

# Positive and Negative Experiences on Social Media and Perceived Social Isolation

American Journal of Health Promotion  
1-10  
© The Author(s) 2019  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/0890117118824196  
journals.sagepub.com/home/ahp



Brian A. Primack, MD, PhD<sup>1,2,3</sup> , Sabrina A. Karim, BA<sup>1</sup>, Ariel Shensa, MA<sup>1,2</sup>,  
Nicholas Bowman, PhD<sup>4</sup>, Jennifer Knight, MA<sup>4</sup>, and Jaime E. Sidani, PhD<sup>1,2</sup>

## Abstract

**Purpose:** To examine the association between positive and negative experiences on social media (SM) and perceived social isolation (PSI).

**Design:** Cross-sectional survey.

**Setting:** One large mid-Atlantic University.

**Participants:** A total of 1178 students aged 18 to 30 were recruited in August 2016.

**Measures:** Participants completed an online survey assessing SM use and PSI. We assessed positive and negative experiences on SM by directly asking participants to estimate what percentage of their SM experiences involved positive and negative experiences, respectively. Social isolation was measured using the established Patient-Reported Outcomes Measures Information System scale.

**Analysis:** We used multivariable logistic regression to assess associations between both positive and negative experiences on SM and PSI. Primary models controlled for sex, age, race/ethnicity, educational status, relationship status, and living situation.

**Results:** Participants had an average age of 20.9 (standard deviation = 2.9) and were 62% female. Just over one-quarter (28%) were nonwhite. After controlling for all sociodemographic covariates, each 10% increase in positive experiences was not significantly associated with social isolation (adjusted odds ratio [AOR] = 0.97; 95% confidence interval [CI]: 0.93-1.005). However, each 10% increase in negative experiences was associated with a 13% increase in odds of PSI (AOR = 1.13; 95% CI: 1.05-1.21).

**Conclusion:** Having positive experiences on SM is not associated with lower social isolation, whereas having negative experiences on SM is associated with higher social isolation. These findings are consistent with the concept of negativity bias, which suggests that humans tend to give greater weight to negative entities compared with positive ones.

## Keywords

social isolation, social media, university students, young adults, PROMIS, perceived social isolation, connectedness, social capital, college

## Introduction

Social isolation, defined as disengagement from social ties, institutional connections, or community participation,<sup>1</sup> can be either objective or subjective (“perceived”). Objective social isolation refers to physical isolation or a lack of social ties, while subjective social isolation refers to one’s *perception* of his or her own isolation or disconnectedness.<sup>2</sup> This study focuses on subjective isolation, hereafter referred to as perceived social isolation (PSI), because this form of isolation in particular has been linked to negative health outcomes and increased mortality.<sup>2,3</sup> Specifically, there are clear linkages between PSI and deficits in the cardiovascular system (increased hypertension, coronary artery disease, cardiac failure), neuroendocrine system (increased glucocorticoid levels and glucocorticoid resistance), and cognitive functioning (increased depressive symptoms, suicidal ideation, and

dementia in old age).<sup>4,5</sup> Overarching conclusions across several studies support a direct association between PSI and morbidity/mortality, or an inverse relationship between social support and morbidity/mortality.<sup>2,4</sup>

<sup>1</sup> Center for Research on Media, Technology, and Health, University of Pittsburgh, Pittsburgh, PA, USA

<sup>2</sup> Department of Medicine, University of Pittsburgh, Pittsburgh, PA, USA

<sup>3</sup> University Honors College, University of Pittsburgh, Pittsburgh, PA, USA

<sup>4</sup> Department of Communication, University of West Virginia, Morgantown, WV, USA

### Corresponding Author:

Brian A. Primack, Department of Medicine, University of Pittsburgh School of Medicine, 3600 Cathedral of Learning, 4200 Fifth Avenue, Pittsburgh, PA 15260, USA.

Email: bprimack@pitt.edu

Social media (SM)—which may represent an opportunity for socially isolated individuals to connect—has been increasing in use substantially. For example, in the United States, the percentage of young adults using SM skyrocketed from 12% in 2005 to 90% in 2015.<sup>6</sup> Among online adults in 2016, Facebook remains the most popular SM platform (79%, a 7-percentage point increase from 2015), followed by Instagram (32%), Pinterest (31%), LinkedIn (29%), and Twitter (24%).<sup>7</sup> Of note, as of 2016, a marked proportion (62%) of American adults reported getting their news from SM.<sup>8</sup>

Because the explicit goal of SM platforms is to connect individuals, it is not surprising that studies suggest the ability of SM to positively influence social connectedness. For example, Facebook may help to maintain existing relationships among college students, which particularly benefits those individuals with low self-esteem and low life-satisfaction.<sup>9</sup> In addition to preserving existing social ties, SM facilitates the formation of new connections, which provide people with an alternative way to connect with others who share similar interests or relational goals.<sup>10,11</sup> Similarly, individuals with a greater number of SM connections report having greater social capital, which also tends to enhance social connectedness.<sup>9,12,13</sup> In turn, those with greater social capital can draw on resources from other members of their networks, leading to useful information, new personal relationships, and employment connections.<sup>14,15</sup> Having a larger Facebook audience also has been associated with increased life satisfaction, perceived social support, and subjective well-being.<sup>16,17</sup>

