Instagram #Instasad?:
Exploring Associations Among Instagram Use, Depressive Symptoms, Negative Social Comparison, and Strangers Followed

Katerina Lup, MA, Leora Trub, PhD, and Lisa Rosenthal, PhD

Abstract

As the use and influence of social networking continues to grow, researchers have begun to explore its consequences for psychological well-being. Some research suggests that Facebook use can have negative consequences for well-being. Instagram, a photo-sharing social network created in 2010, has particular characteristics that may make users susceptible to negative consequences. This study tested a theoretically grounded moderated meditation model of the association between Instagram use and depressive symptoms through the mechanism of negative social comparison, and moderation by amount of strangers one follows. One hundred and seventeen 18–29 year olds completed online questionnaires containing demographics, frequency of Instagram use, amount of strangers followed on Instagram, the Center for Epidemiological Resources Scale for Depression, and the Social Comparison Rating Scale. Instagram use was marginally positively associated with depressive symptoms, and positive social comparison was significantly negatively associated with depressive symptoms. Amount of strangers followed moderated the associations of Instagram use with social comparison (significantly) and depressive symptoms (marginally), and further significantly moderated the indirect association of Instagram use with depressive symptoms through social comparison. Findings generally suggest that more frequent Instagram use has negative associations for people who follow more strangers, but positive associations for people who follow fewer strangers, with social comparison and depressive symptoms. Implications of negative associations of social networking for people who follow strangers and the need for more research on Instagram use given its increasing popularity are explored.

Introduction

O VER THE LAST DECADE, social networking has grown faster and changed more than any other Internet activity. This has coincided with the sharp rise in adults who own smartphones, enabling social networking to happen anytime and anywhere.[1] The well-known social networking site (SNS) Facebook has 1.28 billion users worldwide, and the percentage of adults using SNS in the United States has increased from 8% in 2005 to 72% in 2013.[2] The popularity of Facebook has contributed to the development of numerous SNS catering to specific populations and interests, playing a dominant role in people's social landscapes. Past research on effects of social networking on well-being has yielded mixed results, in particular highlighting the negative implications of passive forms of SNS use.[3–7] Yet, to the best of the authors' knowledge, no work to date has studied the psychological correlates of Instagram use. Instagram, an SNS created in 2010, involves posting photos with the option of using enhancement filters, and nonreciprocal following of other users. These features characterize passive SNS activity that may make people particularly vulnerable to negative effects of use on well-being. This is the first study to examine the association of Instagram use with depressive symptoms in an effort to shed light on what may mediate and moderate that association.

SNS and psychological well-being

Benefits of Facebook use have been found to arise from increased social contact,[6,8–10] social capital,[11] and self-esteem, especially when people makes changes to their own profiles.[12] However, Facebook use has been associated with increased feelings of stress and social overload,[5] lower self-esteem,[4]

Psychology Department, Pace University, New York.

loneliness, and depression.[3,6,7] Quality of feedback plays a role, with positive feedback enhancing self-esteem and well-being, and negative feedback producing the opposite result in adolescents[13] and adults.[14]

Passive use (e.g., browsing others' profiles without posting one's own new material) seems to be particularly detrimental. Passively looking at others' profiles displaying photos of vacations or social events to which one was not invited often triggers resentment, envy, and loneliness.[15] Jealousy and relationship problems can result from spending too much time on profiles of romantic partners,[16] and contact with ex-partners prevents people from post-breakup healing.[17] In adolescent girls, emotional investment in social networking has been linked to lower self-esteem and depressed mood,[18] and exposure to SNS that emphasize appearance has been linked to increased body image disturbance.[19] Taken together, there is evidence of both positive and negative consequences of social networking for well-being, with passive use in particular being linked to negative consequences. Further examination of moderators and mechanisms involved are necessary to understand these associations better.

