Research paper

Qzone use and depression among Chinese adolescents: A moderated mediation model

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ABSTRACT

Background: Social networking sites (SNSs), which provide abundant social comparison opportunities, are ubiquitous around the world, especially among adolescents. In China, Qzone stands out as the most popular SNS. Due to the opportunity it provides for meticulous self-presentation, SNS may give the impression that others are doing better, which is detrimental to individuals’ well-being. Based on social comparison theory, the current study aimed to investigate the association between Chinese adolescents’ SNS (Qzone) use and depression, as well as the mediating role of negative social comparison and the moderating role of self-esteem.

Method: A total of 764 adolescents (aged 12–18 years, M = 14.23, SD = 1.75), who had an active Qzone account, were recruited voluntarily to complete questionnaires on Qzone use intensity, negative social comparison on Qzone, self-esteem, and depression.

Results: More intense Qzone use was associated with higher level of negative social comparison on Qzone, which fully mediated the association between Qzone use and depression. Moreover, the mediating effect of negative social comparison on Qzone was moderated by self-esteem. The specific link between Qzone use and negative social comparison was weaker among adolescents with high self-esteem than those with low self-esteem.

Limitations: As all the data in this study were self-reported and cross-sectional, causal associations cannot be identified. Additionally, the specific activities on SNS were not identified.

Conclusions: Negative social comparison may be a key factor and mechanism accounting for the positive association between SNS use and depression, while self-esteem could protect adolescents from the adverse outcome of SNS use.

1. Introduction

In recent years, social networking sites (SNSs) have achieved notable popularity all over the world. Facebook is the most dominant SNS worldwide (Facebook, 2014). In China, there are some SNSs similar to Facebook, such as Qzone, Renren, and Kaixin. Among them, Qzone stands out as the most widely used SNS in China (CNNIC, 2014), as well as the second largest SNS around the world, according to the number of registered users (Millward, 2013). Adolescent users are fairly active on SNS, as they account for 33.8% of the SNS users in China (CNNIC, 2014).

The popularity of SNSs has raised concerns about the outcomes of SNS use. Although SNSs have been proven to be able to provide considerable social and psychological benefits (McEwan, 2013; Park et al., 2016; Valenzuela et al., 2009), extant studies have shown inconsistent results. For example, SNS use has been found to be negatively associated with subjective well-being and self-esteem (Kross et al., 2013), while positively associated with feelings of distress (Chen and Lee, 2013). In response to these inconsistent results, researchers have suggested that there might be a third variable that either mediated or moderated this relationship (Oh et al., 2014). Relevant studies have found that this relationship may be mediated by specific experiences,
such as rumination, negative emotions (Davila et al., 2012), social support, and positive affect (Oh et al., 2014). Thus, it is necessary to investigate the mechanisms underlying SNS use and its influences on individuals. For adolescents, depression is a common psychological problem with high incidence, which greatly endangers individuals’ interpersonal relationships, social functioning, and quality of life (Cairns et al., 2014; Niu et al., 2016). Research has also revealed the positive association between SNS use and depression (Tandoc et al., 2015; Wright et al., 2013). Based on these results, this study aimed to investigate the mechanism underlying the association between adolescents’ SNS use and depression.

On SNS, individuals can easily acquire information about others through various routes (e.g., updates and photo-posting), which offers abundant opportunities for social comparison, so they frequently compare themselves with others (Lee, 2014; Kim and Chock, 2015; Vries and Kühne, 2015). At the same time, due to the meticulous self-presentation, SNS gives the impression that others are doing better, which is detrimental to individuals’ well-being (Chou and Edge, 2012; Fardouly et al., 2015). Thus, the negative feelings caused by social comparison, not only would endanger individuals’ well-being directly, but also could mediate the negative effects of SNS use on individuals (Vogel et al., 2014; Vries and Kühne, 2015). Based on this, the current study focused on the effect of SNS (Qzone) use on depression through social comparison. In addition, individuals respond differently to the same social comparative information (Collins, 1996). As an overall evaluation or appraisal of one’s own worth, self-esteem may influence individuals’ interpretation of social comparative information, as well as the mechanism of social comparison (Blanton, 2001; Vohs and Heatherton, 2004). Thus, we further aimed to test whether and how the indirect effects of SNS (Qzone) use on depression are subject to individual differences in self-esteem.

