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Associations between positive and negative social media experiences and sleep disturbance among young adults

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Abstract

Objectives: We sought to examine the association of positive and negative experiences using social media (SM) and sleep disturbance in a national survey of U.S. young adults.

Methods: Experiences using social media were assessed with 2 items asking participants about the percentage of time using SM that involved a negative/positive experience that they were personally involved in. Sleep disturbance was assessed using the validated PROMIS 4-item short form. Ordinal logistic regression was used to examine associations between positive and negative SM experiences and high sleep disturbance, while controlling for relevant covariates.

Results: Although reporting high levels of negative experiences was significantly associated with greater odds of high sleep disturbance (AOR = 1.49, 95% CI = 1.18–1.89), reporting high levels of positive experiences was not associated with sleep disturbance.

Conclusions: These findings suggest that more robust examinations of negative SM experiences—especially as they relate to sleep disturbance—may be warranted.

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Keywords

sleep disturbance; social media; negative experiences; positive experiences

INTRODUCTION

Disturbed sleep is associated with poor physical and mental health outcomes,¹ and social media (SM) use has received attention due to its association with disturbed sleep.² Studies examining the frequency and volume of SM use found that more SM use and more frequent visits to SM platforms are associated with poorer sleep.² Other studies found that both “active” SM use (i.e., liking, commenting, or interacting with other users) and “passive” SM use (i.e., the possibility that SM notifications and disruptions could affect sleep in the absence of action) are related to disturbed sleep.³ Because of the large amount of SM use among young adults,⁴ the persistent associations between SM use and disturbed sleep, and evidence that certain aspects of SM use are related to disturbed sleep, it is important to work to identify possible points of intervention.

With SM use increasing,⁴ more research is necessary to determine the degree to which users are having negative and positive experiences on SM and whether these experiences are associated with sleep disturbance. Research conducted with adolescents suggests that negative SM experiences, such as cybervictimization, may predict sleep disturbance over time, and that this might be mediated by rumination about the negative events.⁵ Additionally, 40% of adults report various types of negative experiences online, including name calling, purposeful embarrassment, and exposure to unwanted graphic or sexual images.⁶ However, it is unknown whether these experiences are associated with sleep disturbance.

Studies examining associations between positive experiences and sleep have mainly focused on offline experiences. One study of college students found that having greater social ties, including participating in social activities, was associated with better sleep quality.⁷ Additional studies of adults found that positive interactions with intimate partners predicted greater sleep efficiency,⁸ and that daily positive experiences at home were associated with better sleep quality.¹¹ To our knowledge, however, there have been no studies examining positive experiences online, particularly on SM, and associations with sleep disturbance.

In the context of SM, it has been hypothesized that the stimulating nature of SM could contribute to sleep disturbance, regardless of valence.³ If this hypothesis holds true, positive experiences offline *and* online could be linked to greater sleep disturbance. Previous research has found associations between negative experiences on SM and both depression¹² and social isolation,¹³ suggesting that the ways users interact with others on SM and subsequently interpret those reactions may be related to health outcomes. These same studies found that positive experiences on SM were not related to lower perceived social isolation and were only weakly associated with lower depression risk. Stated differently, though negative SM experiences were linked with poor emotional outcomes, positive SM experiences were not associated with positive mental health outcomes in these areas.

The association between SM experiences and sleep disturbance remains an understudied topic. The scant current literature on negative experiences online, including on SM, suggests an association with greater sleep disturbance. Although studies have suggested that offline positive experiences may be protective against disturbed sleep, this has not yet been examined for SM positive experiences. Considering this, and the evidence that negative and positive experiences on SM are differentially associated with other mental health outcomes, further research into this topic is warranted.

