

# Time Spent on Social Network Sites and Psychological Well-Being: A Meta-Analysis

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## Abstract

This meta-analysis examines the relationship between time spent on social networking sites and psychological well-being factors, namely self-esteem, life satisfaction, loneliness, and depression. Sixty-one studies consisting of 67 independent samples involving 19,652 participants were identified. The mean correlation between time spent on social networking sites and psychological well-being was low at  $r = -0.07$ . The correlations between time spent on social networking sites and positive indicators (self-esteem and life satisfaction) were close to 0, whereas those between time spent on social networking sites and negative indicators (depression and loneliness) were weak. The effects of publication outlet, site on which users spent time, scale of time spent, and participant age and gender were not significant. As most included studies used student samples, future research should be conducted to examine this relationship for adults.

**Keywords:** meta-analysis, psychological well-being, social networking site

## Introduction

SOCIAL NETWORK SITES (SNS), defined as Web sites “that allow individuals to (1) construct a public or semi-public profile within a bounded system; (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system,”<sup>1</sup> have had an unprecedented impact on society, not only because they have billions of users but also because users spend vast amounts of time on them.<sup>2</sup> For example, Facebook had more than one billion users<sup>3</sup> and about 28 percent of online time was spent on SNS.<sup>4</sup> Due to the popularity and prominence of SNS, several studies have been conducted to examine the relationship between SNS use and correlates. One popular topic is the relationship between time spent on SNS and psychological well-being. Examining this relationship has both research and practical implications. From a theoretical standpoint, theoretical models have been proposed to explain the relationship between SNS use and psychological well-being. Findings about the relationship between time spent on SNS and psychological well-being can provide insight for refining theoretical models. From a practical perspective, the effect of SNS was not clear. If SNS has a harmful effect, then intervention programs should be designed to prevent their overuse. If the effect is beneficial, then SNS use should be promoted.

## *The relationship between time spent on SNS and psychological well-being*

Researchers investigating the relationship between time spent on SNS and psychological well-being hold one of four positions. The first hypothesis is that the main purpose of SNS use is to maintain offline relationships, instead of interacting with strangers.<sup>1</sup> Hence, the use of SNS can solidify pre-existing offline relationships, creating a positive effect on psychological well-being. Chen et al.<sup>5</sup> found that the correlation between time spent on Facebook and self-esteem was  $r = 0.08$ , supporting the augmentation model.

The second position is that the SNS use can replace face-to-face interaction, and time spent on communication with family and friends can be replaced by browsing the profiles of complete strangers. Strong ties are replaced by weak ties, leading to the negative effect of SNS use. Hill<sup>6</sup> found that the correlation between time spent on Facebook and self-esteem was  $r = -0.31$ , supporting this replacement hypothesis.

The third position is a social compensation model,<sup>2</sup> which purports that the relationship between SNS use and psychological well-being is moderated by personality traits. This hypothesis was supported by Kraut et al.,<sup>7</sup> who found that the effect of SNS use was positive for extroverts, and negative for introverts. Specifically, they sampled 406 new computer and television purchases, and found that Internet use was

related to high self-esteem and a low level of loneliness for extroverts, but with low self-esteem and a high level of loneliness for introverts.

The fourth position claims that SNS use is not related to psychological well-being. Some research evidence supports this position. For example, Lee et al.<sup>8</sup> surveyed 217 college students in South Korea, and found that the correlation between time spent on SNS and life satisfaction was  $r=0$ .

