



# Active Social Network Sites Use and Loneliness: the Mediating Role of Social Support and Self-Esteem

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## Abstract

A growing body of research has documented the association between general social network sites use and loneliness, though results have not clarified whether social media increases or decreases loneliness. The relationships between specific social network sites use patterns and loneliness, as well as the mechanisms underlying this association, should be further examined. To address this issue, the current study investigated the mediating roles of social support and self-esteem between active social network sites use and loneliness. A sample of 390 undergraduate students ( $M_{age} = 19.39$ ,  $SD = 0.95$ ) anonymously completed the Active Social Network Sites Use Questionnaire, the Rosenberg Self-esteem Scale, the Multidimensional Scale of Perceived Social Support Scale, and the Emotional and Social Loneliness Scale in their classrooms. Latent variables structural equation modeling analysis indicated that: (a) active social network sites use was negatively associated with loneliness; (b) social support and self-esteem could significantly mediate the relationship between active social network sites use and loneliness, which contained two mediating paths: the simple mediating effect of social support and the sequential mediating effects of social support and self-esteem. These results coincide with previous research and extend them by examining the effects of how individuals use social media. Our understanding of how social media use helps to reduce the feeling of loneliness, as well as the intervention programs that aim to reduce loneliness, may benefit from these findings.

**Keywords** Active social network sites use · Loneliness · Perceived social support · Self-esteem · Mediating effect

## Introduction

Loneliness, defined as a subjectively uncomfortable or unpleasant state that results from the contradiction between one's perceived social network and her/his social expectation (Peplau

and Perlman 1982), has been regarded as an important construct in psychological health. As a common interpersonal experience, loneliness has been found to have a wide range of negative impacts on an individual's psychological development and adaptation. For example, loneliness is negatively associated with life satisfaction and self-esteem (Çivitci and Çivitci 2009) and may lead to serious mental and behavioral problems such as depression and suicide (Chang et al. 2015). Thus, the influencing factors of loneliness has been a crucial research theme. Although loneliness is a common feeling among different age groups, the prevalence of loneliness is relatively high among undergraduate students and it has become a serious risk factor for their well-being and health in China (Chen and Shi 2008). Therefore, much attention has been given to exploring the influencing factors of loneliness and its underlying mechanisms. Previous studies found that both individual factors (e.g., self-evaluation) and social-environmental factors (e.g., social support) were important antecedents of loneliness (Zhao et al. 2018), which may also be true in the context of the mobile Internet era. With the development of society, especially the development of the information technology industry, researchers suggest that we should examine loneliness in the context of the current mobile Internet era.

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Nowadays, social network sites (SNS) have been an important part of our daily life. As the most popular SNS all around the world, Facebook has over 2 billion monthly active users and over 1 billion daily active users (Facebook statistics 2019); in China, WeChat Moment and QZone, whose users accounted for 85.8% and 67.8% of the total 700 million Chinese Internet users respectively (CINIC 2017), are the most popular SNS. The burgeoning popularity of SNSs and the large amount of time that users devote to SNSs motivate us to pay attention to the impacts of SNS use on users' psychosocial adaptation and psychological health. Previous research has examined the associations between SNSs use and users' well-being (Lin et al. 2018; Verduyn et al. 2017), depression (Tandoc Jr et al. 2015), loneliness (Berryman et al. 2018; Sheldon 2012; Teppers et al. 2014), body image concerns (Marengo et al. 2018), and so on. Unfortunately, the prior literature has presented inconsistent results. For loneliness, some research suggested that SNS use was negatively associated with loneliness (Ryan and Xenos 2011; Sheldon 2012), while some other studies revealed that the relationships between SNS use and loneliness was positive (Teppers et al., 2014) or even nonsignificant (Berryman et al. 2018). These contradicting findings about loneliness may result from that most of the previous research merely focused on the effects of general SNS use (e.g., frequency and intensity) (Zhou et al. 2017). Specific ways of SNS use (e.g., active SNS use) should be further examined to get a more clear-cut conclusion on the relationship between SNS use and loneliness (Burke et al. 2010; Zhou et al. 2017). The current study responded to this call for considering the specific SNS use patterns by investigating the association between active SNS use and loneliness among undergraduate students, as well as the mediating effects of social support and self-esteem on this relationship.