The roles of following strangers and comparisons to others

There is growing evidence that following strangers on SNS and comparing oneself to others have important implications for well-being. People with more strangers as Facebook "friends" are more likely to believe that others have better lives and that life is not fair,[20] suggesting that the amount of strangers one follows may moderate the association between SNS use and well-being. Further, Facebook use intensity has been linked to comparing oneself negatively to others on Facebook.[21] Also, looking at profile pictures of attractive people triggers less positive emotions than looking at photos of less attractive people,[22] and this sort of negative comparison to others has been found to place people at risk for rumination, which can lead to depression.[23] These findings suggest that social comparison may mediate the association between SNS use and well-being.

Instagram

Instagram, with an estimated 100,000,000 unique monthly visitors, functions through photo and video sharing,[24] and is quickly increasing in popularity with young people.[1] Among the features that make it distinct from Facebook, creating new content requires posting a photo or video. Users can choose from various filters to enrich or beautify photos before posting them, and have the option to comment upon and "like" others' photos by tapping a heart icon (there is no option to "dislike"). Journalists have argued that this image-driven nature of Instagram encourages presentation of only the most positive and polished characterizations of one's life.[25] This issue may be magnified in comparison to Facebook, which, while strongly populated by positive images, is also used to post status updates sharing negative feelings.[26]

In contrast to Facebook, it is common for people to keep public Instagram profiles, enabling users to "follow" and therefore view, like, and comment on photos of people they do not know personally. Following and/or being followed by strangers is also promoted by hashtags or labels used to caption photos, enabling all photos with that hashtag to be

searchable, regardless of the privacy settings of the user. Also in contrast to Facebook, where connecting with other users is reciprocal (both individuals receiving status updates on each other), following someone on Instagram may only go in one direction.[27] This feature may contribute to the popularity of following celebrities with open profiles.[28]

Attribution theory, which highlights people's tendency to attribute others' behavior to dispositional rather than situational factors,[29] would suggest that browsing the enhanced photos of celebrities or other strangers on Instagram may trigger assumptions that these photos are indicative of how the people in them actually live. Such conclusions make people more vulnerable to judging themselves in relation to the assumed (but often unrealistic) lives of others, which can trigger feelings of distress.[20] Thus, the nonreciprocal and public nature of sharing enhanced photos on Instagram may represent a combination of features likely to trigger negative feelings about the self, particularly for users that follow large numbers of strangers.

The current study

The current study aims to examine the association between frequency of Instagram use and depressive symptoms. A moderated mediation model (see Fig. 1) was derived from the literature reviewed, hypothesizing: (a) a positive association exists between frequency of Instagram use and depressive symptoms; (b) this association is mediated by more negative social comparison to other users; and (c) percentage of strangers followed on Instagram will moderate the direct and indirect associations hypothesized, with associations being stronger for individuals following more strangers.

Methods

Participants and procedures

Participants were 18–29 year olds who identified themselves as Instagram users. A call for recruitment was posted on the first author's Facebook page, which was then shared by other users. One hundred and eighty-seven individuals consented to participate and started the online survey. The final sample was comprised of 117 participants who completed all measures of interest, minus one participant identified as a multivariate outlier (84% female; 83% white/European American, 7% multiracial/ethnic or other, 7% Latino/Hispanic, 3% Asian/Pacific Islander, 1% black/African American; 6% H.S. degree/GED, 20% some college, 3% trade/vocational training, 49% bachelor's degree, 18%
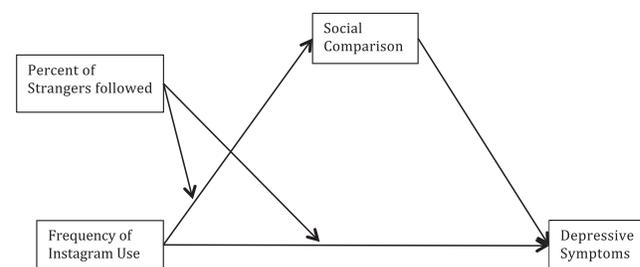

FIG. 1. Conditional associations between Instagram use and social comparison at different levels of strangers followed.

master's degree, 5% professional degree; 88% heterosexual, 5% bisexual, 3% gay/lesbian, 3% questioning, 1% refused; $M_{age} = 24.81$ years, $SD = 2.51$ years).

