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Why social network site use fails to promote well-being? The roles of social overload and fear of missing out

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ABSTRACT

Considering the popularity of social networking sites (SNSs) and the inconsistent results regarding the effect of SNS use on subjective well-being, this study intended to address the question "why SNS fails to predict subjective well-being" by investigating the suppressing role of social overload and moderating role of fear of missing out (FoMO). A sample of 1319 Chinese adolescents was recruited to complete measures on SNS use, social overload, FoMO and subjective well-being. Results showed that SNS use had a positively direct effect on subjective well-being, while the indirect effect via social overload in this association was significantly negative, suggesting that SNS use had a suppressing effect on well-being via social overload. FoMO moderated the suppressing effect of social overload; specifically, the indirect and direct effects were both more potent for adolescents with higher FoMO. Implications and limitations of this study are also discussed.

1. Introduction

Social networking sites (SNSs) today are one of the most popular online applications in modern information society. They have been widely used all over the world, which afford users the opportunity to establish, maintain and expand social networks (Su & Chan, 2017). As their numbers of users are considerably large and continuously growing, a lot of attention has been paid to exploring the association between SNS use and subjective well-being (i. e., people's assessment of their life; Valkenburg, Peter, & Schouten, 2006). However, the findings have been shown to be inconsistent. Some studies revealed the positive association between SNS use and well-being (e.g., Lönnqvist & Große Deters, 2016; Wheatley & Buglass, 2019), while others revealed the opposite (e.g., Reer, Tang, & Quandt, 2019; Sampasa-Kanyinga, 2015), and two studies even found no significant correlation (Lee, Lee, & Kwon, 2011a, 2011b; Utz & Breuer, 2017). To cope with this, some researchers dichotomize SNS activities into active and passive forms of usage (Frison & Eggermont, 2015; Orosz, Tóth-Király, & Bőthe, 2016). Prior research has verified that active use of SNS is positively linked with well-being (Verduyn et al., 2015; Wang, Jackson, Gaskin, & Wang, 2014), while passive one demonstrates a negative link with it (Fardouly, Diedrichs, Vartanian, & Halliwell, 2015; Verduyn et al., 2015).

An alternative resolution may be to identify some mediators, suppressors (inconsistent mediators) or moderators that influence the association between SNS use and subjective well-being (Oh, Ozkaya, & LaRose, 2014; Yoo & Jeong, 2017). According to some researchers, a mediator and suppressor are both used to account for the covariance between the independent variable (X) and the dependent one (Y). What makes them different is that the former provides an illustration how X influences Y, while the latter discloses the reason why X fails to predict Y (Ludlow & Klein, 2014; Wen & Ye, 2014). Apparently, the introduction of a suppressor, rather than a mediator, is more suitable for addressing the aforementioned problem. Besides, a moderator further helps identify the condition under which the suppressor exerts its best influence (Hayes, 2013). In other words, the suppression effect will vary with different levels of moderator. Thus, a combination of suppression and moderation models will contribute to a novel solution to the contradictory results on the relation between SNS and subjective well-being.

In addition, as adolescents have gradually migrated to SNSs and become a considerable group among SNS users (Ellison, Steinfield, &

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Lampe, 2011), research about adolescents' use of SNSs calls for more attention. Based on these, the present study aimed to investigate the mechanisms underlying the association between SNS use and subjective well-being among adolescents by constructing a mixed model with a combination of suppressing and moderating effects. Identifying these mechanisms will contribute to a deeper understanding of the relationship between SNS use and well-being, as well as the prevention of possible risks of SNS use for adolescents.

1.1. SNS use and subjective well-being

Generally, SNSs are characterized by a personal profile consisting of static descriptive information and dynamic update of user content, and a publicly visible list of connections representing users' collection of online social relations (Verduyn, Ybarra, Résibois, Jonides, & Kross, 2017). Examples of popular SNSs include world-wide Facebook, LinkedIn and Instagram, as well as Qzone and Wechat Moments in China. With the development of information and communication technologies, these SNSs have enjoyed great popularity around the world in recent years. Take adolescent populations for example, a survey by China Internet Network Information Center (2017) reported that adolescents' usage rate of Qzone and Wechat Moments were both over 65%. Facebook, one of the most popular SNSs in the world, has been adopted by 71% of adolescents aging from 13 to 17 years old (Lenhart, 2015).

