants were 479 individuals (369 female participants, 110 male participants; mean age = 26.1, $SD = 9.8$) and included students, non-students adults of a community, as well as trainees. The questionnaire was posted online on a Facebook account of a research assistant as well as a Facebook account where people are informed about psychological studies. In addition, participants were asked to send the link to the questionnaire to their friends and relatives. In contrast to Study 1, both individuals with ($N = 398$) and without ($N = 81$) a Facebook account were allowed to participate. All participants were randomly assigned to one of six experimental conditions. Seventy-four participants were exposed to female profile owners with many Facebook friends, 78 participants were exposed to male profile owners with many Facebook friends, 79 participants were exposed to female profile owners with a moderate number of Facebook friends, 78 participants were exposed to male profile owners with a moderate number of Facebook friends, 93 participants were exposed to female profile owners with few Facebook friends, and 77 participants were exposed to male profile owners with few Facebook friends.

The procedure was similar to Study 1, with the following modifications. Participants were exposed to 2 Facebook profiles. In the condition many Facebook friends, the targets had 915 and 932 friends. In the condition moderate number of Facebook friends, the targets had 332 and 350 friends. In the condition few Facebook friends, the targets had 17 and 32 friends. After each profile, participants were asked to report any thoughts they had while viewing the profile. A research assistant who was blind to the participant's experimental condition coded these comments in terms of whether any doubts concerning the authenticity of the profile owners' friendship were noted. It was simply coded whether any doubts were noted at all. That is, participants received a value of either 0 (no doubt was noted) or 1 (doubt was noted). At the end of the study, participants were asked to indicate the number of Facebook friends of each profile owner (among filler items such as the profile owner's interests), which were then averaged using the mean. The reliability of the state self-esteem scale was: $\alpha = .92$.

4.2. Results

As intended, the number of Facebook friends indicated by participants differed across experimental conditions, $F(2, 312) = 264.76, p < .001, \eta_p^2 = 0.63$.² The number of Facebook friends for targets with many friends ($M = 712, SD = 344$) was perceived to be higher compared to targets with a moderate number of Facebook friends ($M = 303, SD = 113$), followed by targets with few Facebook friends ($M = 57, SD = 97$). Hence, the manipulation check was successful.

State self-esteem ratings were analyzed in a 3 (number of Facebook friends: many vs. moderate vs. few) $\times 2$ (target sex) $\times 2$ (participant sex) ANOVA. Most importantly, participant's state self-esteem did not significantly differ as a function of the number of Facebook friends, $F(2, 467) = 0.20, p = .821, \eta_p^2 = 0.00$ (see Table 2). To test the specific prediction that exposure to both profile owners with many and few Facebook friends increases self-esteem compared to profile owners with a moderate number of Facebook friends, planned contrasts were performed on the data. However, the moderate number of Facebook friends condition (contrast weight: -2) did not significantly differ from the many (contrast weight: $+1$) and few number of Facebook friends conditions (contrast weight: $+1$), $t(476) = 0.08, p = .935$. The many and the few number of Facebook friends conditions also did not significantly differ, $t(476) = 0.29, p = .770$. In fact, ratings were very similar across experimental conditions (many: $M = 4.85, SD = 1.15$; moderate: $M = 4.82, SD = 1.19$; few: $M = 4.81, SD = 1.10$). As in Study 1, none of the interactions were significant. When controlling for the number of participant's Facebook friends in an ANCOVA the pattern of findings was virtually the same.

Comments of participants with regard to the profile owners' profiles were analyzed in terms of whether participants were more likely to question the authenticity of the profile owners' friendships when this person had many Facebook friends. In fact, when the profile owners had many Facebook friends, significantly more participants expressed their doubts that the friendships were real (20.4%, 31 out of 152) compared to profile owners with a moderate (3.2%, 5 out of 157) and few number of Facebook friends (0%, 0 out of 170), $\chi^2(2, N = 479) = 54.32, p < .001$.

4.3. Discussion

Extending Study 1, Study 2 examined whether the relationship between the number of other's Facebook friends and participant's state self-esteem might be curvilinear. That is, it could have been that both having too few and having too many Facebook friends have a negative impact on how the profile owner is evaluated, which in turn results in participant's increased state self-esteem (via downward comparison). However, there was neither a linear nor a curvilinear impact of the number of other's Facebook friends on participant's level of state self-esteem. As in Study 1, it appears

that the impact of the number of others' Facebook friends on people's state self-esteem is small.

Study 2 also provided some insights into why exposure to profile owners with many Facebook friends does not negatively affect people's state self-esteem. Participants were more likely to question whether Facebook friendships are real when the profile owner has many friends. This process may serve as a defense mechanism to deal with the threat that one has fewer Facebook friends than others and thus restores people's self-worth. It should be noted, however, that state self-esteem levels of participants who were exposed to profile owners with many Facebook friends and who did or did not doubt the authenticity of these friendships were relatively similar ($M_s = 4.90$ and 4.84).