### Active SNS use and loneliness

SNS provides many functions, and individuals generally have different motivations for usage. As a particular SNS use form, the active SNS use refers to the activities that facilitate direct information exchanges with other users on SNSs, during which new information is often produced (Verduyn et al. 2017). Active SNS use includes not only targeted one-on-one chatting (e.g., sending private messages), but also non-targeted broadcasting (e.g., sharing links and posting status updates, Verduyn et al. 2017). Active SNS use is a common use pattern, and its influence on individuals' loneliness should be further investigated: First, the main purpose and motivation of using SNS is to maintain and/or to expand their social network (Cheung et al. 2011; Park et al. 2009), which is not only a feature shared by both online and offline social interaction behaviors, but also an active way to use SNSs. Thus, active SNS use is a typical SNS use form and may build the foundation of the observed negative associations between overall SNS use and loneliness

(Verduyn et al. 2017). Second, previous studies mainly focused on the overall SNS use or the passive way of SNS use (Chen et al. 2016; Ding et al. 2017; Ryan and Xenos 2011; Sheldon 2012; Teppers et al. 2014), more attention should be paid to the active way of SNS use which remains insufficiently investigated. Third, although there was an experimental study suggesting the mediating role of social connectedness in the relationship between the active way of SNS use (i.e., posting Facebook status updates) and loneliness (Deters and Mehl 2013), little is known about other mediating mechanisms underlying this relationship in different social media platforms. Therefore, the current research examined the association between active SNS use and loneliness among undergraduate students and the mediating roles of social support and self-esteem in this relationship.

### The mediating role of social support and self-esteem

Social support is the experience or perception that someone is cared for, loved, valued, esteemed, and part of a supportive social network of mutual obligations and assistance (Wills 1991), which is of great significance for an individual's well-being and adaptation (Deters and Mehl 2013; Valkenburg et al. 2006). A large body of previous studies has revealed that low social support is an important antecedent of loneliness (Jackson et al. 2002; Kong and You 2013; Perlman and Peplau 1981; Zhao et al. 2013). Besides, as an important resource of social network, social support can also be achieved on SNS platforms because one of the important motives of SNS use is to acquire and maintain social support (Jung and Sundar 2016; Park et al. 2009). Evidence from both theoretical derivation and empirical research suggests a positive relationship between active SNS use and social support. Theoretically, active interpersonal communication is considered a strategy for maintaining a relationship, and it is beneficial for acquiring social capital and support (Canary et al. 1993; Coleman 1988; Crocker and Canevello 2008); as an important platform for interpersonal communication, SNSs provide people with an ideal space for self-disclosure and social interaction behaviors, which helps the active users get more social support (Frison and Eggermont 2016). Empirically, research also supported the positive role of active SNS use in gaining social support (Lee et al. 2013) and the influence of the enhanced perceived social support on users' psychosocial adaptation (e.g., loneliness, depression, and well-being, Deters and Mehl 2013; Sarriera et al. 2012; Valkenburg et al. 2006). Therefore, active SNS use might influence users' loneliness through the mediating effect of social support.

On the other hand, self-esteem, defined as a "favorable or unfavorable attitude towards the self" (Rosenberg 1965), is typically associated with loneliness and its antecedent (Zhao et al. 2013) and might also play a mediating role between active SNS use and loneliness. In terms of the relationship

between self-esteem and loneliness, previous studies indicated that self-esteem is an important protective factor against loneliness (McWhirter et al. 2002; Zhao et al. 2012). For example, Zhao et al. (2012) found that self-esteem could negatively predict loneliness among undergraduate students. In terms of the relationship between SNS use and self-esteem, a substantial body of research has confirmed that active SNS use helps users gain more positive feedback and enhances their self-esteem level (Gonzales and Hancock 2011; Valkenburg et al. 2006; Yang 2014). Taken together with the evidence for these two paths (active SNS use  $\rightarrow$  self-esteem and self-esteem  $\rightarrow$  loneliness), it is indicated that self-esteem possibly mediates the association between active SNS use and loneliness. Moreover, according to the sociometer model of self-esteem (Leary et al. 1995), the self-esteem level is regarded as an inner reflection of a social support level because the self-esteem system functions as a sociometer that monitors the individual's social relationships. Consistent with this theory, empirical research found that self-esteem plays a mediating role between social support and loneliness (Kong et al. 2012). At the same time, active SNS use could also influence self-esteem through the indirect effect of social support (Niu et al. 2015). Thus, social support and self-esteem might be the sequential mediators in the relationship between active SNS use and loneliness.