Considering the large number of SNS users and the enormous amount of time in adopting these sites, an interest of research is to identify the effect of SNS use on people's subjective well-being. A plenty of recent studies have suggested that using SNS can positively affect well-being (e.g., Lönnqvist & Große Deters, 2016; Oh et al., 2014; Verduyn et al., 2017; Wang, Jackson, Gaskin, & Wang, 2014; Wheatley & Buglass, 2019). For example, the finding from a large-scale UK panel data demonstrated that greater use of SNS was associated with higher levels of life satisfaction (a key component of subjective well-being; Wheatley & Buglass, 2019). Pittman and Reich (2016) found a positive relationship between overall usage of Instagram and well-being. In contrast, there is also ample literature highlighting the dark side of SNS use in terms of decreased well-being. For instance, a longitudinal study by Kross et al. (2013) indicated that Facebook use predicted negative shifts on the two components (affect and life satisfaction) of subjective well-being over time. Some cross-sectional studies also indicate a negative relation between SNS and subjective well-being (Rae & Lonborg, 2015; Sagioglou & Greitemeyer, 2014). In addition, the studies by Lee et al. (2011a, 2011b) and Utz and Breuer (2017) even suggested a non-significant correlation between them.

To address the above inconsistencies, a typical resolution is to divide overall usage of SNS into active and passive one (Frison & Eggermont, 2015; Orosz et al., 2016). Active usage, including activities that facilitate direct exchanges with other users (e.g., direct communication, broadcasting; Burke, Kraut, & Marlow, 2011), has been reported to link positively with subjective well-being in both cross-sectional and longitudinal research (Verduyn et al., 2015; Wang et al., 2014; Wenninger, Krasnova, & Buxmann, 2014). However, the opposite findings are consistently observed for passive usage (Fardouly et al., 2015; Shaw, Timpano, Tran, & Joormann, 2015; Tandoc, Ferrucci, & Duffy, 2015; Verduyn et al., 2015), which refers to activities that monitor other users' lives without direct exchanges (e.g., scanning other users' profiles, pictures, and status updates). Further, there is great interest of research in examining the mediating mechanisms underlying the effect of SNS use on subjective well-being. For instance, perceived online social support, social capital and social connectedness (all of them are essentially perceived social support) are often mentioned as important mechanisms that account for the association between active use of SNS and subjective well-being (Frison & Eggermont, 2015; Kim & Lee, 2011). Social comparison and its induced envy are also frequently highlighted for their important role in mediating the association between passive use of SNS and subjective well-being (Krasnova et al., 2015; Tandoc et al., 2015).

Moreover, the introduction of suppressors may also lead to the settlement of the above problem. A suppressor refers to a third variable that "could increase the magnitude of the relationship" between the independent and dependent ones (MacKinnon, Krull, & Lockwood, 2000, p. 174). Usually, suppressors have been regarded as post hoc with little theoretical discussion in the introduction of literature. Some researchers, however, state that it is "reasonable, justifiable, and powerful" to work on an a priori suppressor variable design to address the question why the independent variables fails to predict the dependent one (Ludlow & Klein, 2014; MacKinnon et al., 2000; Wen & Ye, 2014). In other words, a suppression effect could be tested using a strategy of theory-based hypothesis testing instead of post-hoc determination. Therefore, it is reasonable to propose a theory-based suppressor to address the inconsistencies on the association between SNS use and subjective well-being.

1.2. Social overload as a suppressor

Social overload refers to the negative perception on SNS usage when users receive too many social support requests and feel they are giving too much social support to other individuals embedded in their online social network (Maier, Laumer, Eckhardt, & Weitzel, 2012a). Namely, it can be seen as the burden of giving too much social support in SNS context (Maier, Laumer, Eckhardt, & Weitzel, 2014). According to Social Support Theory (SST), there are two different kinds of social support embedded in a social network, one is perceived from the perspective of receivers and the other is enacted from providers. Both of them are vital for network members for their relations with well-being (Cassel, 1976; Cobb, 1976). By definition, social overload can be considered as a kind of enacted social support.

Individual usage behavior has long been theorized to be a significant source of technology-related perceptions in general technology (Kim, 2009) and SNS research in particular (Maier, Laumer, Eckhardt, & Weitzel, 2012b). Social overload is a kind of SNS-related perception during adolescents' daily usage, and its relationship with SNS use can be explained by the essential features of the latter. Specifically, SNS is a useful online tool for establishing, maintaining and expanding social networks (Su & Chan, 2017), which facilitates not only the reception of perceived social support but also the request for actions by others giving social support (i.e. enacted social support). It is more likely for adolescents with frequent use of SNS to be exposed to more social support requests. More intensive SNS use, on the other hand, usually brings about larger and denser social network, which is closely related to more social requests (Baum et al., 1976; Evans & Lepore, 1993). Notably, social requests is a significantly precondition of adolescents' perception of social overload. Therefore, it is easy to make an inference that SNS use contributes to the development of social overload. Supporting this theoretical notion, some empirical studies have demonstrated the positive association between SNS use and social overload (Maier et al., 2012a; Manago, Taylor, & Greenfield, 2012). In addition, as a negative feeling in the context of SNS, social overload may further deteriorate individuals' psychosocial adaptations, such as greater SNS exhaustion (being tired of activities related to the usage of SNS, Ayyagari, Grover, & Purvis, 2011; Maier et al., 2012b), lower satisfaction of SNS use (Au, Ngai, & Cheng, 2008; Maier et al., 2012b), as well as reduced self-esteem (Choi & Lim, 2016), all of which have negative effect on users' well-being (Maier et al., 2014).