Based on these results, this research aimed to investigate the psychological mechanism and individual difference in the effect of Qzone use on depression among Chinese adolescents, hence deepening our understanding of the effects of SNS use.

1.1. SNS use, negative social comparison, and depression

People are thought to possess a fundamental drive to compare themselves with others (Festinger, 1954; Camerer and Lovallo, 1999); therefore, they often compare themselves with others when acquiring others’ information (Mussweiler et al., 2006). On SNS, people can effortlessly obtain others’ information through various routes (Lee, 2014; Kim and Chock, 2015; Sang, 2014). On the one hand, it is convenient for users to observe others’ online presence by keeping track of their regular updates on SNSs (Nadkarni and Hofmann 2012; Vitak and Ellison, 2013). On the other hand, SNSs also offer distinct information that is not typically conveyed in traditional social comparison situations (Vogel et al., 2015). For example, the number of friends on SNS, the comments, and virtual “likes” that one receives could be considered as indicators of popularity or sociability. Thus, SNS offers abundant opportunities for social comparison with detailed information about others (Kim and Chock, 2015; Sang, 2014). At the same time, SNSs provide users a perfect platform for meticulous self-presentation, describing themselves in ways that best represent their ideal self-views (Fardouly et al., 2015; Steers et al., 2014). Thus, the information individuals encounter on SNSs are mainly about others’ positive life experiences, namely upward social comparison information. Researchers have suggested that this type of idealized or upward social comparison information might lead individuals to feel that others are living a better life (Chou and Edge, 2012; Feinstein et al., 2013; Lin and Utz, 2015), which is defined as negative social comparison. Based on these, it was hypothesized that Qzone use would be positively associated with negative social comparison on Qzone (H1).

According to social comparison theory, negative social comparison, which refers to the feeling that others are better off in comparison to themselves, will have a deleterious influence on individuals’ well-being (Chou and Edge, 2012; Festinger, 1954). According to the social rank theory of depression, negative social comparison makes users feel subordinated and outranked, leading to vulnerability to mental health problems, including bulimic symptoms and depression (Sloman et al., 2003; Smith et al., 2013). Given these findings, negative social comparison may be a key mechanism through which SNS use affects individuals’ psychological outcomes. Relevant research has also found that negative comparison on SNS was positively correlated with depression (Davila et al., 2012; Feinstein et al., 2013; Vogel et al., 2015), and social comparison and envy induced by SNS mediated the relationships between Facebook use and depression (Steers et al., 2014; Tandoc et al., 2015). Thus, we hypothesized that negative social comparison on Qzone would be positively associated with depression (H2), and the effect of Qzone use on depression would be mediated by negative social comparison (H3).

1.2. The moderating effect of self-esteem

Furthermore, individuals respond differently to the same social comparative information (Collins, 1996). As an overall evaluation or appraisal of one’s own worth, self-esteem is closely associated with a number of important personal and social life outcomes, such as academic achievement, well-being, and psychological health (Orth et al., 2012; Robins and Trzesniewski, 2005). Self-esteem has also been shown to be negatively associated with depression (Julia and Ulrich, 2013; Orth et al., 2013). In addition, it is one of the important protective factors for self-evaluation and psychological adaption, which could buffer individuals from risk factors (Teng and Chen, 2012; Volmer, 2015; Zeigler-Hill et al., 2012).