Measures

Instagram use. Participants reported how much time they spend on Instagram daily, with choices including 10 minutes or less, 11–30 minutes, 31–60 minutes, 1–2 hours, and 2–3 hours (adapted from Ross et al.[30]).

Strangers followed. A score indicating the percentage of those followed on Instagram who are strangers was derived by dividing number of strangers participants reported following by total number of people they reported following (based on Acar[31]).

Social comparison. Social comparison was measured with four items from the Social Comparison Rating Scale.[32] The original scale included 11 items, which was then adapted by Feinstein et al.[23] to assess the tendency to compare one-self socially to others on Facebook. The four items chosen for this study measured how confident, attractive, desirable, and inferior one feels in comparison to others on Instagram, using a slider with 10 possible points. These items were included, as they were considered relevant to the experience of viewing profiles of friends as well as strangers. They were summed ($\alpha = 0.87$). Higher scores indicate more positive social comparison.

Depressive symptoms. Depressive symptoms were measured with the 20-item Center for Epidemiological Studies Depression scale.[33] Participants responded on a scale ranging from 1 = ''rarely or none of the time'' to 4 = ''most or all of the time'' about how often they felt certain ways in the past week (e.g., ''During the past week I felt lonely''), and items were summed ($\alpha = 0.93$).

Results

Preliminary analyses

First, all main study variables were tested for non-normality, and because depressive symptoms and percentage of strangers followed were skewed, square root transformations were performed on both variables. Next, to decide what, if any, demographic control variables to include in model testing, the study examined whether any demographic characteristics were related to the mediator (social comparison) or outcome (depression) variables using t tests (for white vs. other race/ethnicity, more than college degree vs. college degree or less education, female vs. male, and heterosexual vs. other sexual orientation) and bivariate correlations (for age in continuous years). A t test indicated a significant difference of sexual orientation on social comparison, $t(117) = -2.96$, $p = 0.004$. Heterosexual individuals tended to have higher scores on social comparison than those with other sexual orientations ($M = 22.97$, $SD = 6.14$ heterosexual; $M = 18.06$, $SD = 6.38$ other sexual orientation). There were no other mean differences or correlations based on demographic variables, and therefore sexual orientation (heterosexual vs. other sexual orientation) was included as a control variable in all subsequent analyses. Last, Mahalanobis distance was used to check

Table 1. Means, Standard Deviations, and Bivariate Correlations for Main Study Variables ($N = 117$)

	M	SD	1	2	3
1. Frequency of Instagram use	2.30	0.99			
2. Percent of strangers followed (square root transformed)	0.41	0.29	0.22*		
3. Social comparison	22.49	6.19	0.06	−0.06	
4. Depressive symptoms (square root transformed)	6.22	0.55	0.18*	0.12	−0.22*

Note: Frequency of Instagram use range 1–4: 1, ≤10 minutes; 2, 11–30 minutes; 3, 31–60 minutes; 4, 1 h–2 hours; social comparison range 4–40; depressive symptoms range 20–80 (before transformation).

*$p < 0.05$.

for multivariate outliers with the main study variables, and one participant was removed because of being a multivariate outlier, resulting in a final analytic sample of 117. Means, standard deviations, and bivariate correlations for study variables for the final analytic sample are shown in Table 1. All study variables were intercorrelated in predicted directions.