However, other studies suggest that increased SM exposure may counterintuitively be associated with *increased* PSI.<sup>18</sup> This may be because SM facilitates engagement in social comparison, giving users the impression that others tend to be more connected and meaningfully engaged.<sup>19-21</sup> Consistent with this, a large nationally representative study recently found that increased SM use—both in terms of time per day and frequency of site visits—was associated with low emotional support in a linear fashion.<sup>18</sup> Another study specifically concluded that number of Facebook use is significantly correlated with negative psychosocial variables such as loneliness and depression.<sup>22</sup> It is important to note that not all ties are inherently positive in quality, potentially limiting positive outcomes from social ties. In fact, there are circumstances in which the number of ties may have negative effects on health. For example, in some studies adolescents with either too large or too small network have higher levels of depressive symptoms.<sup>23</sup>

Filling gaps in the literature may help to clarify prior mixed findings surrounding positive and negative experiences on SM and PSI. First, because previous studies have focused on one platform, such as Facebook<sup>24</sup> or Instagram,<sup>21</sup> it may be useful to examine SM as a general construct. Although Facebook and Instagram are important and commonly used platforms, as noted above, an increasing number of individuals are using a more diverse set of platforms,<sup>6,7</sup> with 56% of online adults using more than 1 of 5 SM platforms among Twitter, Instagram, Pinterest, LinkedIn, and Facebook.<sup>7</sup> Second, prior studies have not assessed associations between both positive and

negative experiences and PSI in the same study. It may be useful to assess these associations synchronously to allow for comparison of effect sizes.

Therefore, the purpose of this study was to examine, in a large cohort of university students, associations between positive and negative SM experiences and PSI. Based on prior research described above, we hypothesized that reporting a greater proportion of positive experiences on SM would be associated with lower levels of PSI (hypothesis 1 [H1]). Second, we hypothesized that reporting a greater proportion of negative experiences on SM would be associated with greater levels of PSI (hypothesis 2 [H2]). Our third aim was to compare the effect sizes associated with positive and negative experiences in the same statistical model. For this more exploratory aim, we did not have a specific a priori hypothesis.

## Methods

### Participants and Procedures

For this cross-sectional study, we recruited young adults from one large mid-Atlantic state university to assess the associations between SM use and social isolation. In August 2016, all registered students—both undergraduate and graduate—were invited to participate in the online survey via e-mail.

To be eligible for this study, participants had to be between 18 and 30 years of age. For primary analyses, we only included individuals with complete data for our primary dependent variable (PSI) and independent variables (positive and negative experiences on SM). Therefore, of the 1228 eligible participants, 50 (4.1%) were excluded because of missing data.

Online informed consent was obtained by asking the participants to agree to participate after reading the consent form. In order to thank participants for their time, and to increase participation, participants were entered into a drawing for a \$50 Amazon gift card for every 25 participants enrolled in the study. This study was approved by the West Virginia University institutional review board and the survey was administered via Qualtrics (Seattle, Washington, USA).<sup>25</sup> The median completion time for the survey was 16 minutes. Data from this study are available upon request via a structured form, which researchers can obtain from the senior author.

### Measures

**Perceived social isolation (dependent variable).** We assessed PSI using the 4-item Patient-Reported Outcomes Measurement Information System (PROMIS) scale.<sup>26</sup> The PROMIS is a National Institutes of Health (NIH) Roadmap initiative that aims at providing precise, reliable, valid, and standardized questionnaires measuring patient-reported outcomes across the domains of physical, mental, and social health.<sup>27</sup> According to NIH-developed documentation for this scale, it is appropriate for clinical populations or as a population-based screening tool.<sup>28</sup> The scale has been validated using a combination of techniques designed to explore content, construct, and criterion

validity, and Cronbach  $\alpha$  consistently indicates strong internal consistency reliability.

Our dependent variable of interest was specifically the PROMIS Social Isolation scale, which assesses perceptions of being avoided, excluded, disconnected from, or unknown by others and has been validated against other commonly used measures of social isolation.<sup>29,30</sup> Each of the 4 items is assessed on a 5-point Likert-type scale. Specifically, the items assess how many times in the past 7 days a participant has (1) felt left out, (2) felt that people barely know him or her, (3) felt isolated from others, and (4) felt that people are around him or her but not with him or her. Summing the numerical score for the 4 items gave a raw score for PSI between 4 and 20.

Because the distribution of the social isolation variable was skewed right and no variable transformation resulted in normal distribution, it was not possible to use the dependent variable as continuous. Therefore, for analysis, we collapsed the raw scores into tertiles of “low,” “medium,” and “high” PSI. Because no established clinical cutoffs for PSI exist, we approximated tertiles using the *xtile* command in Stata 14 (Stata Corp, College Station, Texas). As a result, 35% of participants were considered to have low PSI, 41% had medium PSI, and 24% had high PSI. The raw PROMIS scores for low, medium, and high PSI were 4 to 8, 9 to 12, and 13 and above, respectively. The scale displayed excellent internal consistency and reliability (Cronbach  $\alpha = .89$ ).

*Positive and negative experiences on SM (independent variables).* We assessed positive and negative experiences on SM by directly asking participants to estimate what percentage of their SM experiences involved positive and negative experiences, respectively. We presented participants with sliders ranging from 0 to 100 as the response choice for each item. The resulting 2 scores served as independent variables. For logistic regression analyses, we transformed responses into a 10-point scale (1 point for every 10%), based on the natural distribution of responses around these anchors and to improve interpretability of results.

No formal scale has been developed to assess positive and negative experiences on SM. Therefore, we conducted iterative discussions with a convenience sample of 8 individuals in order to explore how best to assess these constructs with maximal validity. All participants were all in the target age range of young adults. Males and females were represented equally, and 25% of participants were nonwhite.