METHODS

Participants and Procedures

We commissioned Qualtrics Sample Services (Qualtrics) to recruit and survey a national sample of 2,408 U.S. young adults aged 18 to 30 in March 2018 as part of a larger study examining SM use and mental health. We implemented a recruitment protocol designed to obtain a sample that reflected the 2010 U.S. Census based on gender, age, race/ethnicity, household income, education level, and geographic region. Participants received an email inviting them to participate in an online survey. Participants who completed the survey received an incentive in the form chosen by the participant.¹⁴ These procedures were approved by the University of Pittsburgh Institutional Review Board and all participants gave informed consent.

Qualtrics implemented techniques to improve data quality. Prior to recruitment of the study sample, they pilot tested the survey with a sample of participants ($n = 30$) who were not included in the final sample. The research team reviewed this data for appropriate response variation, presence of extreme outliers, and correct functioning of skip patterns. Next, Qualtrics conducted, in conjunction with the research team, a data scrubbing procedure that eliminated responses from speeders (i.e., those who completed the survey in less than 1/3 of the median completion time), straightliners (i.e., those who answer the same response for all items), and duplicates (i.e., identical IP addresses). These procedures, which resulted in the removal of 94 responses, were conducted while recruiting the target sample. Finally, Qualtrics implemented a “soft launch” of the survey with 10% of the recruited sample ($n = 240$), to determine whether the survey was functioning as intended and that median completion time was sufficient. These participants were included in the final study sample of 2,408.

Measures

Social Media Experiences.—Participants were presented with an item that asked, “About what percentage of your time using social media involves some kind of negative social experience that you are personally involved in?” with a slider scale ranging from 0 to 100. Examples of negative social experiences, such as heated arguments or offensive content, were provided. A similar item asked, “About what percentage of your time using social media involves some kind of positive social experience that you are personally involved in?” with an accompanying slider scale. Again, examples of positive social experiences, such as pleasant discussions or sharing positive news, were provided. Responses to these items were converted to either high or low negative or positive

experiences to improve interpretability of results, with “high” corresponding to reporting 50% or more negative/positive experiences, and “low” corresponding to reporting less than 50% of negative/positive experiences.

Sleep Disturbance.—We utilized the PROMIS sleep disturbance 4-item Short Form, which assesses perceived sleep quality, depth, and restoration.¹⁵ Participants reported their sleep disturbance using a 5-point scale ranging from “very poor” to “very good.” Participants also rated the degree to which “my sleep was refreshing;” “I had a problem with my sleep;” and “I had difficulty falling asleep.” The 5-point response scale ranged from “not at all” to “very much.” This 4-item scale generated scores ranging from 4 to 20, with higher scores indicating greater sleep disturbance. While the PROMIS measures generate meaningful t-scores that can be compared to the general population, the distribution of scores was non-normal. For this reason, score tertiles were generated to create groups representing low, medium, and high sleep disturbance, as has been done in prior research.^{2,16}

Covariates.

Socio-demographic Factors.: Participants reported their age, sex, race/ethnicity, relationship status, living situation, household income, and education level.

Depression.: Because of its relationship to both negative experiences and sleep disturbance, depression was included as a covariate.¹⁷ Participants completed the 9-item Patient Health Questionnaire (PHQ-9), a brief self-administered questionnaire used to detect both the presence and severity of depression.¹⁸ Because the dependent variable in this study is sleep disturbance, the PHQ-9 item assessing sleep disturbance was omitted to create an 8-item score for analysis.

Social Media Use.: Participants reported how much time they spent per day on social media for personal, non-work related use. Participants responded to this item in hours and minutes, which was converted to hours for analysis.

Data Analysis

We included all participants with complete data on our primary variables of interest (sleep disturbance, positive and negative SM experiences). We used descriptive statistics to examine the distribution of variables and to describe our final sample in terms of socio-demographic composition as well as other related covariates. To assess overall associations between each SM experience, each covariate, and sleep disturbance, we used Chi-square tests for categorical variables and nonparametric equality-of-medians tests for continuous variables. We then used ordinal logistic regression to examine bivariable and multivariable associations between each SM experience, covariate, and high sleep disturbance (compared to the combination of moderate and low). All covariates were included in our multivariable model based on their prior associations with sleep disturbance as well as those presented in Table 1.^{2,19–22} In order to test the robustness of our results, we conducted sensitivity tests—replicating the regression models with SM experience variables in their original form. Additionally, we tested for interaction effects between SM experiences and each covariate.