Based on these, it is possible that SNS use increases social overload, which in turn contributes to negative consequences. In line with this theoretical notion, one study based on structural equation model revealed a negatively indirect effect of SNS use on SNS exhaustion and satisfaction via social overload (Maier et al., 2012b). However, the direct and overall effect of SNS usage was not examined in this study. It was possible that the total effect of SNS use on subjective well-being was suppressed as the direct effect and indirect effect via social

overload were opposite in direction. In other words, SNS failed to predict subjective well-being due to its role in increasing social overload, as the latter was a risk factor for subjective well-being. Given the analysis above, it was hypothesized that:

Hypothesis 1. Social overload would suppress the association between SNS use and well-being.

1.3. Fear of missing out (FoMO) as a moderator

Although SNS use may reduce well-being through the increased social overload, it is possible that not all users are equally influenced. As demonstrated by Valkenburg, Peter and Walther's (2015) summary regarding the trends and commonalities among prominent theories of media effects, this relation may differ for users with different levels of dispositional traits, such as FoMO.

Defined as a pervasive apprehension that others might be having rewarding experiences from which one is absent, FoMO is characterized by the desire to stay continually connected with what others are doing (Przybylski, Murayama, DeHaan, & Gladwell, 2013). Although the construct of FoMO is usually depicted and measured in an online context, neither its definition nor the items of measurement refer to online behavior (Alt, 2018; Przybylski et al., 2013). Therefore, FoMO could be considered as a dispositional trait characterized by the general fear of an individual of missing out on something (Wegmann, Oberst, Stodt, & Brand, 2017). Empirical research has found that FoMO is associated with higher levels of SNS-related stress (Beyens, Frison, & Eggermont, 2016; Fox, Moreland, Fox, & Moreland, 2015), deterioration of physical health and mental well-being (Buglass, Binder, Betts, & Underwood, 2017; Stead & Bibby, 2017), as well as poor sleep quality (Adams et al., 2016; Scott, Gardani, Biello, & Woods, 2016).

Apart from its directly negative effect on individuals, FoMO may also further moderate the influences of SNS use on individuals' adaptation through multiple mechanisms. First, with regarding to cognitive mechanisms, people with high FoMO might be expected to show more attentional bias towards threat (Bradley, Mogg, White, Groom, & De Bono, 1999; Mogg & Bradley, 2002) because of a close relation between FoMO with trait anxiety (Przybylski et al., 2013). According to the feature of selected attentional bias in different levels of trait anxiety (Koster, Crombez, Verschuere, Van Damme, & Wiersema, 2006), people with high FoMO might be more susceptible to the threatening information on the SNS. Second, with regarding to motivational mechanisms, individuals high in FoMO are more likely to use maladaptive methods for fulfilling their psychological needs, such as problematic or addictive social media or smartphone use that may ultimately worsen their social or academic life (e.g., Elhai, Levine, Dvorak, & Hall, 2016; Wolniewicz, Tiamiyu, Weeks, & Elhai, 2017). Third, with regarding to the mechanisms of metacognition, people with high FoMO are thought to have more positive metacognitions towards SNS use, i.e., a specific form of expectancy of the positive role SNS usage play in controlling and regulating cognition and emotion (Casale, Rugai, & Fioravanti, 2018). Therefore, they are more likely to try various functions of SNS and subsequently be vulnerable to the threatening information in it. Fourth, according to its definition and features, individuals high in FoMO are more likely to stay continually connected with others' ongoing activities (Przybylski et al., 2013). Consequently, it is more susceptible for them to engage in compulsive SNS use (Oberst, Wegmann, Stodt, Brand, & Chamarro, 2017; Wolniewicz et al., 2017), which would in turn contribute to poor perceptions or negative cognitive states (Brand, Young, Laier, Wölfling, & Potenza, 2016; Lin, Tsai, Chen, & Koo, 2013), as well as lower well-being (Marino, Gini, Vieno, & Spada, 2018; Van der Aa et a., 2009). Due to the aforementioned analysis, it is reasonable to infer that:

Hypothesis 2. FoMO would moderate the relation between SNS use and social overload, with the relation being stronger for adolescents with higher levels with FoMO.