#### *Empirical findings about the relationship between time spent and well-being*

Findings for the magnitude and direction of correlation between time spent on SNS and well-being are inconclusive. For example, Lemieux et al.<sup>9</sup> examined the relationship between time spent on Facebook and loneliness, and found a negative effect with a moderate-to-large correlation at  $r=0.41$ . Hill<sup>6</sup> found a moderately negative relationship ( $r=-0.31$ ) between time spent on Facebook and self-esteem. Schwartz<sup>10</sup> found small and negative relationships ( $r=-0.12$  for self-esteem and  $r=0.13$  for loneliness), whereas Lee et al.<sup>8</sup> found a zero relationship between time spent on SNS and life satisfaction. A small number of studies found a positive correlation between time spent on SNS and psychological well-being. For example, Burke<sup>11</sup> found that the effect of Facebook was positive and moderate. Specially, the correlation between time spent on Facebook and loneliness was  $r=-0.25$ , whereas that between time spent on Facebook and self-esteem was  $r=0.26$ . As the magnitude and direction of the relationship between time spent on SNS and well-being varies by research work, moderator analyses were needed.

#### *Moderators*

Since the relationship between time spent on SNS and well-being varied among studies, it may be affected by some moderators. This study examined the following potential moderators: publication outlet, sites on which users spent time, scale of time spent, indicator of psychological well-being, and participant gender and age.

#### *Publication outlet*

Studies reporting significant or large results are more likely to be published than those reporting non-significant or small findings.<sup>12</sup> A meta-analysis that includes only published articles may overestimate the mean effect size. The present meta-analysis comprises both published and unpublished articles, and it compares the mean effect sizes among different publication outlets to examine whether the relationship between time spent on SNS and well-being was related to the publication outlet.

#### *The site on which users spent time*

Empirical studies rarely examined the effect of the site on which users spent time. Ward<sup>13</sup> was an exception who examined the relationship of Facebook and Twitter use with life satisfaction for adults with autism spectrum disorder. The effect of the site on which users spent time seemed noticeable. Specifically, the correlation between time spent on Twitter and life satisfaction was  $r=0.01$ , and that between time spent on Facebook and life satisfaction was  $r=0.11$ .

#### *Scale of time spent*

Time spent on SNS can be measured on a ratio or ordinal scale. A ratio variable is usually assessed by asking an open-ended question, such as, "What is the average number of hours you spent on SNS?" An ordinal variable was obtained by providing responses on a Likert scale. For example, "What is the average hours you spent on SNS? 1=0–5 hours; 2=6–10 hours; 3=11–15 hours, and 4=more than 15 hours." The variability of variables is a factor that affects the magnitude of correlation coefficient.<sup>14</sup> Specifically, the correlation increases with the variability among variables. As the variance of time spent may depend on whether it is measured on a ratio or ordinal scale, the relationship between time spent on SNS and well-being may be related to the scale of time spent.

#### *Indicator of well-being*

Well-being can be represented by the level of self-esteem, life satisfaction, loneliness, and depression. Multiple well-being indicators can test whether the relationship between time spent on SNS and well-being depends on the indicators of well-being. Guo et al.<sup>15</sup> examined the relationship of time spent on SNS with life satisfaction and loneliness for a sample of Chinese international students in Japan, and they found that the chosen indicator of well-being seemed to have a noticeable effect on the correlation. The correlation between time spent on SNS and life satisfaction was minor at  $r=-0.03$ , whereas that between time spent on SNS and loneliness was small at  $r=0.14$ . Conversely, the effect was nil in Skues et al.,<sup>16</sup> who sampled 393 Australian college students. They found that the correlation between time spent on Facebook and self-esteem was small at  $r=-0.10$ , and that between time spent on Facebook and loneliness was  $r=0.10$ . The findings based on research conducted in the United States seemed to support an association between the magnitude of the relationship between time spent on SNS and well-being and the chosen well-being indicator. For example, Locatelli et al.<sup>17</sup> examined these relationships for a sample of college students, and they found that the correlation between time spent on Facebook and life satisfaction was again nil at  $r=-0.01$ , and yet the correlation between time spent on Facebook and depression was small at  $r=0.09$ .

#### *Participant gender*

Some studies have found noticeable differences across genders in the relationship between time spent on SNS and well-being. For example, Steers et al.<sup>18</sup> compared the relationship between time spent on Facebook and depression for undergraduate students. The relationship was 0.32 for 107 women, and 0.57 for 26 men. Similarly, Turner-August<sup>19</sup> found that the relationship between time spent on SNS and self-esteem was  $-0.05$  for women, and  $-0.36$  for men. Tran<sup>20</sup> investigated this relationship for a sample of 60 female undergraduate students who had recently experienced a breakup, and found that the relationship between time spent on Facebook and depression was low at  $r=0.06$ .