### Current study and hypotheses

The current research examined the relationship between active SNS use and users' loneliness among Chinese undergraduate students. The mediating roles of social support and self-esteem in this relationship were also tested. Based on the literature review, the current research proposed the following hypotheses:

Hypothesis 1: Active SNS use negatively predicts users' loneliness.

Hypothesis 2: Social support mediates the relationship between active SNS use and loneliness.

Hypothesis 3: Self-esteem mediates the relationship between active SNS use and loneliness.

Hypothesis 4: Social support and self-esteem are the sequential mediators between active SNS use and loneliness.

## Method

### Participants

Participants were three hundred and ninety undergraduate students recruited from a university in Xi'an, China. Participants

aged from 17 to 22 ( $M = 19.39$ ,  $SD = 0.95$ ). One hundred and thirty-eight of them were males, and all the participants were SNS users.

## Measures

### Active SNS use

The Active SNS Use Questionnaire (ASUQ, Ding 2017) was used to assess active SNS use frequency. It consists of five items which were adapted according to the definition of active SNS use from Verduyn et al. (2015). The examples of these items are: "I browse friends' posts or status and give likes or comment on them" and "I interact with friends when browsing their SNS profile pages." Respondents rated their frequency on a 5-point Likert-type scale ranging from 1 = "Never" to 5 = "Always". The final score was the mean of all items' scores, with higher scores reflecting a higher level of active SNS use. For the current sample, the Cronbach's  $\alpha$  coefficient of ASUQ was 0.74.

### Social support

The Multidimensional Scale of Perceived Social Support (MSPSS) was used to measure perceived social support (Zimet et al. 1988). The MSPSS is a 12-item, self-reported scale which assesses perceived support from significant others ( $\alpha = 0.80$ ), family members ( $\alpha = 0.85$ ) and friends ( $\alpha = 0.87$ ). Respondents were asked to rate their agreement on a 7-point Likert-type scale ranging from 1 = "Very strongly disagree" to 7 = "Very strongly agree". Examples of the items are: "There is a special person who is around when I am in need" and "My family is willing to help me make decisions". The final score was the sum of all items' scores, with higher scores reflecting a higher level of perceived social support. For the current sample, the Cronbach's  $\alpha$  coefficient of MSPSS was 0.92.

### Self-esteem

Rosenberg Self-esteem Scale (RSES) developed by Rosenberg (1965) was used to assess self-esteem. Respondents were asked to rate their agreement on a 4-point Likert-type scale ranging from 1 = "Strongly disagree" to 4 = "Strongly agree". The RSES comprised 10 items (e.g., "On the whole, I am satisfied with myself" and "I feel that I am a person of worth, at least on an equal plane with others"). The final score was the sum of all items' scores, with higher scores representing a higher level of self-esteem. For the current sample, the Cronbach's  $\alpha$  coefficient of RSES was 0.83.

## Loneliness

The Emotional and Social Loneliness Scale (ESLS) developed by Wittenberg et al. (Wittenberg, 1986, cited in Shaver and Brennan 1991) was used to measure loneliness. Respondents rated their agreement on a 5-point Likert-type scale ranging from 1 = “Strongly disagree” to 5 = “Strongly agree”. The ESLS comprises 10 items, such as “No one can make me feel intimate in a long time” (emotional loneliness,  $\alpha = 0.71$ ) and “Everyone around me seems like a stranger” (social loneliness,  $\alpha = 0.72$ ). The final score was the sum of all items’ scores, with higher scores representing a higher level of loneliness. For the current sample, the Cronbach’s  $\alpha$  coefficient of ESLS was 0.80.

## Procedure

A convenience sampling technique was used to recruit participants. Three hundred and ninety undergraduate students volunteered to participate in this study with no compensation. The survey was conducted in the quiet classroom environment, and took about 15 min to complete. Before filling out the main scales, demographic questions were answered. The questionnaires were anonymously completed by all respondents. The instructions stated that the data were used for research purposes only and that they have the right to exit whenever they felt uncomfortable about the questions.