Hypothesis 3. FoMO would moderate the relation between SNS use and subjective well-being, with the relation being stronger for adolescents with lower levels of FoMO.

1.4. The present study

In conclusion, based on the perspective of effects of suppression and moderation, the aim of the present study was to investigate the mechanism underlying the association between SNS use and subjective well-being among adolescents by constructing a mixed model: (a) whether social overload suppressed the relation between SNS use and subjective well-being, (b) whether FoMO moderated the relation between SNS use and social overload, and (c) whether FoMO moderated the suppressing effect of social overload in the relationship between SNS use and subjective well-being. This study could not only shed more light on how and when SNS use fails ro predict well-being, but also provide some useful visions for practical intervention.

2. Methods

2.1. Sample and procedure

With the approval of Institutional Review Board of the author's university and inform consent obtained from stakeholders (i. e., the school administrators, teachers, parents and participants), stratified random cluster sampling was used to select the participants in each grade from 7th grade to 12th grade from eight middle schools. Standardized procedures were adopted to ensure the authenticity, independence, confidentiality of all answers. A total of 1473 Chinese students participated in our survey. To acquire representative sample, a group of 85 students without active SNS account were excluded, as well as other 69 students who filled incompletely or carelessly. At last, 1319 participants (615 boys, 704 girls) were yielded who aged between 11 and 19 years old.

In terms of procedure, about 15 min during one lesson was assigned for the participants to fill in the paper questionnaire. Before answering the questions, all the participants were asked to read the instructions carefully. If they have any questions, a researcher would be helpful in solving it.

2.2. Measures

2.2.1. SNS use

Following the practice of Wang et al. (2014), a pilot survey of SNS usage was performed in a sample of 88 Chinese adolescents to understand their most-used SNS. Results showed that 84 (95%) adolescents use Qzone, 7 (8%) use Wechat Moments, while 4 (4%) use both of them. Thus, Qzone was chosen as the SNS for the current study. To capture Qzone use, Qzone use intensity scale in Chinese version revised by Niu et al. (2018) was adopted. It consisted of 8 items: two open-ended questions to assess the average amount of time spent on Qzone in the past week and the number of Qzone friends, and six attitudinal questions with a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) assessing the participants' intensity of emotional connection with Qzone as well as the integration of Qzone into their daily activities. In terms of the former two items, participants reported the number of Qzone friends ranging from 1 to 500 (Mean = 103.70; *SD* = 94.01) and the time of Qzone usage from 10 min to 170 min (Mean = 43.05; *SD* = 29.85). Example of the latter six items included "I would be sorry if Qzone shut down". The eight items were standardized and averaged to create a score of SNS use. Cronbach's alpha for the scale was 0.85.

2.2.2. Social overload

The social overload scale developed by Maier et al. (2012a) was

used in this study, which consisted of six items focusing on participators' perceptions of irritation about SNS use. Example of the scale included "I often find myself overwhelmed because technology has allowed too many other people to have access to my time". Participants were asked to response on a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree). All the items were averaged to create a score of social overload. The scale has been used in Chinese adolescents with good reliability and validity (Chen, Lian, Sun, Chai, & Zhou, 2018). Cronbach's alpha for the scale was 0.84.

2.2.3. FoMO

The scale of trait-FoMO designed by Wegman et al. (2017) was adopted, which consisted of five items. Participants were asked to response on five points (1 = not at all true of me, 5 = extremely true of me). Example of the scale included "I fear others have more rewarding experiences than me". All the items were averaged to create a score reflecting individual differences in FoMO. In our study, this scale was transited into Chinese, and the index of the scale suggested a good fit: $\chi^2/df = 2.97$, $p < 0.01$; RMSEA = 0.04, NFI = 0.98, CFI = 0.99, GFI = 0.99. Cronbach's alpha for the scale was 0.76.

2.2.4. Subjective well-being (SWB)

The Satisfaction with Life Scale (SWLS, Diener, Emmons, Larsen, & Griffin, 1985) was adopted to measure life satisfaction (LS), which consisted of five items with five points (1 = strongly disagree, 5 = strongly agree). SWLS's example included "In most ways, my life is close to my ideal". In the present study, Cronbach's alpha for the scale was 0.84. The Positive and Negative Affect Schedule (Chen & Zhang, 2004) was adopted to measure positive affect (PA) and negative affect (NA). The PA scale consists of 8 items, such as "excited", and the NA scale consists of 6 items, such as "angry". Both of them are on a 4-point Likert scale (1 = not at all, 4 = very strongly) in which participants respond according to their experiences in the past month. Cronbach's alpha for the PA and NA scale in this study were 0.83 and 0.79, respectively. Consistent with previous studies, SWB was computed by summing the standardized LS and PA scores and subtracting standardized NA score (e.g., Sheldon & Elliot, 1999).