#### *Participant age*

No studies to date have compared the relationship between time spent on SNS and well-being across life stages. Because the present meta-analysis includes many studies with diverse

sample ages, it could examine the effect of participant age on the relationship between time spent on SNS and psychological well-being.

### Previous meta-analyses

Huang<sup>21</sup> analyzed 15 studies on the relationship between SNS use (i.e., time spent on SNS, frequency of use of SNS, intensity of SNS use, and compulsive use of SNS) and well-being, and identified 17 independent samples. The weighted mean correlation was  $r = -0.02$ , a small effect size. The major shortcoming of the Huang meta-analysis is that it does not include studies conducted after April 2001.

Song et al.<sup>22</sup> examined the relationship of Facebook use (compulsive use of SNS, time spent on SNS, and visiting frequency) with anxiety, shyness, loneliness, and extraversion. Eight studies consisting of 18 effects were identified. The weighted mean correlation was  $r = 0.17$ , indicating that greater Facebook use was associated with a higher level of anxiety, shyness, or loneliness. The mean correlation ( $k = 4$ ) between time spent and shyness, loneliness, and extraversion was  $r = 0.07$ . Their study was limited in at least three ways. First, because it used a narrow range of terms, it only identified eight studies, and relevant studies were not included. Second, the measure of Facebook use was the only moderator examined. Third, the work only used studies examining Facebook use, and it excluded studies examining other SNS.

Liu and Baumeister<sup>23</sup> examined the relationship of SNS use with self-esteem, narcissism, and loneliness. The SNS use was represented by time spent on SNS, frequency of use, Facebook addiction, and intensity of use. Thirty-three samples examining the relationship between SNS use and self-esteem were identified, and the weighted mean correlation was  $-0.09$ . Their study identified 23 samples to examine the relationship between SNS use and loneliness, and it obtained a weighted mean correlation of  $.017$ . That study was limited because it did not include studies examining some important aspects of psychological well-being, such as depression and life satisfaction.

Although previous meta-analyses have obtained valuable data, their most salient limitation was that they used various indicators to index SNS use, such as duration, visiting frequency, tendency of SNS addiction, and intensity of SNS use. The inclusion of studies examining the intensity of SNS use or Facebook addiction was especially debatable. The use intensity was usually measured by Ellison et al.'s scale,<sup>24</sup> which taps various concepts, such as the duration of Facebook use, number of Facebook friends, the extent that a participant connects to SNS, and the degree that Facebook was a part of their daily life. Facebook addiction measures the symptoms of addiction, such as salience, mood modification, tolerance, withdrawal, conflict, and relapse, as usually measured by the Bergen Facebook Addiction Scale.<sup>25</sup> These symptoms are not good indicators of use of SNS. To avoid the combination of non-comparable studies that may confuse the interpretation, this study focused on studies examining the relationship between time spent on SNS and psychological well-being. Strict criteria about SNS use were applied to yield meaningful findings. Second, some previous meta-analyses<sup>22,23</sup> focused on certain indicators of psychological well-being, and they did not consider a full range of indicators. To address this issue, the present meta-analysis

estimated the relationship between time spent on SNS and various psychological well-being indicators. Third, previous meta-analyses included small numbers of studies,<sup>21,22</sup> and, thus, limited the generalizability of their conclusions. Fourth, the current meta-analysis includes several moderators to clarify the inconsistent findings about the relationship between time spent on SNS and psychological well-being.