Two key pieces of information obtained from this group led to the final items used in this study. First, we determined that it would be most useful for participants to interpret the meaning of “positive” and “negative” experiences for themselves. We could have presented specific “negative experiences” by asking about the frequency of online arguments or being “defriended.”<sup>31</sup> However, our participants felt that not all people would view these as “negative” and that forcing specific interpretations of positive and negative would be counterproductive, too leading, or too nonspecific. For example, several pretesting participants suggested that agreeing or disagreeing

with items such as “People like what I present on social media” would be too nonspecific for a meaningful response.

Second, the scale development team determined that it would be best for participants to answer about an overall sense of negative/positive instead of focusing on a specific time frame such as 7 days. Participants preferred phrasing of the question aimed to capture a more overarching average of the participant’s experiences, noting that a short time frame such as 7 days did not generally capture their overall experiences.

*Sociodemographic factors (covariates).* Participants were asked to report their age, sex, race/ethnicity, highest level of education, relationship status, and living situation. We assessed age as a categorical variable in years (18-30) and collapsed race/ethnicity into 2 categories (white and nonwhite). Multiple-choice items were used to assess relationship status (single [inclusive of separated/divorced/widowed], dating, in a committed relationship [inclusive of married/engaged]), and living situation (with parent/guardian; with significant other; with friends; alone; other). We collapsed categories with <5% responses for model stability in analyses.

## Analyses

We performed  $\chi^2$  tests for sex and race/ethnicity (categorical variables) and *t* tests for age (continuous variable) to assess patterns of missing data and determine whether there were any sociodemographic differences between those with complete and those with incomplete data. There were no significant differences by sex ( $P = .22$ ), race/ethnicity ( $P = .23$ ), or age ( $P = .48$ ).

We described our sample reporting counts and percentages. We then tested our analytic models to ensure the appropriate assumptions had been met. We examined our multivariable models for collinearity using the average variance inflation factor (VIF) and verified that the proportional odds assumption had been met for both ordered logistic regression models.

Based upon the 3-level ordered categorical scale of our dependent variable, we assessed the bivariable and multivariable associations between each independent and dependent variables using ordered logistic regression. We decided a priori to adjust for all sociodemographic covariates in our multivariable models regardless of significance level in bivariable analyses. We defined statistical significance with a 2-tailed  $\alpha$  of .05 and analyzed all data using Stata 14.<sup>32</sup> Our single primary multivariable model included both positive and negative experiences in the same model. However, we also conducted secondary analyses with each of these independent variables in different models in order to confirm findings. Finally, we triangulated our multivariable results with regression analyses that stratified for key sociodemographic variables.

We conducted 3 sets of sensitivity analyses to examine robustness of results. First, we conducted all analyses using continuous variables when they were available (eg, for age). Second, we reconducted all analyses using only covariates with a  $P < .20$  association with the outcome in order to ensure that

**Table 1.** Whole Sample Characteristics and Bivariable Associations Between Independent Variables, Covariates, and Depressive Symptoms (N = 1178).

Independent Variable/Covariate	Whole Sample, N (%)	Perceived Social Isolation, N (%)			P <sup>a</sup>
		Low	Medium	High	
Positive experiences, mean (SD)	71 (31)	73 (32)	72 (30)	67 (32)	.04
Positive experiences, median (IQR)	85 (50-96)	90 (53-99)	85 (52-95)	80 (45-95)	.008
Negative experiences, mean (SD)	11 (16)	9 (14)	12 (16)	14 (19)	.0004
Negative experiences, median (IQR)	5 (1-14)	3 (0-10)	5 (1-15)	5 (1-20)	.0001
Sex, % <sup>b</sup>					.03
Male	455 (37)	170 (39)	177 (36)	107 (36)	
Female	757 (62)	259 (60)	317 (64)	179 (61)	
Other	16 (1)	4 (1)	4 (1)	8 (3)	
Age, years, median (IQR)					.06
18	264 (22)	108 (20)	84 (23)	72 (26)	
19-20	393 (33)	164 (31)	129 (36)	100 (35)	
21-24	377 (32)	190 (36)	102 (28)	85 (30)	
25-30	144 (12)	71 (13)	48 (13)	25 (9)	
Race/ethnicity, % <sup>b</sup>					.25
White, non-Hispanic	842 (72)	393 (74)	256 (71)	193 (69)	
Nonwhite <sup>c</sup>	331 (28)	138 (26)	105 (29)	88 (31)	
Relationship status, % <sup>b</sup>					.04
Single	605 (51)	248 (47)	193 (53)	162 (57)	
Dating	322 (27)	162 (30)	92 (25)	68 (24)	
In a committed relationship <sup>d</sup>	251 (21)	123 (23)	76 (21)	52 (18)	
Living situation, % <sup>b</sup>					.02
With a parent or guardian	172 (15)	70 (13)	54 (15)	48 (17)	
With a significant other	122 (10)	63 (12)	38 (10)	21 (7)	
With friends	564 (48)	266 (50)	175 (48)	123 (44)	
Alone	201 (17)	90 (17)	65 (18)	46 (16)	
Other	119 (10)	44 (8)	31 (9)	44 (16)	
Education					.07
HS diploma or less	268 (23)	118 (22)	79 (22)	71 (25)	
Some college	590 (50)	251 (47)	186 (51)	153 (54)	
Two-year/technical degree	193 (16)	104 (20)	58 (16)	31 (11)	
Bachelor's degree	127 (11)	60 (11)	40 (11)	27 (10)	

Abbreviations: HS, high school; IQR, interquartile range; SD, standard deviation.

<sup>a</sup>Significance level determined using the nonparametric Kruskal-Wallis test for continuous independent variables and  $\chi^2$  tests for categorical sociodemographic variables.

<sup>b</sup>Column percentages may not total 100 due to rounding.