We incorporated study-specific survey weights into the regression analyses to account for any under- or over-sampling on key demographic variables. Statistical significance was defined as $p < 0.05$ and all analyses were conducted using Stata statistical software version 15.1.

RESULTS

The final sample consisted of the 2,354 participants (98%) that had complete data on the dependent and independent variables after omitting 54 participants with incomplete data. The sample was approximately half female (50.9%), and 68.2% White, non-Hispanic. The median age was 27 years [IQR = 25–29] and the median hours per day spent on social media and median depression score among the sample were 2.5 hours [IQR = 1.3–4.0] and 4 hours [IQR = 1–8], respectively. Negative SM experiences, living situation, household income, education, SM hours per day, and depression were all significantly associated with sleep disturbance (p values ranging from < 0.001 to 0.04). Complete results are presented in Table 1.

In bivariable logistic regression analyses, reporting high negative SM experiences (compared to low), living alone, SM hours per day, and depression were all significantly associated with greater odds of high sleep disturbance; whereas having a higher household income and education were significantly associated with lower odds of high sleep disturbance (Table 2). In the multivariable logistic regression model controlling for all covariates, reporting high negative SM experiences was independently associated with greater odds of high sleep disturbance (AOR = 1.49, 95% CI = 1.18–1.89), whereas reporting high positive SM experiences was not significantly associated with sleep disturbance (AOR = 0.91, 95% CI = 0.77–1.08; Table 2). Age, SM hours per day, and depression were each also independently associated with greater odds of high sleep disturbance (AOR = 1.04, 95% CI = 1.01–1.07, AOR = 1.04, 95% CI = 1.00–1.08, and AOR = 1.20, 95% CI = 1.17–1.23, respectively); whereas having a graduate school education was independently associated with lower odds of high sleep disturbance (AOR = 0.73, 95% CI = 1.17–1.23). Additional results are presented in Table 2. Results from sensitivity tests operationalizing SM experience variables in their original continuous form were similar and consistent with these findings.

There were no significant interaction effects between SM experiences and socio-demographic or SM use covariates. However, the association between negative SM experiences and sleep disturbance did differ significantly across levels of depression ($p < 0.001$). The odds of high sleep disturbance increased for both high and low negative SM experiences as depression scores increased. However, the odds of high sleep disturbance were greater for high negative SM experiences (compared to low negative SM experiences) only at normal to mild levels of depression.

DISCUSSION

Reporting high levels of negative experiences on SM was associated with 49% greater odds of reporting high levels of disturbed sleep, compared to the combination of medium and low, even accounting for volume of SM use. Additionally, high levels of positive experiences

were not significantly associated with sleep disturbance. These findings are similar to other recent work suggesting that, compared to positive experiences, negative experiences have a more potent effect on health outcomes.^{12,13}

Because this is a cross-sectional study, conclusions about temporality or causation cannot be assessed. Other studies have hypothesized that users may ruminate about the troubling aspects of SM use (which could include negative experiences), and rumination is a well-studied predictor of sleep disturbance.²³ Similarly, negative experiences on SM may lead to emotional upset or other negative forms of physiologic arousal, which have been demonstrated to impact sleep health.²⁴ Conversely, more disturbed sleep may contribute to a more negative perception of SM, or engaging with others in a negative way on SM. Prior work has demonstrated that lower reported sleep quality corresponds to increased negative affect and increased reactivity to mild stressors.²⁵ Future studies could utilize a longitudinal approach to further assess temporality.

