Impact of problematic Facebook use, loneliness, and poor sleep quality on mental health

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A R T I C L E I N F O

A B S T R A C T

To examine the effects of problematic Facebook use, loneliness, and poor sleep quality on anxiety and depression in the Vietnamese, 354 Facebook users at a university in central Vietnam in a cross-sectional study design was used. Participants completed Depression Anxiety Stress Scales, Bergen Facebook Addiction Scale, UCLA loneliness scale version 3, and the Pittsburgh Sleep Quality Index. Linear regression analysis found that problematic Facebook use, loneliness, and poor sleep quality respectively explained 31.3% and 45.6% of the variance in anxiety and depression. Problematic Facebook use, loneliness, and poor sleep quality were associated with anxiety and depression. Interventions should focus on reducing loneliness, improving sleep quality, and treating problematic Facebook use.

1. Introduction

Problematic Facebook use, loneliness, and poor sleep quality have detrimental effects on an individual's physical and mental health. Previous studies have revealed that there is a close link between loneliness and mental health (Lee et al., 2020; Horigian et al., 2020), Facebook use or problematic Facebook use and mental health (Hanprathet et al., 2015; Frost and Rickwood, 2017), poor sleep quality and mental health (Milojevich and Lukowski, 2016). However, in Vietnam, there have not been any relevant studies on the effects of problematic Facebook use, loneliness, and sleep quality on mental health with the sample as Vietnamese people. The aim of the present study is to explore the influence of problematic Facebook use, loneliness, and poor sleep quality on anxiety and depression in Vietnamese people.

1.1. Problematic Facebook use and mental health

Previous studies have indicated that the abuse of social media has negative impacts on the health, family, school, wellbeing, and social relationships of individuals (Duradoni et al., 2020). People who abuse social media have reported low work or academic performance, isolation, behavioral disturbances, sedentary lifestyle, obesity, disregard for daily activities and leisure (Barnes et al., 2019). What is more, some studies have revealed that problematic social networking sites use was correlated with stress, anxiety, depression, and personality disorder (Hussain and Griffiths, 2018; Kircaburun et al., 2020; Lozano Blasco et al., 2020).

Facebook was established in 2004 with the aim of connecting people around the world. By far, Facebook is currently the most popular, easily accessible social networking site with updated features that help communicate with friends, share photos and videos, meet others based on common interests, play games, date, and blog (Sayeed et al., 2020). Problematic Facebook use has been defined as a lack of control over website usage, which has significant negative effects on relationships, sleep, school, or work performance (Cheng et al., 2019). Most studies have revealed that problematic Facebook use can negatively impact users' mental health and has been linked to anxiety (Hanprathet et al., 2015; Hussain and Griffiths, 2018; Brailovskaia et al., 2019), depression (Al Mamun and Griffiths, 2019; Hanprathet et al., 2015; Foroughi et al., 2019; Sayeed et al., 2020). There is evidence that individuals who spend a lot of time on Facebook are more likely to experience social comparison, which in turn leads to anxiety (Verduyn et al., 2017; Faelens et al., 2019; Foroughi et al., 2019). According to researchers,

individuals who are addicted to Facebook tend to experience feelings of jealousy (Foroughi et al., 2019), or feelings of loneliness (Ryan et al., 2016; Saleem et al., 2016). At the same time, Facebook addicts often report low self-esteem and low optimism (Błachnio and Przepiorka, 2016; Malik and Khan, 2015). All of these increase their risk of depression.

1.2. Loneliness and mental health

Loneliness refers to the cognitive discrepancy between desired and experienced social relationships (Moeller and Seehuus, 2019). Loneliness is associated with poor health outcomes (Zawadzki et al., 2013). People who experience loneliness tend to experience anxiety and depression (Cacioppo et al., 2015). Many studies have explored the mechanism of the relationship between loneliness and depression. Accordingly, loneliness may lead to depression via rumination (Zawadzki et al., 2013) and social self-efficacy (Wei et al., 2005). Others have argued that loneliness contributes to increased anxiety experiences over time (Lim et al., 2016; Heinrich and Gullone, 2006).