2.2.5. Covariates

The present study controlled gender and age in the statistical analyses due to the fact that both of them have played important roles in the relation between SNS use and well-being (Valkenburg, Peter, & Walther, 2015). Age was reported directly by the participants, while gender was assessed as a dichotomous variable (boy = 1, girl = 0).

2.3. Control and assessment of common method biases

To minimize the common method biases of questionnaires, the present study firstly followed the suggestions of Podsakoff, MacKenzie, Lee, and Podsakoff (2003), such as anonymous mode as well as reverse scoring of some items. Then Harman's single-factor test was further used to assess the common method bias. Findings found that seven distinct factors were extracted, which accounted for 56.5% of the total variance, while the largest factor explained 22.5% of the variance. This revealed that there existed no serious common method bias in the present study.

2.4. Statistical analysis

To begin with, we conducted the analysis of descriptive statistics and correlations among main variables using SPSS 19.0. Then we tested the mixed model using model 8 from the SPSS macro PROCESS (http://www.afnaves.com), which was developed by Hayes (2013) with the specific aim to test complex models including both mediating (suppressing) and moderating variables with its effectiveness verified by lots of empirical studies (e.g., Frieder, Wang, & Oh, 2018; Niu et al., 2018).

Table 1
Descriptive statistics and correlations between variables.

Variables	*M*	*SD*	1	2	3	4	5	6
1. SNS use	0	0.64	–					
2. SO	2.41	1.12	0.36***	–				
3. FoMO	2.50	0.76	0.21***	0.31***	–			
4. SWB	0	1.68	0.04	−0.18***	-.07*	–		
5. Gender	0.53	0.50	0.14***	0.01	0.08**	0.17***	–	
6. Age	14.03	1.52	0.05	0.10***	0.02	−0.06**	–	–

Note. SO = social overload, SWB = subjective well-being.
N = 1319, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

3. Results

3.1. Preliminary analysis

The descriptive statistics and correlation matrix were presented in Table 1. SNS use was positively correlated with social overload and FoMO ($r = 0.36$, $p < 0.001$; $r = 0.21$, $p < 0.001$), while the latter two variables were negatively correlated with subjective well-being ($r = -0.18$, $p < 0.001$; $r = -0.07$, $p < 0.05$). However, SNS use was not significantly correlated with subjective well-being ($r = 0.04$, $p > 0.05$).

3.2. Hypothesis testing

Model 8 from the SPSS macro PROCESS was used to test for the proposed model (see Fig. 1) with the main results shown in Table 2. As predicted, SNS use positively predicted social overload ($\beta = 0.30$, $p < 0.001$), which in turn negatively predicted subjective well-being ($\beta = -0.20$, $p < 0.001$). The direct relationship between SNS use and subjective well-being was also significant ($\beta = 0.09$, $p < 0.01$). Therefore, the introduction of social overload increased the magnitude of the relationship between SNS use and subjective well-being, which was non-significant in the analysis of correlation. In other words, social overload suppressed the relation between SNS use and subjective well-being. H1 was thus supported.

Besides, the interaction of SNS use and FoMO had significant effects on social overload and subjective well-being ($\beta = 0.07$, $p < 0.01$; $\beta = 0.08$, $p < 0.05$), suggesting that FoMO moderated the associations between SNS use and social overload as well as subjective well-being. Then simple slope test was used to analyze the moderating effect of FoMO. As was shown in Fig. 2, for individuals with both high (one SD above the mean) and low (one SD below the mean) FoMO, SNS use could significantly and positively predict social overload, but the predictive effect was higher for the former than the latter ones ($\beta_{simple} = 0.38$, $p < 0.001$; $\beta_{simple} = 0.23$, $p < 0.001$). With regards to subjective well-being, it was only predicted by SNS use in individuals with high FoMO ($\beta_{simple} = 0.16$, $p < 0.001$), not in ones with low FoMO ($\beta_{simple} = 0.01$, $p > 0.05$). Furthermore, testing for the conditional indirect and direct effects (at values of the moderator: $M - 1$ *SD*, *M*, and $M + 1$ *SD*) showed that the indirect effects were all significantly different from zero, except for the direct effect in the condition of FoMO at the level of "$M - 1$ *SD*". Namely, the indirect effect of SNS use on well-being through social overload and the direct effect were both moderated by FoMO, and the indirect effect was higher for individuals with higher than lower FoMO, while the direct effect was only found in individuals with higher FoMO. Therefore, H2 was supported, while H3 was contrary to the results.