5. General discussion

The present two studies found little evidence for the hypothesis that exposure to profile owners with many Facebook friends decreases state self-esteem compared to exposure to profile owners with few Facebook friends. Study 2 also showed that the relation was not curvilinear in that exposure to profile owners with a moderate number of Facebook friends had no impact on participant's state self-esteem. In both studies, effect sizes were small and sample sizes were relatively large so the present studies were not underpowered to detect possible effects.

Previous research has shown that Facebook does have an impact on the user's self-esteem. Overall, Facebook use is associated with increased self-esteem (Kim & Lee, 2011; Mehdizadeh, 2010; Valkenburg, Peter, & Schouten, 2006). In particular, viewing or editing the own Facebook profile leads to higher self-esteem (Gentile, Twenge, Freeman, & Campbell, 2012; Gonzales & Hancock, 2011). Responses from other social network users have been shown to influence self-esteem, with positive responses enhancing it and negative responses decreasing it (Acar, 2008; Greitemeyer, Mügge, & Bollermann, 2014; Valkenburg et al., 2006). Research has also shown that social comparison processes are at work when using Facebook, in that upward comparisons have negative consequences for one's well-being, whereas the opposite is true for downward comparisons. For example, in one study, participants who were exposed to a physically attractive Facebook profile owner reported fewer positive emotions afterwards and were more dissatisfied with their own body (Haferkamp & Krämer, 2011). Another study (Krasnova, Wenninger, Widjaja, & Bruxmann, 2013) found that consuming other people's profile information, such as vacation photographs, elicits feelings of envy, which in turn diminishes the experience of life satisfaction. People even actively employ Facebook to manage their mood by engaging in less selective exposure to portrayals of upward comparison targets and more exposure to downward comparisons (Johnson & Knobloch-Westerwick, 2014). Overall, self-esteem has been shown to be negatively associated with a person's social comparison frequency on Facebook (Lee, 2014).

In light of these findings, it is remarkable that the number of other's Facebook friends has a negligible impact on people's self-esteem. Of course, null findings are always difficult to interpret. Hence, it is particularly important to note that the manipulation worked, in that participants were aware of the differing number of Facebook profiles in the experimental conditions. As noted above, sample size in both studies was large so I deem it rather unlikely that a type II error was committed (i.e., the failure to detect an effect that is actually present). Nevertheless, future research is definitely needed before one can come to the conclusion that the number of people's Facebook friends does not have an impact on other's self-esteem.

Study 2 shed some light on why exposure to others with many

Table 2

Means and standard deviations (in parentheses) for participant's level of self-esteem as a function of the number of Facebook friends and profile owner sex (study 2).

Profile owner sex	Number of Facebook friends		
	Many	Moderate	Few
Female	4.91 (1.16)	4.88 (1.19)	4.81 (1.08)
Male	4.80 (1.14)	4.77 (1.19)	4.82 (1.13)

² The degrees of freedom differ across analyses due to missing responses on single measures.

Facebook friends does not decrease people's self-esteem, in that participants doubted that Facebook friendships were real when the profile owner had almost 1000 friends. Having many Facebook friends increases one's social attractiveness (Kleck et al., 2007; Utz, 2010; Zywicki & Danowski, 2008), but having too many friends results in less favorable evaluations (Tong et al. 2008). Future research may identify other mechanisms that contribute to why the number of other users' Facebook friends has little influence on people's state self-esteem.

Some limitations of the present work should be acknowledged. Perhaps most importantly, participants were exposed to Facebook profiles of complete strangers. Given that social influence is stronger the more people know each other, learning that one's own Facebook friends have more or fewer friends than oneself may influence people's self-esteem. In fact, research has shown that children are more likely to compare themselves with close friends (Huguet, Dumas, Monteil, & Genestoux, 2001). In addition, only short-term effects of exposure to Facebook targets were assessed. Repeated exposure to targets with many Facebook friends may have a stronger impact on people's self-esteem. It is also noteworthy that participants were young adults. Given that children are more likely to have minds that are susceptible to social influence, the number of other's Facebook friends may have a stronger impact on children's self-esteem. Addressing these issues would be important avenues for future research.

To conclude, the present studies suggest that people's state self-esteem is hardly impaired by exposure to others with a large number of Facebook friends. By depreciating those profile owners people can effectively keep their high level of self-regard. At the same time, exposure to others with few compared to a moderate number of Facebook friends does not boost people's state self-esteem. Overall, it appears that the number of others' Facebook friends does not matter much how satisfied people are with themselves.

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