1.3. Sleep quality and mental health outcomes

Previously, longitudinal studies and cross-sectional studies have demonstrated a strong link between sleep and mental health outcomes (Baglioni et al., 2016; Chan et al., 2017; Lovato and Gradisar, 2014; Scott et al., 2017). Previous studies indicated that anxiety disorders, the most common type of mental disorder, are associated with sleep-wake disorders (Staner, 2003; Mellman, 2008). Taylor et al. (2005) have indicated that people with insomnia are 17.35 times more likely to develop anxiety than people without insomnia. Present or past anxiety disorders were the most common mental disorder related to insomnia (Ohayon and Roth, 2003). Recent studies have also reported that poor sleep quality increases anxiety symptoms (Richardson et al., 2019; Oh et al., 2019; Teker and Luleci, 2018). For depression, Baglioni et al. (2011) indicated that people with insomnia are twice as likely to develop depression as those who do not have trouble sleeping. In addition, poor sleep quality contributes to the development of depression (Supartini et al., 2016; O'Leary et al., 2017; Li et al., 2018; Liu et al., 2019; Richardson et al., 2019). According to Zhang et al. (2018), individuals with poor sleep quality are at risk of experiencing depression due to the development of stress symptoms.

1.4. Aim of the study

The purpose of this paper was to investigate the association between problematic Facebook use, loneliness, and poor sleep quality with anxiety and depression amongst Vietnamese people. We hypothesize that anxiety has positive correlations with problematic Facebook use, loneliness, and poor sleep quality (H1). We also hypothesize that depression is positively associated with problematic Facebook use, loneliness, and poor sleep quality (H2).

2. Methods

2.1. Study design

Data for this study were obtained from a cross-sectional study conducted in Vietnam. The data were collected in 2020 through an online survey. Slovin's formula was used to calculate the sample size (population size N=3107, and a margin of error e=0.05). The participants were students and staff of a university in central Vietnam. After getting approval from university leaders, researchers met directly with the participants and asked for their help. A total of 361 individuals were invited to participate in the study; however, only 354 questionnaires were recovered (accounting for 98.06%). All participants signed the consent form. Each participant who completed the questionnaire received 50,000 VND.

2.2. Participant characteristics

Statistical analysis was performed to determine the characteristics of the participants. 54.5% of the sample were university students, 54.2% of participants were female and 63.6% of them have rural household registration. In this sample, 65.5% of participants reported poor sleep quality, 33.6% of participants were at risk of problematic Facebook use. The total prevalence of stress, anxiety, and depression were 45.2%, 58.8%, and 46.0%, respectively.

2.3. Measures

In this study we used Vietnamese versions of the Depression Anxiety Stress Scales (short-form version), Bergen Facebook Addiction Scale (BFAS), UCLA loneliness scale version 3, and the Pittsburgh Sleep Quality Index (PSQI).

The short-form version of the Depression Anxiety Stress Scales (DASS–21) was applied to measure symptoms of stress, anxiety, and depression. DASS 21 (Lovibond and Lovibond, 1995) is a popular measurement tool for assessing symptoms of stress, anxiety, and depression with three respective subscales. For each subscale, seven items are considered and the final score is calculated by the sum of the scores of the items related to it, then multiplied by 2. Each item was scored using a 4-point scale, ranging from 0 (never) to 3 (almost always). The total score for each subscale ranges from 0 to 42 with a higher score indicating a higher degree of disorders. Sample items include "I felt that I had nothing to look forward to" (for the depression subscale), "I found it hard to wind down" (for the

stress subscale), and "I was aware of dryness of my mouth" (for the anxiety subscale). In Vietnam, the DASS 21 scale has good reliability (Tran et al., 2013; Le et al., 2017) and in the current study, internal reliability is 0.86, 0.78, and 0.88 for stress, anxiety, and depression subscales, respectively.

The Pittsburgh Sleep Quality Index (PSQI) (Buysse et al., 1989) was used to evaluate the sleep quality of participants. PSQI provides information on sleep quality through a 7-component evaluation (habitual sleep efficiency, subjective sleep quality, sleep duration, sleep latency, sleep disturbances, daytime dysfunction, and use of sleeping medication) in which each component was rated on a 4-point scale from 0 to 3. A total score ranges from 0 to 21 with a total score of 5 or higher indicates poor sleep quality. In Vietnam, the PSQI has good reliability (To and Nguyen, 2015) and in the current study, its internal reliability is 0.71.