4. Discussion

In consideration of the contradictory effects of SNS use on subjective

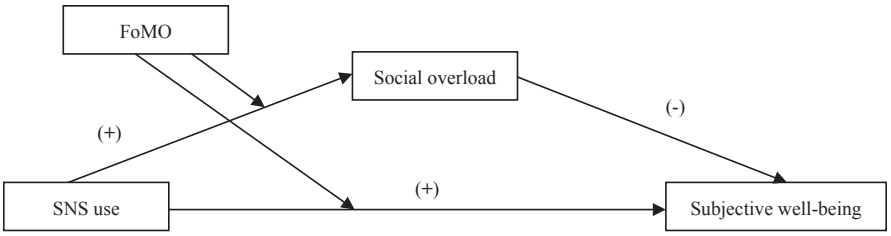

Fig. 1. Hypothesized conceptual models.

well-being (See Erfani, 2018; Verduyn et al., 2017), a plenty of studies have attempted to solve this problem from the perspective of dichotomizing SNS activities into active and passive forms of usage (e.g., Fardouly et al., 2015; Verduyn et al., 2015; Wang, 2014). Instead, the present study proposed a novel solution in an attempt to explain "why SNS use fails to predict subjective well-being", in which social overload might act as a suppressor and FoMO as a moderator in the association between SNS use and subjective well-being. The findings indicate that social overload suppresses the effect of SNS use on subjective well-being. Besides, the indirect and direct links are both stronger for individuals with higher FoMO than for those with lower FoMO.

4.1. The suppressing effect of social overload

To address the issue of inconsistent results on the association between SNS use and subjective well-being, the current study introduced a suppressor into the above association to account for why the former failed to predict the latter. According to some literature (e.g., MacKinnon et al., 2000), suppressors are usually thought about post hoc when the addition of a variable into a model leads to the enhancement of a previous estimated coefficient. However, there are also claims that a priori suppressor variable design is of great significance for its ability in theoretically analyzing the reason why the proposed prediction fails (Ludlow & Klein, 2014; Wen & Ye, 2014). Therefore, in spite of the controversy, it now seems reasonable to adopt a design of a priori suppressor variable to deal with the contradictory findings on the association between SNS use and subjective well-being. More importantly, social overload was chosen for its possible role of suppressor in the association between SNS use and subjective well-being. Previous

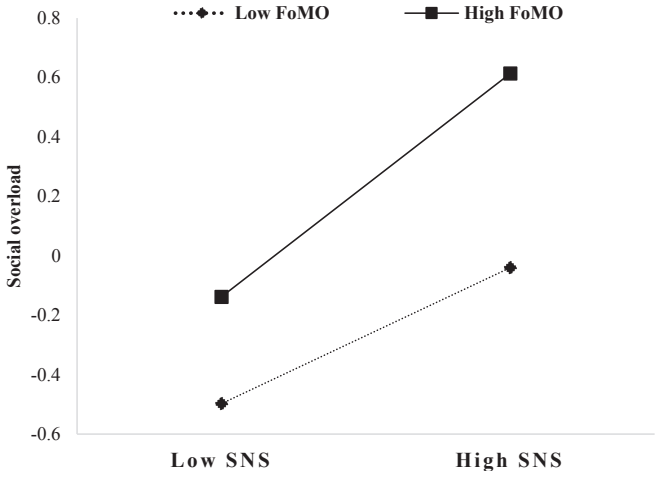

Fig. 2. Plot of the relationship between SNS use and social overload at two levels of FoMO.

studies have highlighted the role of social support in the above association and specifically verified the mediating role of perceived social support (Frison & Eggermont, 2015; Kim & Lee, 2011). The current study makes an extension by examining whether social overload, essentially an enacted form of social support, acts as a suppressor in the above association.

Consistent with our hypothesis, we found that social overload is a suppressor in the relationship between SNS use and subjective well-being, i.e., due to its role in increasing social overload of users, SNS use

Table 2
Regressions testing social overload as a suppressor and FoMO as a moderator in the association between SNS use and subjective well-being.

Regression equation		Fitting index			Significance of coefficients			
outcome	predictors	R	R^2	F	β	t	LLCI	ULCI
SO	constant	0.45	0.21	63.86***	−0.02	−0.62	−0.06	0.03
	gender				−0.06	−2.37*	−0.11	−0.01
	age				0.09	3.79***	0.04	0.14
	SNS use				0.30	11.43***	0.25	0.35
	FoMO				0.25	8.89***	0.19	0.31
	int				0.07	3.06**	0.03	0.12
SWB	constant	0.28	0.07	19.39***	−0.02	−0.58	−0.07	0.04
	gender				0.16	6.06***	0.11	0.21
	age				−0.05	−1.76	−0.10	0.01
	SNS use				0.09	2.62**	0.02	0.15
	SO				−0.20	−6.86***	−0.26	−0.14
	int				0.08	2.37*	0.01	0.14