## Data analysis

A two-step analysis procedure of the mediation effects in structural equation modeling with latent variables was used according to the suggestion of Anderson and Gerbing (1988). In the first step, the goodness-of-fit was calculated to examine whether each latent variable in the measurement model was well-represented by its indicators. In the second step, if the goodness-of-fit was satisfactory in the measurement model, the structural model would be tested by the maximum likelihood estimation method in Mplus 7.4. Two-item parcels were created for the active SNS use factor and three-item parcels were created for self-esteem factors (Little et al. 2002). At the same time, since gender and age are important influencing factors of loneliness (Al-Yagon 2008), they were included in all analyses as control variables. The goodness-of-fit indices used in the current research are as followed (Hu and Bentler 1999): (1) chi-square statistics; (2) Root Mean Square Error of Approximation (RMSEA); (3) the Akaike Information Criterion (AIC: Akaike 1987); (4) Comparative Fit Index (CFI); (5) Tucker-Lewis index (TLI); and (6) Standardized Root Mean Square Residual (SRMR).

Because the bootstrap method is among the most accurate techniques to get the confidence intervals for indirect effect assessment (Mackinnon et al. 2004), it was used to test the

mediating effects of perceived social support and self-esteem between active SNS use and loneliness. By random sampling with replacement, there were 1000 bootstrap samples chosen from the original dataset in the current study to calculate the confidence intervals (CI). If the 95% CI does not include zero, the indirect effects will be regarded as significant (Shrout and Bolger 2002).

## Results

### Descriptive analysis

The descriptive analysis results for all variables (i.e., means, standard deviations, and the correlation coefficients) are shown in Table 1. Active SNS use was negatively correlated with loneliness ( $r = -0.21, p < .001$ ) and positively correlated with social support ( $r = 0.19, p < .001$ ) and self-esteem ( $r = 0.1, p < .05$ ). Social support was positively correlated with self-esteem ( $r = 0.36, p < .001$ ), and negatively correlated with loneliness ( $r = -0.45, p < .001$ ). Self-esteem was negatively correlated with loneliness ( $r = -0.36, p < .001$ ).

### Testing for mediated association

#### Measurement model

In the measurement model, there are four latent variables (i.e., active SNS use, social support, self-esteem, and loneliness) and 10 observed variables. Confirmatory factor analysis revealed that the goodness-of-fit for the measurement model was satisfactory:  $\chi^2/df = 1.53$ , RMSEA = 0.04, CFI = 0.94, TLI = 0.94, SRMR = 0.05. All the indicators well represented its latent factor respectively, since all factor loadings for the indicators on the latent factors were significant ( $p < .001$ ) as seen in Fig. 1.

#### Structural model

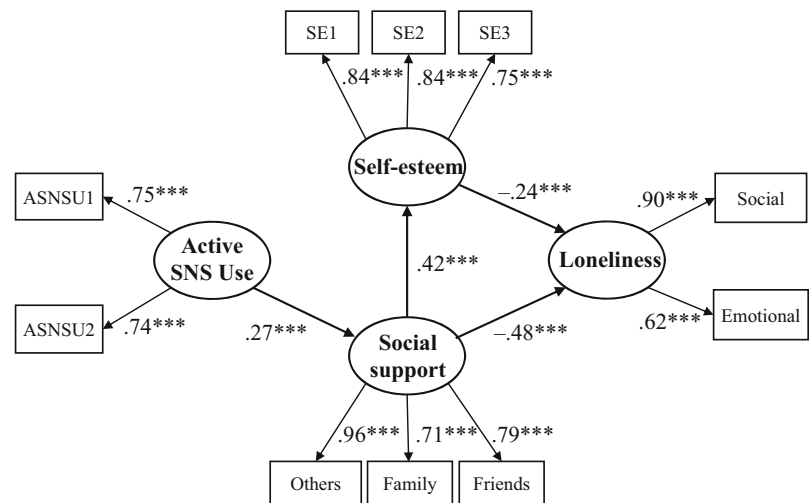
The direct path coefficient from active SNS use to loneliness was significant ( $\beta = -0.26, p < 0.01$ ). A mediated model (Model 1) fitted well with the data:  $\chi^2/df = 1.28$ , TLI = 0.99, RMSEA = 0.03, SRMR = 0.03, CFI = 0.99, but the residual direct coefficient path from active SNS use to loneliness and the