### Methods

To identify relevant studies, the PsycINFO, Communication and Mass Media Complete, and ProQuest Dissertations and Theses databases were searched by using terms related to social networking sites (namely, Facebook, Twitter, Instagram, MySpace, social media, online social network\*, and social network\* site\*) and psychological well-being (self-concept, self-esteem, self-worth, depress\*, loneliness, life satisfaction, and well-being) through October 2016. A wildcard character (\*) was used to match zero or more characters in each search. The reference lists for all relevant articles and previous review articles<sup>21–23,26,27</sup> were subsequently examined for additional studies that were not identified in computer-based searches.

Inclusion criteria were as follows. First, studies should report at least one of the correlations of time spent on SNS with self-esteem, life satisfaction, loneliness, and depression. Studies examining the visiting frequency, number of logins, Facebook use intensity (usually measured by Ellison et al.'s<sup>24</sup> scale), and SNS addiction were excluded. Furthermore, studies that measured collective self-esteem were excluded. Second, studies should report sample size to compute the weighted mean correlations. Third, studies must be published in English.

### Analysis

The sampling distribution of  $r$  is not symmetrical. Specifically, the distribution of correlation coefficients becomes increasingly skewed as the correlation coefficient  $r$  increases above 0.<sup>28</sup> To address this issue, the correlation coefficient  $r$  between time spent on SNS and psychological well-being was converted to a normalized correlation by using the equation of Fisher's transformation of  $r$  to  $Z_r$ . The inverse variance was used to compute weighted mean correlation coefficients. The means and confidence intervals of  $Z_r$  were then transformed back to the correlation coefficient. The random-effects model was adopted.

For positive indicators of psychological well-being, namely self-esteem and life satisfaction, a positive correlation coefficient indicated a conducive effect, that is, more time spent on SNS being associated with higher self-esteem or life satisfaction. When psychological well-being was measured by loneliness and depression, a positive correlation coefficient indicated a detrimental effect, that is, more time spent on SNS use was associated with higher levels of loneliness or depression. To compute the weighted mean correlation across positive and negative indicators, the directions of correlations between time spent on SNS and negative indicators of psychological well-being (i.e., loneliness and depression) were reversed. Thus, a positive correlation, indicating more time spent on SNS, was associated with high scores on positive indicators, or with low scores on negative indicators.