At the same time, self-esteem also could regulate the process of self-evaluation, as individuals with high self-esteem are more likely to engage in self-enhancement and a “self-serving bias” (make judgments, attributions, and explanations in his favor) (Beer, 2014; Schlenker, 1990). Thus, self-esteem may influence individuals’ interpretation of social comparative information, as well as the mechanism of social comparison. The assimilation effect may be more likely to occur among individuals with high self-esteem when they encounter upward social comparison information: these individuals are more likely to view the social comparative information as challenging rather than threatening, and be motivated to be better (Collins, 1996; Vohs and Heatherton, 2004). However, for individuals with low self-esteem, the opposite effect is more likely to occur: these individuals tend to feel inferior to others when encountered with upward social comparison information (Blanton, 2001; Vohs and Heatherton, 2004). Thus, self-esteem may moderate the way social comparison information on Qzone is processed, and individuals with high self-esteem may engage in less negative social comparison on SNS (Qzone). Based on these results, it was hypothesized that the indirect effect between Qzone use and depression through negative social comparison would be attenuated among adolescents with high self-esteem (H4). All hypotheses are summarized in Fig. 1.

2. Methods

2.1. Participants

The current survey study was conducted among students from
grades 7 to 12 at a school in Wuhan (a city in central China), under the approval of school authority and the Academic Committee for Scientific Research at Central China Normal University. In total, 828 students who had an active Qzone account were recruited to participate in our research voluntarily. After receiving a complete description of the study, all participants provided written informed consent. Surveys were completed in a large lecture hall during six sessions of 40 min each, and 764 students aged 12 to 18 years (M<sub>age</sub> = 14.23 years; SD<sub>age</sub> = 1.75) completed the survey (358 females).

2.2. Measurements

2.2.1. Qzone use

Eight items adapted from the Facebook intensity scale created by Ellison et al. (2007) were used. In addition to two open-ended questions about amount of time spent on the SNSs on a typical day and the number of SNS friends, there were also six attitudinal questions (e.g., “Qzone is part of my everyday activity”) using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). These eight items were then divided into their different scales and averaged to create the intensity of Qzone use. In this study, a confirmatory factor analysis with these eight items produced an acceptable fit: χ²/df = 3.24, RMSEA = 0.06, AGFI = 0.96, NFI = 0.97, GFI = 0.94, IFI = 0.95, TLI = 0.94, CFI = 0.95; the Cronbach’s alpha for the scale was 0.85.

2.2.2. Negative social comparison on Qzone

To measure the degree of negative social comparison (feeling that others are better off when viewing others’ updates) on Qzone, we adapted previous measures of negative social comparison on Facebook (Lee, 2014), which included three questions (e.g., ‘When I read news feeds (or see others’ photos), I often think that others are doing better than me”). Answer options ranged from 1 (totally disagree) to 5 (totally agree). The three items were summed to create a total score reflecting negative social comparison on Qzone. Cronbach’s alpha for the scale was 0.81.

2.2.3. Self-esteem

The Chinese version of the ten-item Rosenberg self-esteem scale was used to assess self-esteem (Ji and Yu, 1993). Each item was assessed on a four-point Likert scale ranging from 0 (totally disagree) to 3 (totally agree), and they were averaged to create a single measure of self-esteem for each person. In this study, the Cronbach’s alpha for the scale was 0.91.

2.2.4. Depression

The Chinese version of the Center for Epidemiologic Studies Depression Scale (CES-D) was used in this study (Wang et al., 2013). This scale consists of 20 items, and respondents rate how often they agree (1 = strongly disagree to 5 = strongly agree) with a statement regarding depressive symptoms. In this study, the Cronbach’s alpha for the scale was 0.84. Note: *** p < .001.

3. Results

Among the 764 participants who completed the survey, the mean duration of Qzone use was 3.67 (SD = 1.24) years; the average frequency of Qzone use was 4.07 (SD = 1.43) times per week, while approximately 35.8% of the participants used Qzone more than once a day; the average number of Qzone friends was 81.9 (SD = 31.95).