Testing the moderated mediation model

The model displayed in Figure 1 was analyzed using bootstrap analyses with Hayes'[34] PROCESS macro for SPSS, using Model 8 (for moderated mediation) with 10,000 bootstrap samples, and including sexual orientation as a covariate. Results indicated that strangers followed was a significant moderator of the association of Instagram use with social comparison (estimate of interaction = −4.03, $SE = 1.89$ [95% CI −7.78 to −0.29], $p = 0.035$), but was only a marginally significant moderator of the direct association of Instagram use with depressive symptoms (estimate of interaction = 0.30, $SE = 0.17$ [95% CI −0.03 to 0.64], $p = 0.078$). Figures 2 and 3 show these interactions with estimates of the associations of Instagram use with social comparison (Fig. 2) and depressive symptoms (Fig. 3) at the 10th, 25th, 50th, 75th, and 90th percentiles of strangers followed. The conditional association of Instagram use with social comparison was positive and significant only at the 10th percentile of strangers followed (estimate of conditional effect = 1.93, $SE = 0.96$ [95% CI 0.03 to 3.83], $p = 0.046$), indicating that for individuals at the lowest level of following strangers only, more Instagram use is associated with more positive social comparison. There were nonsignificant trends that Instagram use was associated with more negative social comparison at the highest levels of strangers followed. The conditional direct associations of Instagram use with depressive symptoms were positive and significant only at the 75th (estimate = 0.16, $SE = 0.06$ [95% CI 0.04 to 0.28], $p = 0.012$) and 90th (estimate = 0.22, $SE = 0.09$ [95% CI 0.05 to 0.39], $p = 0.013$) percentiles of strangers followed, indicating that more Instagram use is related to greater depressive symptoms only for those at highest levels of strangers followed; for those at lower levels of strangers followed, Instagram use and depressive symptoms were unrelated.

FIG. 2. Association of Instagram use with depressive symptoms at different percentiles of strangers followed. Percentile of strangers followed: ▬ ▬ , 10th percentile; • • • , 25th percentile; ▬▬▬, 50th percentile; ———, 75th percentile; ══════, 90th percentile.

Results also supported moderated mediation, with strangers followed significantly moderating the indirect association of Instagram use with depressive symptoms through social comparison (estimate = 0.08, $SE = 0.05$ [CI 0.01 to 0.24]; exact p value not included in output for this effect, but CI not including 0 indicate significance at $p < 0.05$). Estimates of the conditional indirect association of Instagram use with depressive symptoms through social comparison at the 10th, 25th, 50th, 75th, and 90th percentiles of strangers followed are shown in Table 2, and were not significant at any of the percentiles of strangers followed used for the estimates. However, there was a trend that the conditional indirect associations between Instagram use and depressive symptoms through social comparison were positive at the highest levels

FIG. 3. Association of Instagram use with social comparison at different percentiles of strangers followed. Percentiles of strangers followed: ———, 10th percentile; ══════, 25th percentile; ▬ ▬ , 50th percentile; ▬▬▬, 75th percentile; • • • , 90th percentile.

TABLE 2. CONDITIONAL INDIRECT ASSOCIATION OF INSTAGRAM USE ON DEPRESSION AT VALUES OF STRANGERS FOLLOWED ($N = 117$)

Percentile of strangers followed	Indirect effect estimate	Standard error	95% Confidence intervals	
10th Percentile	−0.04	0.03	−0.12	0.001
25th Percentile	−0.02	0.02	−0.09	0.003
50th Percentile	−0.01	0.01	−0.05	0.01
75th Percentile	0.01	0.02	−0.01	0.06
90th Percentile	0.03	0.02	−0.002	0.10

of strangers followed, but negative at the lowest levels of strangers followed. Instagram use also had a marginally significantly positive association with depressive symptoms (estimate = 0.09, $SE = 0.05$ [95% CI −0.01 to 0.20], $p = 0.066$), and social comparison had a significant negative association with depressive symptoms (estimate = −0.02, $SE = 0.01$ [95% CIs −0.04 to −0.003], $p = 0.021$), with social comparison and the interaction between strangers followed and Instagram use in the model.

Last, two possible alternative models were tested with different directions of effects, both treating depressive symptoms as the predictor and strangers followed as the moderator, but one treating Instagram use as the outcome and social comparison as the mediator, and another treating social comparison as the outcome and Instagram use as the mediator. Moderated mediation and conditional indirect associations at different levels of the moderator were all nonsignificant in these models, suggesting they do not fit the data better than the present model.