TABLE 1. SUMMARY OF STUDIES ON THE RELATIONSHIP BETWEEN TIME SPENT ON SOCIAL NETWORK SITES AND PSYCHOLOGICAL WELL-BEING

Study	Country	N	Mean age	Pfemale	WB indicator	Name of SNS	Measure of time	r <sup>a</sup>
Abarado <sup>32</sup>	Ireland, Austria, India, Iceland, Philippines, and United States	69	NA	NA	Self-esteem	Facebook	Likert	0.02
Acar <sup>33</sup>	United States	427	19.50	0.51	Self-esteem	Facebook	NA	0.01
Apaoalaza et al. <sup>34</sup>	Spain	344	14.50	0.52	Self-esteem, loneliness, and life satisfaction	Tuenti	Likert	-0.06, <sup>b</sup> 0.02, <sup>b</sup> -0.02 <sup>b</sup>
Arianna <sup>35</sup>	United Kingdom, Romania, Estonia, Canada, United States, Germany, Italy, Austria, Ireland, Netherlands, Macedonia, Slovenia, Poland, Mexico, India, France, Belgium, and Cyprus	147	25.16	0.70	Self-esteem, loneliness	Facebook	NA	0.08, -0.01
Aubrey et al. <sup>36</sup>	United States	507	19.68	0.62	Self-esteem	Facebook and MySpace	Ratio	-0.04
Baker and Oswald <sup>37</sup>	United States	207	19.19	0.67	Loneliness	Facebook	NA	0.04
Baker et al. <sup>38</sup>	United States	386	21.98	0.81	Depression	SNS	Ratio	0.09
Balci and Olkun <sup>39</sup>	Foreign students in Turkey	259	21.80	0.32	Loneliness	Facebook	NA	0.15
Banjanin et al. <sup>40</sup>	Serbia	336	18	0.66	Depression	SNS	NA	0.05
Bevan-Dye <sup>41</sup>	South Africa	346	NA	NA	Self-esteem	Facebook	NA	0.01
Bourke <sup>42</sup>	Ireland	204	13.66	0.57	Self-esteem, loneliness	Facebook	Ratio	-0.20, 0.17
Brusilovskiy et al. <sup>43</sup>	United States	232	NA	0.61	Loneliness	SNS	Likert	0
Burke <sup>11</sup>	Ireland	98	NA	0.63	Loneliness, self-esteem	Facebook	Likert	-0.25, 0.26
Chen et al. <sup>5</sup>	Indonesia, Thailand, Taiwan, and Vietnam	352	25	0.49	Self-esteem	Facebook	NA	0.09
Chop <sup>44</sup>	United States	143	NA	0.49	Depression, life satisfaction	Facebook	NA	0.13, -0.09
Cramer et al. <sup>45</sup>	United States	267	23.63	0.67	Self-esteem	Facebook	NA	-0.08
Davila et al., <sup>46</sup> No. 1	United States	384	20.22	0.68	Depression	Facebook	NA	0.03
Davila et al., <sup>46</sup> No. 2	United States	334	19.44	0.62	Depression	Facebook	NA	0.14
Denti et al. <sup>47</sup>	Sweden	1,011	32.60	0.67	Self-esteem	Facebook	NA	-0.08
Doğan and Çolak <sup>48</sup>	Turkey	475	17	0.64	Loneliness	SNS	Ratio	0.03
Feinstein et al. <sup>49</sup>	United States	301	19.44	0.62	Depression	Facebook and MySpace	NA	0.01
Frison et al. <sup>50</sup>	Belgium	1,621	14.76	0.48	Depression, life satisfaction	Facebook	Likert	0.15, -0.13
Giota and Kleftharas <sup>51</sup>	Greece	143	23.80	0.58	Depression	SNS	NA	0.13
Glynn et al. <sup>52</sup>	United States	228	38.90	0.61	Life satisfaction	Facebook	NA	0.07
Guo et al. <sup>15</sup>	Chinese international students in Japan	142	NA	0.61	Life satisfaction, loneliness	SNS	Ratio	-0.03, 0.14
Hill <sup>6</sup>	United States	56	NA	0.41	Self-esteem	Facebook	Likert	-0.31
Hong et al. <sup>53</sup>	Taiwan	241	20	0.41	Self-esteem	Facebook	Ratio	0.05

(continued)

TABLE 1. (CONTINUED)