Then, a correlation analysis was conducted. Table 1 included the means, standard deviations, and Pearson’s correlations between all study variables. As hypothesized, Qzone use intensity was positively correlated with users’ negative social comparison on Qzone (r = 0.355, p < .001), negative social comparison on Qzone was negatively correlated with self-esteem (r = −0.354, p < 0.001) and positively correlated with depression (r = 0.314, p < 0.001). Qzone use intensity positively correlated with depression (r = 0.206, p < 0.001), and self-esteem was negatively correlated with depression (r = −0.397, p < 0.001).

The hypothesized moderated mediation model (Fig. 1) was subsequently tested using Mplus 6 and maximum likelihood estimation. In the model, Qzone use was included as the independent variable, negative social comparison was included as the mediator, and depression was included as the dependent variable. Self-esteem was incorporated as a moderator of the path from Qzone use to negative social comparison. Note that Qzone use and self-esteem were mean-centered before they were entered into the model to facilitate the interpretation of the results. Finally, negative social comparison and depression were regressed on age and gender to control for the effects of these covariates (Sun et al., 2016). Tests of the indirect effects, which are reported below, are based on bootstrapped and bias-corrected confidence intervals (5000 bootstrap samples).

In line with H1 and H2, more intense Qzone use was positively related to negative social comparison, B = 0.309, SE = 0.036, p < 0.001; negative social comparison was also positively related to depression, B = 0.163, SE = 0.021, p < 0.001.

The indirect effect of negative social comparison in the relationships between Qzone use and depression (Mediating effect = 0.050, SE = 0.009 Bootstrap 95% CI: 0.032/0.086) was statistically significant, which confirmed the mediating role of negative social comparison. Importantly, there were no significant direct effects of Qzone use on depression, B = 0.061, SE = 0.024, p = 0.234. This further indicates that the relationship between Qzone use and self-perception was fully mediated by negative social comparison. These findings support H3.

The results also showed that, the interaction term between self-esteem and Qzone use significantly and negatively predicted negative social comparison, B = −0.171, SE = 0.060, p = 0.007. As hypothesized, Qzone use was less strongly related to negative social comparison at higher levels of self-esteem (i.e., at one standard deviation above the mean, B = 0.153, SE = 0.025, p < 0.005) than at lower levels of self-esteem (i.e., at one standard deviation below the mean, B = 0.423, SE = 0.031, p < 0.001) and at average levels of self-esteem (i.e., at the mean, B = 0.309, SE = 0.036, p < 0.001). This interaction pattern is visually depicted in Fig. 2. In line with H4, the indirect relationship between Qzone use and depression was weaker at high levels of self-esteem (i.e., one standard deviation above the mean, Mediating effect = 0.025, SE = 0.013; Bootstrap 95% CI: 0.005/0.042) than at low (i.e., at one standard deviation below the mean, Mediating effect = 0.069, SE = 0.024; Bootstrap 95% CI: 0.031/0.098) and at average levels (i.e., at the mean, Mediating effect = 0.050, SE = 0.02; Bootstrap 95% CI: 0.021/0.074) of self-esteem.

4. Discussion

The purpose of this study was to explore the associations between Qzone use and depression, as well as the underlying mechanism: the mediating role of negative social comparison and the moderating role of self-esteem. The results found that SNS use may negatively affect adolescents’ well-being by stimulating negative social comparison and increasing the risk of depression, especially among those adolescents with

### Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>M (SD)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.Qzone use intensity (Z Score)</td>
<td>0(1)</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.Negative social comparison on Qzone</td>
<td>3.31(0.85)</td>
<td>.355***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.Self-esteem</td>
<td>3.49(0.66)</td>
<td>-.175***</td>
<td>-.354***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.Depression</td>
<td>0.83(0.49)</td>
<td>.206</td>
<td>-.314</td>
<td>-.397***</td>
<td></td>
</tr>
</tbody>
</table>
low self-esteem.