<sup>c</sup>Includes black, Hispanic, Asian, Native American, and Multiracial.

<sup>d</sup>Included being engaged, married, or in a domestic partnership.

we were not overcontrolling in our models. Finally, we reconducted all analyses using PSI as a dichotomous variable instead of in tertiles. Because all of these additional analyses demonstrated similar results to primary models, only primary results are presented here.

For our primary multivariable analysis, based upon our observed  $R^2$  value, the number of predictors, and the desired effect size to be detected (0.1), we had >90% power. Because of this slight overpowering, we interpreted with caution statistically significant results to ensure that they were also clinically meaningful.

## Results

Our final sample consisted of 1178 individuals with complete data on our 2 independent variables and 1 dependent variable.

There were no significant differences by age, race/ethnicity, or sex when comparing those with and without missing data. In addition, our sample demonstrated a similar demographic profile to the overall population assessed. When the survey was conducted, this university had a total student population of approximately 28 500 undergraduate (78%) and graduate students (22%). Just over half (54%) identified as male, 78% identified as white, 5% as black/African American, and 4% as Hispanic or Latino.<sup>33</sup> While this does not ensure that our sample was entirely representative of the population, it lends some confidence in the external generalizability of our findings.

As shown in Table 1, the majority of our sample was female (62%) and white, non-Hispanic (72%, hereafter referred to as “white”). Our sample ranged in age from 18 to 30 years, with a median age of 20 (interquartile range [IQR] = 19-22). About

**Table 2.** Multivariable Associations Between SM Experiences, Sociodemographic Characteristics, and Perceived Social Isolation (N = 1178).

Independent Variable/Covariate	Perceived Social Isolation		
	Model 1 <sup>a</sup> AOR (95% CI) <sup>b</sup>	Model 2 <sup>a</sup> AOR (95% CI) <sup>b</sup>	Model 3 <sup>a</sup> AOR (95% CI) <sup>b</sup>
Positive experiences <sup>c</sup>	0.96 (0.93-0.995)	-	0.97 (0.93-1.005)
Negative experiences <sup>c</sup>	-	1.14 (1.07-1.22)	1.13 (1.05-1.21)
Sex			
Male	Reference	Reference	Reference
Female	1.17 (0.93-1.47)	1.19 (0.95-1.50)	1.21 (0.96-1.52)
Other	2.92 (0.98-8.74)	3.41 (1.13-10.23)	3.14 (1.04-9.53)
Age			
18	Reference	Reference	Reference
19-20	0.87 (0.62-1.24)	0.88 (0.62-1.25)	0.88 (0.62-1.24)
21-24	0.71 (0.473-1.06)	0.74 (0.49-1.10)	0.72 (0.48-1.07)
25-30	0.76 (0.43-1.33)	0.81 (0.46-1.43)	0.79 (0.45-1.38)
Race/ethnicity			
White, non-Hispanic	Reference	Reference	Reference
Nonwhite <sup>d</sup>	0.80 (0.62-1.01)	0.80 (0.63-1.02)	0.81 (0.64-1.03)
Relationship status			
Single	Reference	Reference	Reference
Dating	0.74 (0.57-0.96)	0.75 (0.58-0.97)	0.75 (0.58-0.97)
In a committed relationship <sup>e</sup>	0.88 (0.64-1.22)	0.90 (0.65-1.25)	0.89 (0.64-1.23)
Living situation			
With a parent or guardian	Reference	Reference	Reference
With a significant other	0.91 (0.54-1.52)	0.87 (0.52-1.46)	0.86 (0.51-1.44)
With friends	0.86 (0.62-1.20)	0.86 (0.62-1.20)	0.85 (0.61-1.19)
Alone	1.00 (0.67-1.51)	0.98 (0.65-1.47)	0.97 (0.64-1.45)
Other	1.69 (1.08-2.63)	1.66 (1.07-2.60)	1.64 (1.05-2.56)

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; SM, social media.

<sup>a</sup>Model 1 includes positive experiences and all covariates included in the table. Model 2 includes negative experiences and all covariates included in the table. Model 3 includes both of these independent variables and all covariates included in the table.

<sup>b</sup>Adjusted for age, sex, race, relationships status, and living situation.

<sup>c</sup>Each independent variable indicates the proportion of participants' SM experiences they perceive as being positive or negative. Associated odds represent the increase in perceived social isolation for every 10% increase in the independent variable.

<sup>d</sup>Includes black, Multiracial, Hispanic, Asian, and Native American.

<sup>e</sup>Included being engaged, married, or in a domestic partnership.

half of participants reported being single (51%) and reported living with friends (48%). Variables significantly associated with PSI in bivariable analyses included positive experiences, negative experiences, sex ("Other"), relationship status ("Dating"), and living situation ("Other").

We screened our 3 multivariable models for collinearity among covariates and confirmed that each model met the proportional odds assumption. An average VIF of 1.4 indicated no issues of multicollinearity among each independent variable and covariates. Moreover, pairwise correlations among the independent variable and covariates for each multivariable model were below 0.72 (where 0.72 was the correlation between education and age) using Pearson *r*. All models met the proportional odds assumption, indicated by nonsignificant *P* values ranging from .82 to .91.

The distribution of each independent variable was skewed right. Participants reported that about 72% (standard deviation [SD] = 31) of their SM experiences were positive. This corresponded with a median of 85% (IQR = 50-97). However, participants reported that about 11% (SD = 16) of their SM

experiences were negative, and this corresponded with a median of 5% (IQR = 1-14).