<i>Study</i>	<i>Country</i>	<i>N</i>	<i>Mean age</i>	<i>Pfemale</i>	<i>WB indicator</i>	<i>Name of SNS</i>	<i>Measure of time</i>	<i>r<sup>a</sup></i>
Jin <sup>54</sup>	Korea	536	34	0.50	Loneliness	Facebook	NA	-0.06
Kalpidou et al. <sup>55</sup> No. 1	United States	35	18.31	0.67	Self-esteem	Facebook	Likert	-0.09
Kalpidou et al. <sup>55</sup> No. 2	United States	35	20.91	0.67	Self-esteem	Facebook	Likert	-0.31
Košir et al. <sup>56</sup>	Slovenia	335	13.17	0.45	Self-esteem	Facebook	NA	0
Krishnan <sup>57</sup>	United States	691	19.64	0.56	Self-esteem	SNS	Ratio	-0.01
Labrague <sup>58</sup>	Philippines	76	NA	0.82	Depression	Facebook	NA	0.23
Lee et al. <sup>8</sup>	Korea	217	21.30	0.50	Life satisfaction	SNS	NA	0
Lemieux et al. <sup>9</sup>	United States	280	19.50	0.53	Loneliness	Facebook	NA	0.41
Locatelli et al. <sup>17</sup>	United States	251	18.72	0.72	Life satisfaction, depression	Facebook	Likert	-0.01, 0.09
Mersin and Acilar <sup>59</sup>	Turkey	789	24	0.70	Self-esteem	Facebook	NA	-0.03
Michikyan et al. <sup>60</sup>	United States	261	21.92	0.75	Self-esteem, depression	Facebook	Ratio	-0.01, 0.10
Moorman <sup>61</sup>	Canada	431	20.40	0.71	Depression, loneliness	Facebook	Likert	0.17, 0.10
Morin-Major et al. <sup>62</sup>	Canada	94	14.50	0.53	Depression, self-esteem	Facebook	Likert	-0.10, -0.07
Pantic et al. <sup>63</sup>	Serbia	160	18.02	0.68	Depression	SNS	NA	0.15
Petrocchi et al. <sup>64</sup>	United States	205	20.50	NA	Loneliness	Facebook	Ratio	0.20
Ryan and Xenos <sup>65</sup>	Australia	1,158	29.50	0.60	Loneliness	Facebook	Likert	0.15
Schufreider <sup>66</sup>	United States	166	21.50	0.88	Self-esteem	Facebook	Likert	-0.17
Schwartz <sup>10</sup>	United States	213	21	0.60	Self-esteem, loneliness	Facebook	Likert	-0.12, 0.13
Seto <sup>67</sup>	United States	175	19.20	0.84	Self-esteem	Facebook	Ratio	-0.07
Shaw et al. <sup>68</sup>	United States	75	19.20	0.55	Depression	Facebook	Likert	0.08
Simonic et al. <sup>69</sup>	United States	237	18.81	0.47	Depression	Facebook	Likert	0.10
Skues et al. <sup>16</sup>	Australia	393	20.59	0.76	Self-esteem, loneliness	Facebook	NA	-0.10, 0.10
Steers et al., <sup>18</sup> No. 1	United States	107	24.41	1	Depression	Facebook	Likert	0.32
Steers et al., <sup>18</sup> No. 2	United States	26	24.41	0	Depression	Facebook	Likert	0.57
Steers et al., <sup>18</sup> No. 3	United States	93	22.55	1	Depression	Facebook	Likert	0.02
Steers et al., <sup>18</sup> No. 4	United States	59	22.55	0	Depression	Facebook	Likert	-0.01
Tandoc et al. <sup>70</sup>	United States	727	19.09	0.68	Depression	Facebook	NA	0.01
Tang and Livingston <sup>71</sup>	Hong Kong	257	NA	0.58	Loneliness, depression	Facebook	NA	0.16, 0.20
Teppers et al. <sup>72</sup>	Belgium	256	15.88	0.64	Loneliness	Facebook	Likert	0.07
Toledo <sup>73</sup>	United States	65	19.23	0.68	Self-esteem	Facebook	Likert	0.14
Tran <sup>20</sup>	United States	60	18.93	1	Depression	Facebook	Likert	0.08
Tucker <sup>74</sup>	United States	170	24	NA	Self-esteem	Facebook	Ratio	-0.03
Turner-August, <sup>19</sup> No. 1	United States	117	39	1	Self-esteem	SNS	Ratio	-0.05
Turner-August, <sup>19</sup> No. 2	United States	72	39	0	Self-esteem	SNS	Ratio	-0.36
Ward <sup>13</sup>	United States	110	29	0.39	Life satisfaction	Facebook and Twitter	Ratio	0.07
Wilson et al. <sup>75</sup>	Australia	201	19.07	0.76	Self-esteem	SNS	Ratio	0.02 <sup>b</sup>
Wohn and LaRose <sup>76</sup>	United States	380	17.75	0.70	Loneliness	Facebook	Likert	0.04
Wright et al. <sup>77</sup>	United States	361	20.26	0.53	Depression	Facebook	NA	0.16
Yu et al. <sup>78</sup>	Macao	395	19.05	0.63	Loneliness	SNS	NA	-0.03
Zabawska <sup>79</sup>	Ireland	123	33.74	0.57	Self-esteem	Facebook	Likert	0.01

<sup>a</sup>The direction of correlation between time spent on SNS and depression and that between time spent on SNS and loneliness were not reversed in this table.

<sup>b</sup>Effect sizes were obtained from the authors.