Previous research has shown that the relationship between SNS use and its outcomes is inconsistent. SNS has been proven to possess the potential to strengthen weak ties and maintain existing relationships, thus providing individuals with considerable social and psychological benefits (McEwan, 2013; Park et al., 2016; Valenzuela et al., 2009). However, research has also shown that SNS use was negatively associated with subjective well-being and self-esteem (Kross et al., 2013), yet positively associated with feelings of distress and depression (Chen and Lee, 2013; Davila et al., 2012; Vogel et al., 2015). Previous research has also suggested that SNS use can impact well-being in positive and negative ways through different routes (Davila et al., 2012; Oh et al., 2014). The current study further shows that, Qzone use is positively related to depression, and this relationship is fully mediated by negative social comparison on Qzone.

As people can effortlessly obtain information about others through various routes on SNS (Lee, 2014; Kim and Chock, 2015; Sang, 2014), they may compare themselves with others more frequently when exposed to this type of information (Mussweiler et al., 2006). In particular, the friends on adolescents’ SNS are mainly their friends and classmates in the real world, with whom they are similar in many ways (CNNIC, 2014), and social comparison is far more likely to happen in this case (Knochloch-Westervick and Hastall, 2006). Therefore, the positive self-presentation (Fardouly et al., 2015), and the extensive amount of time spent on viewing these idealized SNS profiles, pictures, and status updates of others (Pempek et al., 2009), may result in negative social comparison and the feeling that others are living a better life than they are (Chou and Edge, 2012; Lee, 2014; Vries and Kühne, 2015), which is positively correlated with depression (Davila et al., 2012; Feinstein et al., 2013; Vogel et al., 2015). Based on these results, this study further reveals that SNS use increases the risk for depression through negative social comparison. This is also in accordance with the social rank theory of depression, which states that the feeling of subordination is the mechanism that triggers depression (Sloman et al., 2003). Therefore, SNS use itself does not necessarily cause negative effects, but the concrete behaviors and feelings (such as negative social comparison) induced by SNS use can influence the indirect effect of SNS use on individuals’ psychological adaptation.

Self-esteem is closely associated with several important personal and social life outcomes (Orth et al., 2012; Robins and Trzesniewski, 2005), as well as being one of the most important protective factors for self-evaluation and psychological adaption (Teng and Chen, 2012). Research has shown that self-esteem moderates the way in which social comparison information is processed, and individuals with high self-esteem are less negatively affected by social comparison (Blanton, 2001; Vohs and Heatherton, 2004). This research further reveals that both the relationship between Qzone use and negative social comparison, and the indirect effect of Qzone use on depression through negative social comparison are attenuated among adolescents with high self-esteem. Namely, the vast amounts of idealized social information encountered on SNS may be processed in less negative ways by individuals with high self-esteem. Compared to relevant results (Feinstein et al., 2013; Steers et al., 2014; Tandoc et al., 2015; Vogel et al., 2015), this study further investigated the psychological mechanism and individual difference in the effects of Qzone use on depression among Chinese adolescents, which furthers our understanding of the complex mechanism between SNS use and its outcomes.

The current study’s findings must be considered in the light of several limitations. Firstly, this study is limited because the data were self-reported and cross-sectional, preventing the testing of causal hypotheses. Future work should examine these variables longitudinally. Additionally, there are many specific activities on SNS, which have different effects on individuals’ psychological adoption and well-being (Chen and Lee, 2013; Smith et al., 2013; Verdun et al., 2015). However, the current study only investigated general SNS use, without identifying these specific activities. Future research should adopt longitudinal and experimental designs identifying the specific activities on SNS in order to provide more comprehensive and objective understandings of the association between SNS use and individuals’ well-being.

In summary, this study investigated the mechanism underlying the relationship between SNS use and depression, and identified adolescents who are more vulnerable to negative effects. It not only suggests that we should study the effect of SNS use and its mechanism comprehensively and objectively, but it is also crucial for the prevention of negative effects of SNS use on well-being. Individuals, especially adolescents with low self-esteem, should acknowledge how SNS afford selective self-presentation, and need to block specific connections or remove them from visible feeds if necessary.

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Conflict of interest

All authors declare they have no conflicts of interest.

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Fig. 2. Relationships between Qzone use and negative social comparison at different levels of self-esteem (SE).