Discussion

This study tested a theoretically driven model proposing that more frequent Instagram use would be associated with greater depressive symptoms, that more negative social comparison with other Instagram users would mediate that association and that these associations would be stronger the more strangers one follows. Findings partially supported the model. First, partially consistent with the hypotheses and past research,[7,14,35] more frequent Instagram use had a marginally significant direct association with greater depressive symptoms. Contrary to the hypotheses, more frequent Instagram use was not associated with social comparison. Thus, mediation was not supported for the entire sample. Finally, consistent with the hypotheses as well as past research on Facebook,[36] more positive social comparison was associated with less depressive symptoms.

Also as predicted, the amount of strangers followed significantly moderated the association of Instagram use with social comparison and the indirect association of Instagram use with depressive symptoms through social comparison, as well as marginally significantly moderated the direct association of Instagram use with depressive symptoms. At the lowest level of strangers followed only, more frequent Instagram use was associated with more positive social comparison. At the highest levels of strangers followed only, more frequent Instagram use had direct associations with greater depressive symptoms. Further, nonsignificant trends suggest that at higher levels of strangers followed, greater

Instagram use was associated with greater depressive symptoms through social comparison as a mediator, whereas at lower levels of strangers followed, greater Instagram use was associated with lower depressive symptoms through social comparison as a mediator. These findings underscore the importance of how many strangers one follows, which is consistent with findings that Facebook users with more friends who are strangers are more likely to exhibit attribution error toward those users they do not know.[20] This then places undue emphasis on internal characteristics to explain behavior, which can lead to negative social comparison.[22,23] On the other hand, seeing photos of friends and acquaintances might trigger positive feelings, or at least be counterbalanced by knowing how those people *actually* live, and thus reduce attribution error and thereby negative social comparison. This is suggested by the present results, which find that individuals mostly following people who they know as opposed to strangers are more likely to engage in positive social comparison toward those they follow. The current findings support and extend this past work, and suggest Instagram use has negative associations with well-being for those who follow many strangers, but positive associations with well-being for those who follow few strangers.

Strengths, limitations, and directions for future research

This is the first study to examine Instagram use and well-being, which established a link between Instagram use and depressive symptoms, and explored a mediator and a moderator of that association, resulting in a clearer picture of the various psychological constructs at play. In a time when social networking is increasingly dominant in people's social lives, this study provides valuable insight into the differing effects of particular features of social networking, and the potential dangers associated with exposure to strangers' profiles. These findings pave the way for future research that more closely establishes and explores the moderating effect of following strangers on people's subjective experience of using social networking. For example, a nondichotomous definition of ''stranger'' that includes a way of distinguishing between a distant acquaintance and a good friend would deepen the current findings. Also, evidence of mediation between Instagram use and depressive symptoms through social comparison might be easier to establish using a more precise measure of Instagram use and including psychological traits known to affect social comparison. A methodology that explored the immediate impact of Instagram use on mood[36] would allow for a deeper look at these processes. The cross-sectional nature of this study makes it impossible to be certain of the direction of effects and longer-term processes involved in Instagram use, and thus causal claims must be interpreted with caution. Future work could address this more completely through longitudinal and experimental methods. Finally, more research is needed to determine the unique consequences of Instagram use in comparison to other SNS, given its increasing popularity.

Implications and conclusions

The current findings suggest that people using Instagram or other SNS to keep in touch solely with people they know personally are not at risk for negative consequences. To the contrary, this use may yield benefits, consistent with past work.[9,37] However, following strangers may lead to or reinforce already existing negative feelings about the self by triggering negative social comparisons.[15,22] This is particularly important because of the increasing size of people's social networks, which have tripled over the last decade, jumping from an average of 150–200[8] to 649,[38] which most likely reflects a trend toward including more distant acquaintances and strangers. Continuing research on these dynamics and consequences of SNS use is critical to help people anticipate, understand, and maintain greater control over the consequences of social networking for their well-being, and to help parents, teachers, and mental health workers help children and teens navigate social networking to reduce negative effects and support growth and positive development.

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Address correspondence to:
Dr. Leora Trub
Department of Psychology
Pace University
41 Park Row, Room 1316
New York, NY 10038

E-mail: ltrub@pace.edu