Bergen Facebook Addiction Scale (BFAS) (Andreassen et al., 2012) was used to evaluate participants' problematic Facebook use levels. This measure contains six items, scored on a 5-point scale from 1 (very rarely) to 5 (very often). An example item includes "You feel an urge to use Facebook more and more." Item responses were summed, with higher scores indicating higher problematic Facebook use levels. According to Andreassen et al. (2012), a score of 3 or more in response to four of the six items is an indicator of problematic use. In this study, the BFAS has good internal reliability (α=0.81).

The UCLA loneliness scale (v.3) (Russell, 1996) was applied to evaluate participants' loneliness levels. This scale has twenty items which are scored using a four-point scale ranging from never (1) to often (4). An example item includes "How often do you feel that you lack companionship?" The total score ranges from a low of 0 to a high of 80. In Vietnam, Tran and Cao (2018) reported that UCLA has good reliability (α=0.85). The sample had a Cronbach's alpha of 0.87.

2.4. Statistical analyses

In this study, we used SPSS v.20 for data analysis. Cronbach's alpha was used to calculate the reliability of the scales. Descriptive statistics were used to summarize the data for stress, anxiety, depression, loneliness, sleep quality, and problematic Facebook use. Pearson's correlation analysis was performed to examine the relationships between variables. To test the hypotheses, multiple linear regressions were performed to determine the independent effects of diagnoses on anxiety and depression. In the regression model, anxiety and depression were used as dependent variables in two independent models; while loneliness, problematic Facebook use, and poor sleep quality were used as independent variables. All multiple models were controlled for gender and age.

3. Results

Table 1 presents the descriptive characteristics of the variables, and Table 2 presents the bivariate correlations among the variables (Tables 1 and 2).

3.1. Problematic Facebook use, loneliness, and sleep quality on anxiety

Problematic Facebook use, loneliness, and sleep quality explained 31.3% of the variance in anxiety (F[3, 350]=53.258, p<0.001). The results reported positive correlations between problematic Facebook use and anxiety amongst Vietnamese people. Similarly, loneliness has positive correlations with anxiety, and sleep quality is positively associated with anxiety. As problematic Facebook use scores or loneliness scores or sleep quality scores increased, anxiety scores also increased. Hypothesis 1 was therefore supported (Table 3).

3.2. Problematic Facebook use, loneliness, and sleep quality on depression

Problematic Facebook use, loneliness, and sleep quality explained 45.6% of the variance in depression (F[3, 350]=97.899, p<0.001). It is suggested from the results that problematic Facebook use has positive correlations with depression. A significant association between loneliness depressions was found and sleep quality is also positively correlated with depression. The increases in problematic Facebook use scores or loneliness scores or sleep quality scores give rise to depression scores amongst Vietnamese respondents. Hypothesis 2 was therefore supported (Table 4).

Table 1: Descriptive statistics for the studied variables

Variables	Range	Mean ± SD
Problematic Facebook use	1- 30	14.42 ± 4.577
Loneliness	1 - 80	43.92 ± 9.661
Sleep quality	0 -21	7.34 ± 3.568
Stress	0 - 42	14.85 ± 9.093
Anxiety	0 – 42	10.03 ± 7.985
Depression	0 - 42	9.97 ± 8.972

Table 2: Pearson correlations of the variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) Problematic Facebook use	1	0.239**	0.290**	0.321**	0.333**	0.318**
(2) Sleep quality		1	0.420**	0.519**	0.422**	0.608**
(3) Loneliness			1	0.488**	0.471**	0.497**
(4) Stress				1	0.762**	0.767**
(5) Anxiety					1	0.724**
(6) Depression						1

**: p <0.01

Table 3: Multiple linear regression models for anxiety

Variables	B	SE B	Beta	95% CI
Problematic Facebook use	0.320***	0.081	0.183	[0.159, 0.480]
Sleep quality	0.704***	0.112	0.315	[0.484, 0.924]
Loneliness	0.204***	0.041	0.247	[0.124, 0.284]
R^2 (ΔR^2)	0.313 (0.308)			
F for R^2	53.258 (3,350) ***			