**Table 1** Means, standard deviations, and correlations of the variables

| Variables         | <i>M (SD)</i> | 1       | 2       | 3       | 4 |
|-------------------|---------------|---------|---------|---------|---|
| 1. ASNSU          | 2.97 (0.57)   | –       |         |         |   |
| 2. Social support | 61.91 (11.08) | .19***  | –       |         |   |
| 3. Self-esteem    | 28.19 (3.56)  | .10*    | .36***  | –       |   |
| 4. Loneliness     | 27.17 (5.85)  | -.21*** | -.45*** | -.36*** | – |

Note: ASNSU = active social network site use. \* $p < .05$ . \*\*\* $p < .001$

**Fig. 1** The mediating effects of social support and self-esteem between active SNS use and loneliness ( $N = 390$ ). All the factor loadings are standardized. ASNSU1 and ASNSU2 are two parcels of active social networking sites use; SE1, SE2 and SE3 = three parcels of self-esteem.  $*p < .05$ ,  $**p < .01$ ,  $***p < .001$



path coefficient from active SNS use to self-esteem were non-significant. Therefore, these two paths were constrained to zero, and the modified model (Model 2) was retested. Compared to Model 1, Model 2 also fitted well with the data:  $\chi^2/df = 1.34$ , TLI = 0.99, RMSEA = 0.03, SRMR = 0.03 CFI = 0.99. There was no significant difference between Model 1 and Model 2 ( $\Delta\chi^2(2, 390) = 5.457, p > .05$ ), which means removing the nonsignificant paths did not make the model worse. Therefore, Model 2 was taken as the final model (see Fig. 1).

To further test the indirect effects in the final model (see Fig. 1), the bootstrap procedure was used to get the CI for all possible indirect effects. The indirect effect of active SNS use on loneliness mediated by social support and self-esteem was estimated at  $-0.03$  (95% CI:  $-0.06 \sim -0.01$ ), as illustrated in Table 2. The 95% CI did not include zero, indicating that the active SNS use significantly exerted indirect effects on loneliness via social support and self-esteem. Moreover, active SNS use exerted a significant indirect effect on self-esteem via social support (Estimated indirect effect: 0.11, 95% CI: 0.06 ~ 0.18), and social support exerted a significant indirect effect on loneliness via self-esteem (estimated indirect effect:  $-0.10$ , 95% CI:  $-0.18 \sim -0.05$ ).

### Discussion

The current research constructed a sequential mediation model to examine the mediating effect of social support and self-esteem in the relationship between active SNS use and loneliness. The findings suggest that the association between active SNS use and lower loneliness is explained by enhanced social support and self-esteem. To the best of our knowledge, the current research is one of the first studies to date to clarify the mediating mechanisms of social support and self-esteem in the association between active SNS use and loneliness.

### Active SNS use and loneliness

The present study found that active SNS use plays an important role in users' loneliness. Specifically, active SNS use was negatively associated with their sense of loneliness. This finding is in line with previous studies that focused on the effects of SNS use on users' psychosocial adaptation (Kim et al. 2013; Deters and Mehl 2013; Sheldon 2012). This result supported hypothesis 1. Active SNS use is an important protective factor against loneliness. On one hand, this may be due to the asynchronicity and accessibility of online communication. Compared to the offline communication, users have more time to think about how to respond in online communication. This makes the interpersonal communication much easier especially for some individuals with relatively low social skills (Kraut et al. 2010). Therefore, SNS provides these people with a better platform to communicate and to get connected with others, which may finally alleviate their feelings of loneliness. On the other hand, active SNS use is a specific use pattern in which individuals share inner thoughts, personal feelings, experiences, and information with others (Mazer et al. 2007). These online self-disclosures have great benefits in fostering social capital

**Table 2** Standardized indirect effects and their 95% confidence intervals

| Model Path          | Estimated effect | 95% CI |       |
|---------------------|------------------|--------|-------|
|                     |                  | Lower  | Upper |
| ASNSU → SS → L      | -0.13            | -0.22  | -0.07 |
| ASNSU → SS → SE     | 0.11             | 0.06   | 0.18  |
| SS → SE → L         | -0.10            | -0.18  | -0.05 |
| ASNSU → SS → SE → L | -0.03            | -0.06  | -0.01 |

Note. ASNSU = active social networking sites use; SS = Social support; SE = Self-esteem; L = Loneliness; 95% CI = 95% confidence intervals

(Liu and Brown 2014), gaining social support (Frison and Eggermont 2016), enhancing users' attitudes toward themselves (Gonzales and Hancock 2011; Yang 2014), and eventually reducing their feelings of loneliness. Congruent with the previous research indicating that overall SNS use is negatively associated with users' loneliness (Ryan and Xenos 2011; Sheldon 2012), our findings not only confirmed this relationship between SNS use and loneliness but also further presented that active SNS use may underlie this observed relationship.