This study is unique in its examination of SM experiences and their link with sleep disturbance. The finding that high levels of negative experiences were significantly associated with sleep disturbance even when controlling for the amount of SM use adds to a growing body of literature identifying specific aspects of SM use and associations with sleep disturbance.²³ Thus, it is important to focus on these aspects as well as overall SM use, as they may be targetable points of intervention. Future research could explore the causal impact of SM experiences and explore the possibility that different types of experiences may differentially impact sleep. Should future studies demonstrate that negative SM experiences contribute causally to poor sleep, whether night-to-night or over time, intervention strategies could focus on increasing awareness of the impact of negative SM use experiences, as well as managing SM use to modulate the level of negative experiences. This may include modifying the way SM is used, or perhaps using cognitive strategies to regulate how SM use is experienced and internalized. Supporting prior research suggesting that positive experiences have a less robust relationship to positive outcomes, our findings suggest that negative experiences on SM are an important component of the relationship between SM use and sleep to investigate further in future work.

An interaction effect was found between negative SM experiences and depression for sleep disturbance, in that the odds of high sleep disturbance were greater for high negative SM experiences (compared to low negative SM experiences) only at normal to mild levels of depression. It is possible that, for individuals with normal to mild levels of depression, negative SM experiences are associated with sleep disturbance. This is potentially valuable information, as it suggests that negative SM experiences may be independently related to poor health outcomes, such as sleep disturbance, in individuals without depression. Conversely, it is also possible that, for individuals with more severe depression, negative SM experiences may not be independently associated with high sleep disturbance due to the comorbidity of depression and sleep disturbance. These findings should be explored further in longitudinal studies, such as conducting mediation analyses to examine direct and indirect effects of SM experiences and depression on sleep disturbance.

The results of this study should be considered with some limitations. Our measures of positive and negative experiences do not offer any self-report of the types of experiences reported by users (e.g., bullying, graphic or sexual images). To our knowledge, no measures exist to comprehensively capture positive or negative SM experiences, as many focus on only one type of experience (e.g., cyberbullying). Since SM experiences may impact sleep differentially by experience type, qualitative studies are needed to determine the most common types of negative experiences that SM users report, which may help inform the development of a formal scale to measure experiences on SM, including types of interactions and experiences of users. Additionally, because no established cut-points for SM experiences exist in the literature, we chose to categorize the items as low and high, which may lead to loss of information about the association or a false positive. However, sensitivity tests with these variables in their original form did not change the significance or directionality of findings. Finally, we used a self-reported measure of time spent on social media, consistent with previous research.^{2,26,27} Considering self-report measures are subject to inaccuracy, future research could examine the associations between SM experiences and sleep disturbance using direct measurement of SM use using techniques such as experience sampling methods or tracking software.^{28,29}

Conclusion

Having more negative experiences on SM was significantly associated with greater odds of reporting high sleep disturbance. Positive SM experiences were not significantly associated with sleep disturbance. Future work should focus on robust measurement of SM experiences and elucidating the direction of this relationship.

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Table 1.

Whole sample characteristics and bivariable associations with sleep disturbance (N = 2,354)