***: $p < 0.001$; Δ: Adjusted; CI=Confidence interval

Table 4: Multiple linear regression models for depression

Variables	B	SE B	Beta	95% CI
Problematic Facebook use	0.256**	0.081	0.130	[0.095, 0.416]
Sleep quality	0.663***	0.112	0.264	[0.443, 0.883]
Loneliness	0.433***	0.041	0.466	[0.353, 0.513]
R^2 (ΔR^2)	0.456 (0.452)			
F for R^2	97.899 (3,350) ***			

***: $p < 0.001$; Δ: Adjusted; CI=Confidence interval

4. Discussion

For the sample of Facebook users in Vietnam, problematic Facebook use, loneliness, and poor sleep quality were positively associated with anxiety as in hypothesis 1. Similarly, problematic Facebook use, loneliness, and poor sleep quality were positively related to depression as in hypothesis 2.

In line with previous research (Hanprathet et al., 2015; Hussain and Griffiths, 2018; Brailovskaia et al., 2019), this result shows that individuals reporting problematic Facebook use are at risk of experiencing symptoms of anxiety. According to some studies, problematic social media use may be related to anxiety via decreased satisfaction in relationships (Griffiths et al., 2014; Bettmann et al., 2020), increased social comparisons (Verduyn et al., 2017; Faelens et al., 2019; Foroughi et al., 2019), increased stress symptoms (Hussain and Griffiths, 2018; Brailovskaia et al., 2019), poor sleep quality. As expected, this study has found that problematic Facebook use was significantly positively correlated with stress and poor sleep quality Hence, Facebook users reporting problematic use are more at risk of developing symptoms of anxiety.

In this study, as loneliness levels increase, anxiety levels also show an upward trend. This finding is consistent with previous findings (Moeller and Seehuus, 2019; Cacioppo et al., 2015), which reported that individuals with a higher level of loneliness have a higher level of anxiety. According to Lim et al. (2016), loneliness has contributed to increased anxiety experiences over time (Lim et al., 2016).

Consistent with previous findings (Richardson et al., 2019; Oh et al., 2019; Teker and Luleci, 2018), this study reveals that poor sleep quality is associated with anxiety symptoms. This may be because individuals with poor sleep quality tend to experience stress symptoms (Zhang et al., 2018), while stressed individuals tend to develop anxiety symptoms (Valikhani and Goodarzi, 2017; Valikhani et al., 2020). Therefore, individuals with poor sleep quality are more likely to experience anxiety through high levels of stress.

This study also concludes that problematic Facebook use was positively correlated with the development of depressive symptoms. This finding supports previous results (Al Mamun and Griffiths, 2019; Hanprathet et al., 2015; Foroughi et al., 2019; Sayeed et al., 2020). Prior studies reported that problematic Facebook use leads to problems in relationships and increased feelings of loneliness (Ryan et al., 2016; Saleem et al., 2016). In addition, problematic social media use may be related to depression via poor sleep quality. In line with previous findings (Lou et al., 2012; Saleem et al., 2016; Ryan et al., 2016), our research has found that problematic Facebook use is positively correlated with loneliness and poor sleep quality (Table 2). Therefore, in this study, Facebook users reporting problematic use are at risk of experiencing loneliness and poor sleep quality, and thereby increases the individual's likelihood of suffering from depression.

In this study, as loneliness levels increased, depression also increased. This finding is consistent with previous findings (Moeller and Seehuus, 2019; Cacioppo et al., 2015), who reported that individuals with higher levels of loneliness have higher levels of depression. Although it is not possible to determine causal relationships between these variables, these relationships can be understood in a number of ways. One reasonable interpretation of the relationship between loneliness and depression is that loneliness can lead to rumination, which in turn can lead to symptoms of depression (Zawadzki et al., 2013).