After controlling for all sociodemographic covariates, in a model only including positive experiences, each 10% increase in positive experiences on SM was associated with a 4% decrease in PSI (adjusted odds ratio [AOR] = 0.96; 95% confidence interval [CI]: 0.93-0.995), supporting H1 (Table 2, model 1). In a model only including negative experiences, each 10% increase in negative experiences on SM was associated with a 14% increase in PSI (AOR = 1.14; 95% CI: 1.07-1.22), supporting H2 (Table 2, model 2). As shown in Table 2, covariates significantly associated with PSI in each model included positive experiences, negative experiences, sex ("Other"), relationship status ("Dating"), and living situation ("Other").

When independent variables were in the same model (Table 2, model 3), results were only slightly different. Each 10% increase in positive experiences on SM was associated with a 3% decrease in PSI (AOR = 0.97; 95% CI: 0.93-1.005), although this result was not statistically significant. In this same model, each 10% increase in negative experiences

**Table 3.** Bivariable Associations Between SM Experiences and Perceived Social Isolation, Stratified by Sex, Age, and Race (N = 1178).

Demographic Characteristic	OR (95% CI) Negative Experiences <sup>a</sup>	OR (95% CI) Positive Experiences <sup>a</sup>
<b>Sex</b>		
Male	1.07 (0.97-1.18)	1.03 (0.98-1.10)
Female	1.25 (1.14-1.38)	0.91 (0.87-0.96)
<b>Age</b>		
18	1.35 (1.16-1.57)	0.86 (0.79-0.94)
19-20	1.18 (1.05-1.33)	0.99 (0.93-1.05)
21-24	1.03 (0.92-1.16)	0.99 (0.94-1.05)
25-30	1.02 (0.86-1.22)	0.90 (0.82-0.99)
<b>Race/ethnicity</b>		
White, non-Hispanic	1.11 (0.99-1.23)	0.92 (0.86-0.98)
Nonwhite <sup>b</sup>	1.16 (1.07-1.26)	0.99 (0.95-1.02)

Abbreviations: CI, confidence interval; OR, odds ratio.

<sup>a</sup>Each independent variable indicates the proportion of participants' SM experiences they perceive as being positive or negative. Associated odds represent the increase in perceived social isolation for every 10% increase in the independent variable.

<sup>b</sup>Includes black, Multiracial, Hispanic, Asian, and Native American.

was associated with a 13% increase in odds of PSI (AOR = 1.13; 95% CI: 1.05-1.21), which was statistically significant. Covariates significantly associated with PSI in this model with both independent variables included positive experiences, negative experiences, sex ("Other"), relationship status ("Dating"), and living situation ("Other").

We triangulated our multivariable results with regression analyses that stratified for key sociodemographic variables (Table 3). These results were generally consistent with multivariable results, but in some cases they provided additional insight. For example, there was a stronger association between negative experiences on SM and social isolation among females versus males (OR = 1.25, 95% CI: 1.14-1.38 vs OR = 1.07, 95% CI: 0.97-1.18).

## Discussion

This study of a convenience sample of young adult university students found that having positive experiences on SM was only weakly associated with lower PSI, while having negative experiences on SM was strongly associated with higher PSI. Because 83% of SM users are within the age range of our study population,<sup>34</sup> it is valuable to know that the quality of online experiences may be associated with important outcomes such as PSI in this population. These findings may encourage individuals to pay closer attention to their online exchanges and experiences.

Importantly, the effect sizes for positive experiences and negative experiences were quite different. The effect size for negative experiences would be considered high. This is because the noted 15% increase in odds of depression was associated with a relatively slight (10% increase) in SM negativity. Thus,

the associated increase in odds of PSI would be very large for a more substantial change (eg, 10% negativity to 40% negativity). At these levels, the effect size of the change was as large a change as has been seen for the most important currently known risk factors for PSI.<sup>2</sup> The effect size for positive experiences was quite low, however. Because there was only a 5% decrease in odds of PSI for each 10% change in SM positivity, even a relatively large change in positivity (say 10%-40%) would still only be associated with about a 20% decrease in odds of PSI; this kind of decrease would be considered meaningful but not extremely large.

Because these data were cross-sectional, it is not clear whether people with higher PSI seek out negative SM experiences or vice versa. If it is the latter, one potential explanation for the association between quality of SM experiences and PSI is that individuals use and experience SM in very different ways. For example, some individuals use SM for social engagement, information seeking, passing time, relaxation, or entertainment.<sup>35</sup> In these various contexts, some users tend to have positive exchanges that bolster their feeling of connectedness, while others engage in negative exchanges and arguments that may leave them feeling lonely or disconnected.

The fact that quality of social relationships and exchanges is associated with feelings of connectedness is consistent with *social network theory*.<sup>15,36</sup> This theory posits that "strong ties" among individuals—which are based on trust and affection and are more likely to manifest in positive experiences—lead to greater levels of emotional support. Alternately, "weak ties" are helpful for finding new information and resources but may provide low levels of intimacy and relationship intensity.<sup>15,36</sup> In the complex milieu of SM—where the average Facebook user has 217 network "friends"<sup>20</sup> and the average size of a real-life social network is around 125—frequent engagement with weak ties may increase misunderstandings and negative experiences, ultimately leading to greater PSI.<sup>32</sup> The difference between these 2 average sizes of friend networks (217 – 125 = 92) suggests that 92 additional "friends" are associated with membership on an SM site. If the ties are weak, these relationships could potentially increase disconnectedness rather than engender meaningful connections. However, it should be noted that there are circumstances under which the strength of ties is less important than the content of the ties. For example, weak ties used for professional networking may actually lead to other resources that enhance one's social support.