NA, not available; Pfemale, proportion of females; SNS, social network sites; WB indicator, well-being indicator.

*Independence*

All correlation coefficients between time spent on SNS and indicators of psychological well-being were coded. For instance, if two indicators of psychological well-being (e.g., self-esteem and loneliness) were examined for a sample, then two correlation coefficients were coded (i.e., the correlation between time spent on SNS and self-esteem and that between time spent on SNS and loneliness). To address the issue of non-independence, the mean correlation was computed for each sample, except when examining the effect of indicators of psychological well-being, for which the multiple effect sizes were considered independent.

**Results**

The meta-analysis comprised 19,652 participants analyzed in 61 studies, consisting of 67 independent samples that reported correlation between time spent on SNS and psychological well-being. Table 1 presents the summary of included studies. The mean sample size was 293.31 participants (range, 26–1,621 participants). The mean age was available for 58 samples, and it was 21.91 years old (range, 13.17–39 years old) across these 58 samples.

The correlation between time spent on SNS and psychological well-being was  $-0.07$ . This relationship significantly differed from 0 in that the 95% confidence interval, ranging from  $-0.09$  to  $-0.04$ , excluded 0. The correlation was low according to Cohen's<sup>29</sup> guidelines.

To examine the possible file-drawer problem, the trim and fill method<sup>30</sup> was used. No effect size was imputed, and the file-drawer problem was not an issue in the present meta-analysis.

*Moderator analyses*

**Publication outlet.** Separate means were computed for each publication outlet. As shown in Table 2, the effect of publication outlet was not statistically significant ( $p=0.68$ ). Nevertheless, the mean correlation between time spent on SNS and psychological well-being for bachelor's theses was  $r=-0.01$ , whereas that for conference papers was  $r=-0.12$ .

**Sites on which users spent time.** Most studies ( $k=50$ ) measured the time spent on Facebook, and some studies ( $k=13$ ) measured the time spent on all SNS. The mean correlations did not significantly differ, with  $Q_B=0.52$  ( $p=0.47$ ).

**Scale of time spent.** Twenty-five studies measured time spent on SNS on a Likert scale, whereas 15 studies were on a ratio scale. The mean correlation between time spent on SNS and psychological well-being for studies using a Likert scale was  $r=-0.09$ , whereas that for studies using a ratio scale was  $r=-0.06$ . The effect of scale time spent on SNS was not statistically significant ( $p=0.43$ ).

**Indicator of psychological well-being.** As previously mentioned, multiple correlation coefficients were coded if studies measured multiple indicators of psychological well-being. Coding the effect sizes yielded 82 correlation coefficients, comprising 30 data points for self-esteem, 20 for loneliness, 8 for life satisfaction, and 24 for depression. The indicator of psychological well-being had a statistically significant effect ( $p=0.04$ ). The mean correlations for pos-

TABLE 2. MODERATOR ANALYSES

Indicator	k	Mean	95% CI		Q <sub>B</sub>
			Upper	Lower	
Publication outlet					2.29
Journal	45	-0.07	-0.10	-0.03	
Bachelor	5	-0.01	-0.16	0.14	
Master	5	-0.05	-0.19	0.09	
Doctor	8	-0.10	-0.20	0.00	
Conference	3	-0.12	-0.35	0.13	
Site					0.52
Facebook	50	-0.08	-0.11	-0.05	
SNS	13	-0.05	-0.12	0.01	
Scale of time spent					0.62
Likert	25	-0.09	-0.13	-0.04	
Ratio	15	-0.06	-0.11	-0.01	
PWB indicator					8.28*
Self-esteem	30	-0.04	-0.08	-0.00	
Loneliness	20	-0.08	-0.13	-0.04	
Life satisfaction	8	-0.03	-0.11	0.05	
Depression	24	-0.11	-0.15	-0.07	
Gender					6.04
Mixed	56	-0.06	-0.09	-0.04	
Female	4	-0.13	-0.32	0.08	
Male	3	-0.27	-0.59	0.13	

The direction of correlation between time spent on SNS and depression and that between time spent on SNS and loneliness were reversed in this table.