Facebook users with poor sleep quality tend to experience depression. This conclusion has been found in previous studies of Supartini et al. (2016), O'Leary et al. (2017), Li et al. (2018), Liu et al. (2019), and Richardson et al. (2019). In this study, the relationship between poor sleep quality and depression may be related to stress. Correlation analysis showed that poor sleep quality was positively correlated with stress (Table 2). Therefore, having consensus with Zhang et al. (2018), we believe that people with poor sleep quality can lead to depression through an increase in stress symptoms.

The findings of this study have important theoretical and practical implications. Theoretically, the study has highlighted the effects of loneliness, poor sleep quality, and problematic Facebook use on anxiety and depression among Vietnamese people. In practical terms, the findings of this study have important implications for mental health services

and health professionals. Mental health services develop programs to prevent anxiety and depression by reducing loneliness, improving sleep quality, and treating problematic Facebook use.

This study used a cross-sectional study design. Therefore, we cannot determine the causal relationship between the independent variables and the dependent variables. At the same time, we cannot determine the long-term effects of problematic Facebook use, loneliness, and poor sleep quality on anxiety and depression. A longitudinal study design is needed to clarify the long-term effects of problematic Facebook use, loneliness, and poor sleep quality on anxiety and depression among Vietnamese people. Moreover, additional investigation is needed to identify the mechanism underlying the associations between problematic Facebook use and mental health outcomes, loneliness, and mental health outcomes, and sleep quality and mental health outcomes among Vietnamese people. This study used convenient sampling and a self-reporting method. Therefore, the findings of this study are dependent on the self-reporting of participants. Caution should be exercised when generalizing the findings of this study to other age groups or regions.

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Compliance with ethical standards

Conflict of interest

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

References

Al Mamun MA and Griffiths MD (2019). The association between Facebook addiction and depression: A pilot survey study among Bangladeshi students. Psychiatry Research, 271: 628-633. https://doi.org/10.1016/j.psychres.2018.12.039

Andreassen CS, Torsheim T, Brunborg GS, and Pallesen S (2012). Development of a Facebook addiction scale. Psychological Reports, 110(2): 501–517. https://doi.org/10.2466/02.09.18.PR0.110.2.501-517

Baglioni C, Battagliese G, Feige B, Spiegelhalder K, Nissen C, Voderholzer U, and Riemann D (2011). Insomnia as a predictor of depression: A meta-analytic evaluation of longitudinal epidemiological studies. Journal of Affective Disorders, 135(1-3): 10-19. https://doi.org/10.1016/j.jad.2011.01.011

Baglioni C, Nanovska S, Regen W, Spiegelhalder K, Feige B, Nissen C, and Riemann D (2016). Sleep and mental disorders: A meta-analysis of polysomnographic research. Psychological Bulletin, 142(9): 969-990. https://doi.org/10.1037/bul0000053

Barnes SJ, Pressey AD, and Scornavacca E (2019). Mobile ubiquity: Understanding the relationship between cognitive absorption, smartphone addiction and social network services. Computers in Human Behavior, 90: 246-258. https://doi.org/10.1016/j.chb.2018.09.013

Bettmann JE, Anstadt G, Casselman B, and Ganesh K (2020). Young adult depression and anxiety linked to social media use: Assessment and treatment. Clinical Social Work Journal. https://doi.org/10.1007/s10615-020-00752-1

Błachnio A and Przepiorka A (2016). Personality and positive orientation in Internet and Facebook addiction: An empirical report from Poland. Computers in Human Behavior, 59: 230-236. https://doi.org/10.1016/j.chb.2016.02.018

Brailovskaia J, Margraf J, and Köllner V (2019). Addicted to Facebook? Relationship between Facebook addiction disorder, duration of Facebook use and narcissism in an inpatient sample. Psychiatry Research, 273: 52-57. https://doi.org/10.1016/j.psychres.2019.01.016

Buysse DJ, Reynolds CF, Monk TH, Berman SR, and Kupfer DJ (1989). The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. Psychiatry Research, 28(2): 193–213. https://doi.org/10.1016/0165-1781(89)90047-4

Cacioppo S, Grippo AJ, London S, Goossens L, and Cacioppo JT (2015). Loneliness. Perspectives on Psychological Science, 10(2): 238–249. https://doi.org/10.1177/1745691615570616