After controlling for all sociodemographic covariates and including both independent variables in the same model, positive experiences on SM were not significantly associated with social isolation. The direction of the result is consistent with studies demonstrating value for SM in developing and maintaining social capital and social connectedness, entities that are inversely correlated with PSI.<sup>10,12</sup> However, each 10% increase in *negative* experiences was significantly associated with a 14% increase in odds of PSI (AOR = 1.14; 95% CI: 1.07-1.22). It is interesting that when analyzed in the same model, negative experiences remain significantly associated with PSI, whereas positive experiences do not. This may lead to the

conclusion that negative SM experiences may be more “potent” than positive experiences as related to PSI. This reasoning is consistent with the concept of *negativity bias*, which purports that there is a tendency for humans to give greater weight to negative entities (eg, events, objects, personal traits) compared with positive ones.<sup>37</sup> This idea may be particularly relevant in the context of SM use. For example, while positive experiences may be associated with fleeting positive reinforcement, negative experiences such as public SM arguments may rapidly escalate due to a need to shape or defend one’s “digital identity”<sup>38</sup> and may in turn leave a lasting, potentially traumatic impression on the individual.

Because these data are cross-sectional, it may also be that individuals with PSI tend to subsequently have more negative experiences and fewer positive experiences on SM. This explanation is plausible because socially isolated individuals may seek out SM relationships due to their limited in-person social opportunities.<sup>39</sup> This tendency could be reflected in personality traits such as increased aggression or ability to “handle” negative experiences. For example, one study showed that when controlling for sociodemographic covariates and time spent online, “problematic Internet use” (PIU) was related to higher neuroticism and lower conscientiousness,<sup>40</sup> while another study stated that loneliness, depression, and computer self-efficacy were significant predictors of PIU.<sup>41</sup> It may of course also be that the association between SM experiences and PSI is bidirectional in nature.

Aside from positive experiences and negative experiences on SM, 3 covariates were associated with PSI. First, compared with those who were single, participants who were dating demonstrated a 25% decrease in odds of PSI (AOR = 0.75; 95% CI: 0.58-0.97). It may be that dating is a proxy for being socially integrated and therefore a marker of being less socially isolated. Second, compared with those who identified as male, participants who identified as “other” had 3-fold odds of increased PSI (AOR = 3.14; 95% CI: 1.04-9.53). This is consistent with other research demonstrating that gender-fluid individuals tend to feel marginalized.<sup>42</sup> However, because of the relative paucity of research in this area, it would be useful for future research to explore this relationship quantitatively and/or qualitatively. Finally, compared with those who lived with parents, participants who reported an “other” living situation—versus living with a significant other, friends, or alone—had 64% odds of increased PSI (AOR = 1.64; 95% CI: 1.05-2.56). It may be that these individuals live with others whom they do not consider “friends,” which may make them feel isolated.

Although these early findings need to be replicated, they still may be useful to public health practitioners. Directionality cannot be ascertained from this study, making a strong suggestion to educate the public about possible risks associated with engaging with negative encounters online premature. However, public health practitioners may wish to encourage the public to be more cognizant and thoughtful regarding their online experiences. In turn, this could help to interrupt a potential cycle of negative experiences and PSI. Many environments, such as

universities, workplaces, and community spaces, which are home to an abundance of SM users, may be leveraged to increase awareness and education around positive and negative online SM experiences.

Although the association between positive experiences and lower PSI was not significant in our model including both independent variables, and only weakly significant in the model including only positive experiences, it still may be valuable for individuals to have positive SM experiences. In general, engaging in various forms of SM has been shown to enhance communication, social connection, and even technical skills among children and adolescents.<sup>43</sup> Effective SM use—such as communication and knowledge transfer, maintenance of existing connections, and fellowship building—can also lend itself to positive SM experiences for individuals, which may in turn lead to lower PSI.

We found some interesting differences according to sex. While in multivariable results there were not independent associations between sex and social isolation, bivariable associations between positive and negative experiences were sometimes slightly different when stratifying by demographic variables. For example, there was a stronger association between negative experiences on SM and social isolation among females versus males (OR = 1.25, 95% CI: 1.14-1.38 vs OR = 1.07, 95% CI: 0.97-1.18). Although our analyses were not powered to determine differences among these smaller subgroups, the magnitude of the association (1.25 vs 1.07) is interesting to consider. In particular, it may be that females are more sensitive to negative experiences compared with males. Although the magnitudes of effect sizes are relatively small in a sample that is relatively large, it could be valuable to continue to examine differences according to sex in future fully powered analyses.

Based on feedback from our pretesting participants, we used an open assessment of positive and negative SM experiences that did not limit participants to assessment of specific activities on SM or over a specific time frame. This decision should be considered in interpretation of results. For example, because we did not ask about specific activities that were considered negative, we do not know whether something a participant considered negative was severe cyber-bullying or simply being “unfriended” by someone. It would be valuable in future research to provide more fine-grained assessments.

Similarly, pretesting participants felt it was preferable in terms of overall validity of the measure to assess negativity overall instead of given a specific time frame, such as 7 days. This is because participants did not feel that the past 7 days reflected their overall experiences. However, it should be noted that this choice did introduce the complexity that the positivity/negativity measures were assessed generally while the PSI, which came from a well-established, validated scale, was assessed over a 7-day time period. Therefore, results should be interpreted accordingly. For example, a participant may have had a highly negative life experience in the past 7 days and a remote history of negative SM experiences. In this case, we may be inappropriately inferring associations. Thus, it may

be valuable for future analyses to explore these issues and experiment with comparison of overall positivity/negativity in the SM milieu with positivity/negativity in certain recent time frames.