Conditional indirect effect	FoMO values	Effect	Boot SE	Boot LLCI	BootULCI
	−1 (M-1SD)	−0.05	0.01	−0.07	−0.03
	0 (M)	−0.06	0.01	−0.08	−0.04
	1 (M+1SD)	−0.08	0.01	−0.10	−0.06

Conditional direct effect	FoMO values	Effect	Boot SE	Boot LLCI	BootULCI
	−1 (M-1SD)	0.01	0.05	−0.09	0.11
	0 (M)	0.09	0.03	0.02	0.15
	1 (M+1SD)	0.16	0.04	0.09	0.24

Note. int = SNS use × FoMO; LL = lower limit, CI = confidence interval, UL = upper limit. The research variables in regression equations were all standardized.

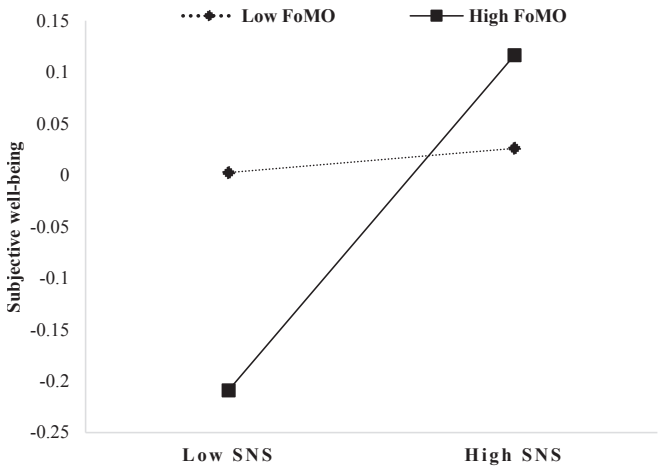

Fig. 3. Plot of the relationship between SNS use and subjective well-being at two levels of FoMO.

fails to significantly predict subjective well-being. With regard to the direct effect of SNS use on subjective well-being, we found that SNS use positively predicts adolescents' well-being, which was in line with the findings of most research examining the association between overall SNS use and well-being (e.g., Lönnqvist & Große Deters, 2016; Wang et al., 2014). First of all, SNS use, especially some specific use behaviors, such as self-disclosure, self-presentation and self-promotion, is beneficial for establishing, maintaining and expanding social networks (Lee et al., 2011a, 2011b), which could help users gain more attention and perceived social support from others (Kim & Lee, 2011; Valkenburg et al., 2006), further contributing to higher well-being. Besides, SNS with some entertainment functions can be used to enrich users' free time and reduce their feelings of boredom, thus being significant for promoting their well-being (Valenzuela, Park, & Kee, 2009).

By contrast, the indirect effect of social overload linking SNS use to subjective well-being was significantly negative, suggesting that SNS use would reduce adolescents' subjective well-being through increased social overload, which is similar to the finding of the study conducted by Maier et al. (2014). Also, it was congruent with some previous studies which demonstrated a negative association between SNS use and subjective well-being (Rae & Lonborg, 2015; Sagioglou & Greitemeyer, 2014). For the first stage of the influence path (i.e., the association between SNS use and social overload), our finding echoes the theoretical notion that individual usage behavior is an essential factor influencing technology-related perceptions (Kim, 2009; Maier et al., 2012b). As the intensity of SNS use increasing, adolescents will be confronted with larger and denser social network, which makes them susceptible to more social requests and finally causes social overload. For the second stage of the influence path (i. e., the association between social overload and well-being), our finding coincides with the negative association between negative perceptions and well-being. A large body of literature have found that social overload would contribute to greater SNS exhaustion (Ayyagari et al., 2011; Maier et al., 2012b), deterioration of SNS satisfaction (Au et al., 2008; Maier et al., 2012b), and reduced self-esteem (Choi & Lim, 2016), all of which are detrimental to users' well-being (Maier et al., 2014). What needs to be mentioned is that social overload, an enacted form of social support, weakens the level of subjective well-being of users. But, perceived social support has been demonstrated a role of enhancement for users' well-being (Frison & Eggermont, 2015; Kim & Lee, 2011). Therefore, it is possible that different forms of social support have different effects on the association between SNS use and subjective well-being, which necessitates further validation in future research.

4.2. The moderating effect of FoMO

To further explore the condition under which social overload exerts its best effect of suppression, the current study investigated whether FoMO moderates the suppression of social overload in the association between SNS use and subjective well-being. As a relatively new concept closely related to SNS use, FoMO has been exclusively treated as a kind of online behavior, deviating far from its nature as a dispositional trait. The present study, therefore, could largely extend previous studies by examining whether individuals with different levels of FoMO (individual-difference variable) behave differently in the above association.