Chan MS, Chung KF, Yung KP, and Yeung WF (2017). Sleep in schizophrenia: A systematic review and meta-analysis of polysomnographic findings in case-control studies. Sleep Medicine Reviews, 32: 69-84. https://doi.org/10.1016/j.smrv.2016.03.001

Cheng J, Burke M, and Davis EG (2019). Understanding perceptions of problematic Facebook use: When people experience negative life impact and a lack of control. In the 2019 CHI Conference on Human Factors in Computing Systems, Association for Computing Machinery, Glasgow, UK: 1-13. https://doi.org/10.1145/3290605.3300429

Duradoni M, Innocenti F, and Guazzini A (2020). Well-being and social media: A systematic review of Bergen addiction scales. Future Internet, 12(2): 24. https://doi.org/10.3390/fi12020024

Faelens L, Hoorelbeke K, Fried E, De Raedt R, and Koster EH (2019). Negative influences of Facebook use through the lens of network analysis. Computers in Human Behavior, 96: 13-22. https://doi.org/10.1016/j.chb.2019.02.002

Foroughi B, Iranmanesh M, Nikbin D, and Hyun SS (2019). Are depression and social anxiety the missing link between Facebook addiction and life satisfaction? The interactive effect of needs and self-regulation. Telematics and Informatics, 43: 101247. https://doi.org/10.1016/j.tele.2019.101247

Frost RL and Rickwood DJ (2017). A systematic review of the mental health outcomes associated with Facebook use. Computers in Human Behavior, 76: 576–600. https://doi.org/10.1016/j.chb.2017.08.001

Griffiths MD, Kuss DJ, and Demetrovics Z (2014). Social networking addiction: An overview of preliminary findings. In: Rosenberg KP (Ed.), Behavioral addictions criteria, evidence, and treatment: 119-141. Academic Press, Cambridge, USA. https://doi.org/10.1016/B978-0-12-407724-9.00006-9

Hanprathet N, Manwong M, Khumsri J, Yingyeun R, and Phanasathit M (2015). Facebook addiction and its relationship with mental health among Thai high school students. Journal of the Medical Association of Thailand, 98(3): s81–s90.

Heinrich LM and Gullone E (2006). The clinical significance of loneliness: A literature review. Clinical Psychology Review, 26(6): 695-718. https://doi.org/10.1016/j.cpr.2006.04.002

Horigian VE, Schmidt RD, and Feaster DJ (2020). Loneliness, mental health, and substance use among US young adults during COVID-19. Journal of Psychoactive Drugs, 53(1): 1-9. https://doi.org/10.1080/02791072.2020.1836435

Hussain Z and Griffiths MD (2018). Problematic social networking site use and comorbid psychiatric disorders: A systematic review of recent large-scale studies. Frontiers in Psychiatry, 9: 686. https://doi.org/10.3389/fpsyt.2018.00686

Kircaburun K, Alhabash S, Tosuntaş ŞB, and Griffiths MD (2020). Uses and gratifications of problematic social media use among university students: A simultaneous examination of the Big Five of personality traits, social media platforms, and social media use motives. International Journal of Mental Health and Addiction, 18(3): 525-547. https://doi.org/10.1007/s11469-018-9940-6

Le MTH, Tran TD, Holton S, Nguyen HT, Wolfe R, and Fisher J (2017). Reliability, convergent validity and factor structure of the DASS-21 in a sample of Vietnamese adolescents. PLOS ONE, 12(7): e0180557. https://doi.org/10.1371/journal.pone.0180557

Lee CM, Cadigan JM, and Rhew IC (2020). Increases in loneliness among young adults during the COVID-19 pandemic and association with increases in mental health problems. Journal of Adolescent Health, 67(5): 714-717. https://doi.org/10.1016/j.jadohealth.2020.08.009

Li YI, Starr LR, and Wray-Lake L (2018). Insomnia mediates the longitudinal relationship between anxiety and depressive symptoms in a nationally representative sample of adolescents. Depression and Anxiety, 35(6): 583-591. https://doi.org/10.1002/da.22764

Lim MH, Rodebaugh TL, Zyphur MJ, and Gleeson JF (2016). Loneliness over time: The crucial role of social anxiety. Journal of Abnormal Psychology, 125(5): 620-630. https://doi.org/10.1037/abn0000162