### The mediating role of social support and self-esteem

Consistent with hypothesis 2, the current research found that social support substantially mediated the relationship between active SNS use and loneliness. Specifically, individuals who tend to use SNS actively are more likely to have a higher level of perceived social support, which is associated with a lower level of loneliness. In the first stage of the indirect effect (active SNS use  $\rightarrow$  social support), active SNS use was positively associated with social support. This result is consistently supportive of the view that active interpersonal communication is beneficial to acquiring social capital and social support (Canary et al. 1993; Coleman 1988; Crocker and Canevello 2008). When people actively use SNS, there will be much interpersonal interaction and communication (Mehdizadeh 2010), which is a useful strategy for maintaining a relationship (Canary et al. 1993). Consequently, they are more likely to perceive social support from these well-maintained relationships. In the second stage of the indirect effect (social support  $\rightarrow$  loneliness), social support was negatively associated with users' loneliness. This finding is in line with previous research indicating that social support is a protective factor against loneliness (Jackson et al. 2002; Kong and You 2013; Perlman and Peplau 1981; Zhao et al. 2013). One possible explanation for this is that social support helps individuals maintain strengths in stressful times (Lee and Goldstein 2016; Thoits 2011), thus reducing the possibly detrimental consequences (e.g., loneliness, Aanes et al. 2009; Zhao et al. 2013).

In addition, the current research found that the pathway from active SNS use to self-esteem in the finalized model was not significant, which means the simple mediating effect of self-esteem between active SNS use and loneliness is not significant. This result is inconsistent with hypothesis 3. One possible explanation is that active SNS use is still a relatively general use pattern containing many specific user behaviors. It is one of these specific active use behaviors (e.g., selected self-presentation) that have direct impacts on users' self-esteem (Gonzales and Hancock 2008, 2011). Another possible explanation is that the relation between active SNS use and self-esteem is moderated by some other variables of individual differences, such as personality (Seidman 2013) and social

comparison orientation (Wang et al. 2017). These two possible explanations need further examination in future studies.

Although the active SNS use cannot exert influence on self-esteem directly, it was indirectly associated with self-esteem through the mediating role of social support. This result is consistent with the sociometer model of self-esteem (Leary et al. 1995), which suggested that self-esteem is a sociometer of individuals' social relationships. The association between active SNS use and loneliness was sequentially mediated by social support and self-esteem. This finding revealed the important roles of both individual factors and social-environmental factors in the relationship between active SNS use and loneliness. Active SNS users often experience higher social support, which further helps them have a more favorable attitude towards themselves and eventually reduces their feelings of loneliness. Hypothesis 4 was supported.

### Limitations and contributions

The findings of the present research should be interpreted in light of some limitations. First, although the hypothetical model of this research was proposed based on both empirical evidence and theoretical deduction, the causal relationship between variables cannot be established because of the cross-sectional nature of this study. Future studies should test the sequential mediation model in longitudinal and/or experimental design to further contribute to our understanding of the relationships among specific ways of SNS use, social support, self-esteem, and loneliness. Second, there might be some other possible mediators in the relationship between active SNS use and loneliness, but the current research only focused on self-esteem and social support. Future research can explore other mediators (e.g., social capital, self-concept clarity) and moderators (e.g., personality) in this relationship. Finally, our study only focused on a sample of Chinese undergraduate students, so the generalizability of our findings to other age groups (e.g., the elderly group) and other cultural settings (e.g., individualism culture) needs to be further investigated.

Despite these limitations, the current research has some important contributions. By testing the mediating roles of social support and self-esteem between active SNS use and loneliness, this study contributes to our understanding of how active SNS use is indirectly related to users' loneliness. Besides, our findings also indicate that an intervention program which aims to reduce undergraduate students' loneliness may benefit from realizing the important associations among active SNS use, social support, self-esteem, and loneliness. Rather than placing a restriction on the time of SNS use, helping college students use SNS more actively through intervention programs might be a more practical way to reduce their feelings of loneliness.

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## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

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