In consistent with the theoretical summary by Valkenburg et al. (2015), this study revealed that FoMO could moderate the suppression effect of social overload in the association between SNS use and well-being. Specifically, the indirect and direct effects were both more potent for adolescents with higher FoMO. This finding indicates that media effects are conditional, which can be enhanced by individual-difference variables. For the moderating effect of FoMO in the indirect effect, it may be explained by the following reasons. First, adolescents with high FoMO tend to show more attentional bias towards threat (Bradley et al., 1999; Mogg & Bradley, 2002). Therefore, they are more likely to be exposed to the threatening information (specifically, too much social requests beyond their control) on the SNS, which would lead to more social overload. Second, adolescents with high FoMO are more likely to adopt maladaptive methods for fulfilling their psychological needs (Elhai et al., 2016; Wolniewicz et al., 2017) and thus more susceptible to the annoyance of too much social requests and experience more social overload. Third, adolescents with high FoMO are more desirable to stay continually connected with what others are doing (Przybylski et al., 2013). Thus, they are more likely to develop into compulsive SNS use (Oberst et al., 2017; Wolniewicz et al., 2017), which could bring about more social overload (Brand et al., 2016; Lin et al., 2013).

However, contrary to our hypothesis regarding the moderating effect of FoMO in the direct effect, SNS use is more likely to promote subjective well-being in high FoMO users. As mentioned above, adolescents with high FoMO are more likely to engage in various kinds of SNS activities (Alt, 2018; Przybylski et al., 2013), which provide opportunity for their accumulating perceived social support as a source of subjective well-being. It is possible that adolescents with high FoMO engaging in SNS actives could acquire both more enacted social support (social overload) and perceived one, which are largely independent from each other. Therefore, SNS users with high FoMO could experience more subjective well-being in the direct way.

One additional point that needs to be mentioned is the low magnitude of effect size of the proposed model. The current study highlighted the possible effect of SNS use intensity on participants' subjective well-being, while other aspects (e.g., motivation, Wang, Jackson, Wang, & Gaskin, 2015; tie strength in SNS communication, Lin & Utz, 2015) of SNS use may also play important roles in the development of subjective well-being. Besides, as stated in previous research (Aguinis, Beaty, Boik, & Pierce, 2005), the effect sizes in moderation models tend to be low with non-experiment studies in particular. However, it is also of great value to research small effects if proposed theory viewpoint could be supported or important outcomes elicited in large population (Ellis, 2010). Given the potential effect of SNS use on adolescents' subjective well-being, it is valuable for the present study to verify the effectiveness of the proposed model. Moreover, this study is congruent with prior similar studies (e.g., Bao, Li, Zhang, & Wang, 2015; Chen, Fan, Liu, Zhou, & Xie, 2016) for a small size of effect. Therefore, our study still has its particular significance.

5. Implications and limitations

Overall, this study developed a mixed model with social overload as

a suppressor and FoMO as a moderator to identify when and why SNS use fails to predict adolescents' subjective well-being. First, it contributes to the settlement of the controversies of mixed effects of SNS use on subjective well-being. The adoption of suppression and moderation effects was helpful to answer the question related to "why SNS use fails to predict adolescents' well-being". Second, given the suppressing effect of social overload linking SNS use to well-being, it is suggested for parents and educators to help adolescents lower their perception of social overload. Last but not least, considering the moderating effect of FoMO, it is necessary to take some measures to lower adolescents' FoMO. Just as Przybylski et al. (2013) put it, like many other stable constructs (e.g., self-esteem; Kernis, 2003), it was justifiable to infer that FoMO may be influenced by situational and relational factors across months, or even the course of the day.

Despite of the above implications, this study also has several limitations. First, although the mixed model proposed by this study is based on relevantly theoretical and empirical research, it is basically a cross-sectional research design, thus unable to infer the causality among the variables. It is necessary for the future researchers to conduct longitudinal or experimental research to determine the direction of the effects. Second, data collection method of this study is relied on adolescents' self-reports, which is susceptible to social desirability and other biases. Hence, it is suggested that reports from multiple informants (e.g., parents, teachers, and peers) and even the objective data directly from the SNS platform should be used in the future research. Third, the representativeness of the sample in this study is under challenge, as participants are all from one city in China. One direction of future research is to recruit cross-country samples to broaden the generalizations of the findings. Fourth, this study only explored the roles of enacted social support (i.e., social overload) and a particular personality trait (FoMO) in the association between SNS use and subjective well-being. Future research is needed to add a combination of enacted and perceived social support and other significant personality traits into the above association.

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