Liu RQ, Bloom MS, Wu QZ, He ZZ, Qian Z, Stamatakis KA, and Dong GH (2019). Association between depressive symptoms and poor sleep quality among Han and Manchu ethnicities in a large, rural, Chinese population. PLOS ONE, 14(12): e0226562. https://doi.org/10.1371/journal.pone.0226562

Lou LL, Yan Z, Nickerson A, and McMorris R (2012). An examination of the reciprocal relationship of loneliness and Facebook use among first-year college students. Journal of Educational Computing Research, 46(1): 105–117. https://doi.org/10.2190/EC.46.1.e

Lovato N and Gradisar M (2014). A meta-analysis and model of the relationship between sleep and depression in adolescents: Recommendations for future research and clinical practice. Sleep Medicine Reviews, 18(6): 521-529. https://doi.org/10.1016/j.smrv.2014.03.006

Lovibond PF and Lovibond SH (1995). The structure of negative emotional states: Comparison of the depression anxiety stress scales (DASS) with the beck depression and anxiety inventories. Behaviour Research and Therapy, 33(3): 335–343. https://doi.org/10.1016/0005-7967(94)00075-U

Lozano Blasco R, Latorre Cosculluela C, and Quílez Robres A (2020). Social network addiction and its impact on anxiety level among university students. Sustainability, 12(13): 5397. https://doi.org/10.3390/su12135397

Malik S and Khan M (2015). Impact of Facebook addiction on narcissistic behavior and self-esteem among students. Journal of Pakistan Medical Association, 65(3): 260-263.

Mellman TA (2008). Sleep and anxiety disorders. Sleep Medicine Clinics, 3(2): 261–268. https://doi.org/10.1016/j.jsmc.2008.01.010

Milojevich HM and Lukowski AF (2016). Sleep and mental health in undergraduate students with generally healthy sleep habits. PLOS ONE, 11(6): e0156372. https://doi.org/10.1371/journal.pone.0156372

Moeller RW and Seehuus M (2019). Loneliness as a mediator for college students' social skills and experiences of depression and anxiety. Journal of Adolescence, 73: 1-13. https://doi.org/10.1016/j.adolescence.2019.03.006

O'Leary K, Bylsma LM, and Rottenberg J (2017). Why might poor sleep quality lead to depression? A role for emotion regulation. Cognition and Emotion, 31(8): 1698-1706. https://doi.org/10.1080/02699931.2016.1247035

Oh CM, Kim HY, Na HK, Cho KH, and Chu MK (2019). The effect of anxiety and depression on sleep quality of individuals with high risk for insomnia: A population-based study. Frontiers in Neurology, 10: 849. https://doi.org/10.3389/fneur.2019.00849

Ohayon MM and Roth T (2003). Place of chronic insomnia in the course of depressive and anxiety disorders. Journal of Psychiatric Research, 37(1): 9–15. https://doi.org/10.1016/S0022-3956(02)00052-3

Richardson C, Oar E, Fardouly J, Magson N, Johnco C, Forbes M, and Rapee R (2019). The moderating role of sleep in the relationship between social isolation and internalizing problems in early adolescence. Child Psychiatry and Human Development, 50(6): 1011–1020. https://doi.org/10.1007/s10578-019-00901-9

Russell DW (1996). UCLA loneliness scale (Version 3): Reliability, validity, and factor structure. Journal of Personality Assessment, 66(1): 20-40. https://doi.org/10.1207/s15327752jpa6601_2

Ryan T, Chester A, Reece J, Xenos S, Chester A, Reece J, and Xenos S (2016). A qualitative exploration of Facebook addiction: Working toward construct validity. Addicta: The Turkish Journal on Addictions, 3(1): 55-76. https://doi.org/10.15805/addicta.2016.3.0004

Saleem M, Irshad R, Zafar M, and Tahir MA (2016). Facebook addiction causing loneliness among higher learning students of Pakistan: A linear relationship. Journal of Applied and Emerging Sciences, 5(1): 26-31.