\* $p < 0.05$ .

CI, confidence interval; PWB indicator, indicator of psychological well-being.

itive indicators (i.e., self-esteem and life satisfaction) were close to 0, whereas those for negative indicators (i.e., loneliness and depression) were close to weak ( $-0.08$  and  $-0.11$ ).

**Participant gender.** The proportion of female users was available in 63 samples. This study used weighted regression analysis to test the gender effect. The regression coefficient represented by  $b$  (0.05) was not significant ( $p=0.55$ ). Some studies reported the correlations between time spent on SNS and psychological well-being for male and female participants separately. Table 2 presents the mean correlations for female-only, male-only, and mixed-gender samples. Of these 63 samples, 56 were mixed-gender, 4 were female-only, and 3 were male-only samples. The mean correlations were  $-0.06$  for mixed-gender,  $-0.13$  for female-only, and  $-0.27$  for male-only samples.

**Participant age.** The mean age was available for 58 samples, and the regression coefficient  $b$  (0.00) was not significant ( $p=0.56$ ). The mean sample age was not related to the relationship between time spent on SNS and psychological well-being.

**Discussion**

Due to the popularity of SNS and the current concern for users' mental health, the investigation of the relationship of time spent on SNS and psychological well-being is pivotal. Although previous meta-analyses<sup>21–23</sup> have examined the relationship between SNS use and correlates, they aggregated

various indicators of SNS use, making interpretations difficult. To address this issue, the current meta-analysis estimated the relationship between time spent on SNS and psychological well-being.

Based on Cohen's<sup>29</sup> guidelines, the mean correlation between time spent and psychological well-being was low at  $r = -0.07$ . The mean correlation in the present meta-analysis was similar to the estimate of time spent with various loneliness measures ( $r = 0.07$ ) in Song et al.<sup>22</sup> Conversely, the mean correlation derived by the present meta-analysis was lower than the mean correlation between SNS use and self-esteem ( $r = -0.09$ ) and that between SNS use and loneliness ( $r = 0.17$ ) in Liu and Baumeister.<sup>23</sup> Nevertheless, the mean correlation ( $r = -0.02$ ) found in Huang<sup>21</sup> was near 0. Differences in the magnitudes of the relationship between SNS use and psychological well-being may be due to the differential inclusion criteria in the meta-analyses.

The relationship between time spent on SNS and life satisfaction has attracted less research attention than that between time spent on SNS and self-esteem, loneliness, or depression. As the indicator of psychological well-being was related to the relationship between time spent and psychological well-being, further research is needed to examine the relationship between SNS and life satisfaction.

Although the mean correlation between time spent on SNS and psychological well-being was weak, the correlations of time spent on SNS with positive and negative indicators varied. More specifically, the correlations for positive indicators were close to 0, whereas those for negative indicators were weak. These findings were consistent with Liu and Baumeister,<sup>23</sup> who found that the mean correlation between SNS use and loneliness was somewhat higher than that between SNS use and self-esteem. Given the evidence that positive and negative indicators of psychological well-being had differential correlations with SNS use, future studies examining the consequences of SNS use should incorporate both positive and negative indicators to better understand the relationship between SNS use and mental health.

Previous meta-analyses rarely examined the effect of gender on the relationship between time spent on SNS and psychological well-being. Although the effect of proportion of women in the sample was not related to the correlation between time spent on SNS and psychological well-being, the mean correlation for studies using male-only participants was moderate. However, the correlation for male-only samples should be interpreted with caution, due to the small number of samples ( $k = 3$ ).

This study has some limitations. First, some moderators were not examined due to insufficient samples. For example, the effect of the self-esteem scale could not be examined, because most studies used the Rosenberg Self-Esteem Scale,<sup>31</sup> and a few studies used other scales. Second, most included studies used student samples. Only a few studies examined the relationship between time spent and psychological well-being for adults. Future research should focus on adults to examine whether this relationship changes over lifetime.

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