### Limitations

The primary limitation of this study is that the data are from a cross-sectional study. This design not only limiting our ability to assess directionality of the noted associations; it also affects our ability to determine whether there is a third factor that might explain the associations. Therefore, it will be useful for future studies to address these issues using other designs such as longitudinal cohort studies and/or qualitative assessments.

Another limitation is that this study focused on young adults and university students, which could have resulted in sampling bias, thus limiting our ability to generalize our results to other populations.

It should also be noted that the data set did not include a well-validated measure of socioeconomic status that we were able to use as a covariate. Although we attempted to compensate by including educational status, which is sometimes used

as an approximation of socioeconomic status, it would be useful for future studies to include more direct measures of socioeconomic status, such as household income.

Future studies would also benefit from incorporating more qualitative approaches—such as free text answers from participants regarding their experiences and symptoms—to supplement quantitative models.

A final limitation is the possibility that participants may have underreported PSI due to the sensitive nature of this topic. Although we attempted to minimize this by assuring participants of confidentiality and having participants self-administer the survey, this remains a consideration.

### Conclusions

Having positive experiences on SM is not associated with lower social isolation, whereas having negative experiences on SM is associated with higher social isolation. This pattern seems consistent with negativity bias. It will be especially important to attempt to assess directionality in future work. In the meantime, however, it may be useful to view having negative experiences on SM with caution in order to interrupt a potential cycle of negative exchanges on SM and PSI.

### Authors' Note

The authors confirm that the research presented in this article met the ethical guidelines, including adherence to the legal requirements, of the United States and received approval from the institutional review board of the University of West Virginia.

### Acknowledgments

The authors acknowledge Michelle Woods for editorial assistance. The authors acknowledge the funding from the Fine Foundation.


### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The authors received funding from the Fine Foundation.

### ORCID iD

Brian A. Primack, MD, PhD  <https://orcid.org/0000-0002-5962-0939>

### References

1. Seeman TE. Social ties and health: the benefits of social integration. *Ann Epidemiol*. 1996;6(5):442-451.
2. Holt-Lunstad J, Smith TB, Baker M, Harris T, Stephenson D. Loneliness and social isolation as risk factors for mortality: a meta-analytic review. *Perspect Psychol Sci*. 2015;10(2):227-237.
3. Cacioppo JT, Hawkley LC. Perceived social isolation and cognition. *Trends Cogn Sci*. 2009;13(10):447-454.
4. Pantell M, Rehkopf D, Jutte D, Syme SL, Balmes J, Adler N. Social isolation: a predictor of mortality comparable to traditional

## SO WHAT? Implications for Health Promotion Practitioners and Researchers

### What Is Already Known on This Topic?

Prior research suggests that total SM use is positively associated with increased PSI. However, not all SM use is the same, and until now the associations between positive experiences on SM and PSI versus the association between negative experiences on SM and PSI has not been systematically compared.

### What Does This Article Add?

This study demonstrates that—in a large population of young adults—positive experiences on SM were not significantly associated with reduced PSI. However, each 10% increase in negative experiences was associated with a 13% increase in odds of PSI.

### What Are the Implications for Health Promotion Practice or Research?

These results may be very important to consider when developing interventions. For example, in order to reduce PSI, it may be useful to specifically try to reduce an individual's negative experiences on SM. This might be more feasible and effective than trying to reduce overall SM exposure. In terms of research, it would be valuable to explore why negative experiences may be more potent than positive ones in the SM milieu with regard to PSI.