Sayeed A, Hassan MN, Rahman MH, El Hayek S, Al Banna MH, Mallick T, and Kundu S (2020). Facebook addiction associated with internet activity, depression and behavioral factors among university students of Bangladesh: A cross-sectional study. Children and Youth Services Review, 118: 105424. https://doi.org/10.1016/j.childyouth.2020.105424

Scott AJ, Webb TL, and Rowse G (2017). Does improving sleep lead to better mental health? A protocol for a meta-analytic review of randomized controlled trials. BMJ Open, 7(9): e016873. https://doi.org/10.1136/bmjopen-2017-016873

Staner L (2003). Sleep and anxiety disorders. Dialogues in Clinical Neuroscience, 5(3): 249–258. https://doi.org/10.31887/DCNS.2003.5.3/lstaner

Supartini A, Honda T, Basri NA, Haeuchi Y, Chen S, Ichimiya A, and Kumagai S (2016). The impact of sleep timing, sleep duration, and sleep quality on depressive symptoms and suicidal ideation amongst Japanese freshmen: The EQUSITE study. Sleep Disorders, 2016: 8737654. https://doi.org/10.1155/2016/8737654

Taylor DJ, Lichstein KL, Durrence HH, Reidel BW, and Bush AJ (2005). Epidemiology of insomnia, depression, and anxiety. Sleep, 28(11): 1457–1464. https://doi.org/10.1093/sleep/28.11.1457

Teker AG and Luleci NE (2018). Sleep quality and anxiety level in employees. Northern Clinics of Istanbul, 5(1): 31–36. https://doi.org/10.14744/nci.2017.58855

To N and Nguyen N (2015). Validity of the Vietnamese version of the Pittsburgh sleep quality index. Sleep Medicine, (16): S52. https://doi.org/10.1016%2Fj.sleep.2015.02.128

Tran TD, Tran T, and Fisher J (2013). Validation of the depression anxiety stress scales (DASS) 21 as a screening instrument for depression and anxiety in a rural community-based cohort of northern Vietnamese women. BMC Psychiatry, 13(1): 1-7. https://doi.org/10.1186/1471-244X-13-24

Tran TMD and Cao QT (2018). Cảm nhận cô đơn của sinh viên và mối liên hệ giữa cảm nhận cô đơn với tự đánh giá bản thân, tiêu điểm kiểm soát bên ngoài [Students' feelings of loneliness and

the relationship between feeling lonely and self-esteem, focus of external control]. Tạp Chí Tâm Lý Học, 233(8): 16–30.

Valikhani A and Goodarzi MA (2017). Contingencies of self-worth and psychological distress in Iranian patients seeking cosmetic surgery: Integrative self-knowledge as mediator. Aesthetic Plastic Surgery, 41(4): 955–963. https://doi.org/10.1007/s00266-017-0853-8

Valikhani A, Kankat LR, Hariri P, Salehi S, and Moustafa AA (2020). Examining the mediating role of stress in the relationship between mindfulness and depression and anxiety: Testing the mindfulness stress-buffering model. Journal of Rational-Emotive and Cognitive-Behavior Therapy, 38(1): 14–25. https://doi.org/10.1007/s10942-019-00321-7

Verduyn P, Ybarra O, Résibois M, Jonides J, and Kross E (2017). Do social network sites enhance or undermine subjective well-being? A critical review. Social Issues and Policy Review, 11(1): 274–302. https://doi.org/10.1111/sipr.12033

Wei M, Russell DW, and Zakalik RA (2005). Adult attachment, social self-efficacy, self-disclosure, loneliness, and subsequent depression for freshman college students: A longitudinal study. Journal of Counseling Psychology, 52(4): 602-614. https://doi.org/10.1037/0022-0167.52.4.602

Zawadzki MJ, Graham JE, and Gerin W (2013). Rumination and anxiety mediate the effect of loneliness on depressed mood and sleep quality in college students. Health Psychology, 32(2): 212-222. https://doi.org/10.1037/a0029007

Zhang Y, Peters A, and Chen G (2018). Perceived stress mediates the associations between sleep quality and symptoms of anxiety and depression among college nursing students. International Journal of Nursing Education Scholarship, 15(1): 1-9. https://doi.org/10.1515/ijnes-2017-0020