Independent variable/covariate	Whole sample % ^a	Sleep disturbance			<i>p</i> -value ^b
		Low 30.1%	Medium 28.1%	High 41.8%	
Negative SM experiences					< 0.001
Low	83.1	91.7	80.7	78.4	
High	17.0	8.4	19.3	21.6	
Positive SM experiences					0.83
Low	35.8	35.4	36.8	35.4	
High	64.2	64.6	63.3	64.6	
Sex					0.07
Male	49.1	49.8	52.3	46.5	
Female	50.9	50.2	47.7	53.5	
Race					0.39
White, non-Hispanic	68.2	68.2	70.2	66.9	
Other ^c	31.8	31.8	29.9	33.1	
Relationship status					0.24
Partnered	56.6	59.0	54.4	56.3	
Single	43.4	41.0	45.5	43.7	
Living situation					0.04
With others	81.7	84.7	80.0	80.8	
Alone	18.3	15.3	20.0	19.3	
Household income					< 0.001
Less than \$25,000	16.9	12.8	17.0	19.7	
\$25,000 to \$49,999	26.9	24.5	25.5	29.6	
\$50,000 to \$74,999	22.6	23.0	23.6	21.6	
\$75,000 and above	33.6	39.7	33.9	29.1	
Education					< 0.001
High school graduate or less	13.8	10.6	11.8	17.4	
Some college or technical school	31.1	28.0	27.9	35.6	
College graduate	33.3	34.8	37.8	29.3	
Graduate school	21.8	26.6	22.6	17.7	
Age, y, median [IQR]	27 (25–29)	27 (25–29)	28 (25–29)	27 (25–29)	0.70
SM hours per day, median [IQR]	2.3 (1.3–4.0)	2.0 (1.0–3.0)	2.3 (1.3–4.0)	3.0 (1.5–4.5)	< 0.001
Depression ^d , median [IQR]	4(1–8)	1 (0–3)	4(2–7)	6 (3–11)	< 0.001

^aColumn percentages may not equal 100 due to rounding.^bSignificance determined by Chi-square tests for categorical variables and the nonparametric equality-of-medians test for continuous variables.^cIncludes Black, non-Hispanic; Hispanic; Asian; American Indian/Native Alaskan; and Native Hawaiian/Pacific Islander.^dMeasured on a scale ranging from 0–24.

Table 2.

Bivariable and multivariable associations between social media experiences and high sleep disturbance.

Independent Variable/Covariate	Sleep Disturbance	
	OR (95%CI)	AOR ^a (95%CI)
Negative SM Experiences		
Low	Reference	Reference
High	2.01 (1.66–2.43)	1.49 (1.18–1.89)
Positive SM Experiences		
Low	Reference	Reference
High	1.01 (0.87–1.18)	0.91 (0.77–1.08)
Sex		
Male	Reference	Reference
Female	1.13 (0.97–1.31)	0.97 (0.82–1.14)
Race		
White, non-Hispanic	Reference	Reference
Other ^b	1.06 (0.90–1.25)	0.86 (0.71–1.03)
Relationship Status		
Partnered	Reference	Reference
Single	1.07 (0.92–1.25)	0.89 (0.74–1.08)
Living Situation		
With others	Reference	Reference
Alone	1.23 (1.02–1.48)	1.04 (0.83–1.31)
Household Income		
Less than \$25,000	Reference	Reference
\$25,000 to \$49,999	0.88 (0.69–1.11)	1.07 (0.83–1.38)
\$50,000 to \$74,999	0.70 (0.55–0.89)	0.96 (0.73–1.26)
\$75,000 and above	0.58 (0.47–0.73)	0.83 (0.63–1.08)
Education		
High school graduate or less	Reference	Reference
Some college or technical school	0.82 (0.63–1.06)	0.95 (0.72–1.26)
College graduate	0.58 (0.45–0.74)	0.78 (0.58–1.04)
Graduate school	0.49 (0.37–0.64)	0.73 (0.53–0.99)
Age ^c	1.00 (0.98–1.03)	1.04 (1.01–1.07)
SM Hours per Day ^c	1.10 (1.06–1.14)	1.04 (1.00–1.08)
Depression ^c	1.21 (1.19–1.24)	1.20 (1.17–1.23)

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

Abbreviations: OR = odds ratio; CI = confidence interval; AOR = adjusted odds ratio.

^aAdjusted for all variables listed in the table.^bIncludes Black, non-Hispanic, Hispanic, Asian, American Indian/Native Alaskan, and Native Hawaiian/Pacific Islander.

^c Associated odds ratios represent the odds per 1-unit increase in the variable.

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