- clinical risk factors. *Am J Public Health*. 2013;103(11):2056-2062.
5. Valtorta NK, Kanaan M, Gilbody S, Ronzi S, Hanratty B. Loneliness and social isolation as risk factors for coronary heart disease and stroke: systematic review and meta-analysis of longitudinal observational studies. *Heart*. 2016;102(13):1009-1016.
  6. Perrin A. *Social Media Usage: 2005–2015*. Pew Research Center. 2015. <http://www.pewinternet.org/2015/10/08/social-networking-usage-2005-2015/#>. Accessed November 27, 2018.
  7. Greenwood S, Perrin A, Duggan M. *Social Media Update 2016*. Washington, DC; 2016. <http://www.pewinternet.org/2016/11/11/social-media-update-2016/>. Accessed January 8, 2019.
  8. Gottfried J, Shearer E. *News Use Across Social Media Platforms 2016*. Pew Research Center. 2016. <http://www.journalism.org/2016/05/26/news-use-across-social-media-platforms-2016/>. Accessed November 27, 2018.
  9. Ellison NB, Vitak J, Gray R, Lampe C. Cultivating social resources on social network sites: facebook relationship maintenance behaviors and their role in social capital processes. *J Comput Commun*. 2014;19(4):855-870.
  10. Ellison NB, Steinfield C, Lampe C. The benefits of Facebook “friends”: social capital and college students’ use of online social network sites. *J Comput Commun*. 2007;12(4):1143-1168.
  11. Ellison NB, Heino R, Gibbs J. Managing impressions online: self-presentation processes in the online dating environment. *J Comput Commun*. 2006;11(2):415-441.
  12. Steinfield C, Ellison NB, Lampe C. Social capital, self-esteem, and use of online social network sites: a longitudinal analysis. *J Appl Dev Psychol*. 2008;29(6):434-445.
  13. Ellison NB, Steinfield C, Lampe C. Connection strategies: social capital implications of Facebook-enabled communication practices. *New Media Soc*. 2011;13(6):873-892.
  14. Paxon P. Is social capital declining in the United States? a multiple indicator assessment. *Am J Sociol*. 1999;105(1):88-127.
  15. Granovetter MS. The strength of weak ties. *Am J Sociol*. 1973;78(6):1360-1380.
  16. Manago AM, Taylor T, Greenfield PM. Me and my 400 friends: the anatomy of college students’ Facebook networks, their communication patterns, and well-being. *Dev Psychol*. 2012;48(2):369-380.
  17. Kim J, Lee JR. The Facebook paths to happiness: effects of the number of Facebook friends and self-presentation on subjective well-being. *Cyberpsychol Behav Soc Netw*. 2011;14(6):359-364.
  18. Shensa A, Sidani JE, Lin L, Bowman N, Primack BA. Social media use and perceived emotional support among US young adults. *J Community Health*. 2016;41(3):541-549.
  19. Chou HTG, Edge N. “They are happier and having better lives than I am”: the impact of using Facebook on perceptions of others’ lives. *Cyberpsychol Behav Soc Netw*. 2012;15(2):117-121.
  20. Acar A. Antecedents and consequences of online social networking behavior: the case of Facebook. *J Website Promot*. 2008;3(1-2):62-83.
  21. Lup K, Trub L, Rosenthal L. Instagram #instasad?: exploring associations among Instagram use, depressive symptoms, negative social comparison, and strangers followed. *Cyberpsychology Behav Soc Netw*. 2015;18(5):247-252.
  22. Lou LL, Yan Z, Nickerson A, McMorris R. An examination of the reciprocal relationship of loneliness and Facebook use among first-year college students. *J Educ Comput Res*. 2012;46(1):105-117.
  23. Falci C, McNeely C. Too many friends: social integration, network cohesion and adolescent depressive symptoms. *Soc Forces*. 2009;87(4):2031-2061.
  24. Kross E, Verduyn P, Demiralp E, et al. Facebook use predicts declines in subjective well-being in young adults. *PLoS One*. 2013;8(8):e69841.
  25. Qualtrics. Qualtrics. 2015. <http://www.qualtrics.com>. Accessed November 27, 2018.
  26. HealthMeasures PROMIS. 2017. <http://www.healthmeasures.net/explore-measurement-systems/promis>. Accessed November 27, 2018.
  27. Cella D, Riley W, Stone A, et al. The Patient-Reported Outcomes Measurement Information System (PROMIS) developed and tested its first wave of adult self-reported health outcome item banks: 2005–2008. *J Clin Epidemiol*. 2010;63(11):1179-1194.
  28. Patient-Reported Outcomes Measurement Information System. *Social Isolation: A Brief Guide to the PROMIS Social Isolation Instruments*. Bethesda, MD; 2015. <https://www.assessmentcenter.net/documents/PROMIS%20Social%20Isolation%20Scoring%20Manual.pdf>. Accessed January 8, 2019.
  29. Stacciarini JM, Smith R, Garvan CW, Wiens B, Cottler LB. Rural Latinos’ mental wellbeing: a mixed-methods pilot study of family, environment and social isolation factors. *Community Ment Health J*. 2015;51(4):404-413.
  30. Johnston KL, Lawrence SM, Dodds NE, Yu L, Daley DC, Pilonis PA. Evaluating PROMIS<sup>®</sup> instruments and methods for patient-centered outcomes research: patient and provider voices in a substance use treatment setting. *Qual Life Res*. 2016;25(3):615-624.
  31. Primack BA, Shensa A, Sidani JE, et al. Social media use and perceived social isolation among young adults in the U.S. *Am J Prev Med*. 2017;53(1):1-8.
  32. Hill RA, Dunbar RIM. Social network size in humans. *Hum Nat*. 2003;14(1):53-72.
  33. West Virginia University. Main Campus Enrollment Trends: Fall 1995 through Fall. 2016. [https://planning.wvu.edu/files/d/7a7df2aa-cbd4-4c99-91f3-713d4328961d/wvu\\_enrollment\\_trends\\_fall-2016.pdf](https://planning.wvu.edu/files/d/7a7df2aa-cbd4-4c99-91f3-713d4328961d/wvu_enrollment_trends_fall-2016.pdf). Accessed January 8, 2019.
  34. Duggan M, Brenner J. *The Demographics of Social Media Users — 2012*. Washington, DC; 2013. <http://pewinternet.org/Reports/2013/Social-media-users.aspx>. Accessed January 8, 2019.
  35. Whiting A, Williams D. Why people use social media: a uses and gratifications approach. *Qual Mark Res An Int J*. 2013;16(4):362-369.
  36. Krackhardt D. The strength of strong ties: the importance of Philos in organizations. In: Nohria N, Eccles R, eds. *Networks and Organizations: Structure, Form, and Action*. Cambridge, MA: Harvard Business School Press; 1992.
  37. Rozin P, Royzman EB. Negativity bias, negativity dominance, and contagion. *Personal Soc Psychol Rev*. 2001;5(4):296-320.

38. Cover R. *Digital Identities: Creating and Communicating the Online Self*. London, England: Elsevier; 2015.
39. Caplan SE. Preference for online social interaction: a theory of problematic Internet use and psychosocial well-being. *Communic Res*. 2003;30(6):625-648.
40. Durak M, Senol-Durak E. Which personality traits are associated with cognitions related to problematic Internet use? *Asian J Soc Psychol*. 2014;17(3):206-218.
41. Ceyhan AA, Ceyhan E. Loneliness, depression, and computer self-efficacy as predictors of problematic internet use. *CyberPsychology Behav*. 2008;11(6):699-701.
42. Grubb HM. Marginalization of transgender identities: implications for health equity. *Psychiatr Ann*. 2016;46(6):334-339.
43. O’Keeffe GS, Clarke-Pearson K. The impact of social media on children, adolescents, and families. *Am Acad Pediatr*. 2011; 127(4):800-804.