Nomophobia and Stress among Vietnamese High School Students in Covid-19 Pandemic: A Mediation Model of Loneliness

Be Thi Ngoc Nguyen*, Tu Thi Nguyen, Uyen Thi Thanh Le

Abstract

Nomophobia is rising among high school students, especially in light of the Covid-19 pandemic, such as social distancing, long-term online learning, and lack of social support. Many studies have also shown that students with high levels of nomophobia have a higher risk of stress. However, very few researchers are interested in studying loneliness as a mediation factor for the relationship between nomophobia and stress. This study investigated whether the loneliness factor is a mediator in the relationship between nomophobia and stress in Vietnamese high school students. Participants include 556 Vietnamese high school students. Participants completed the Nomophobia Scale, Depression Anxiety Stress Scales 21, The UCLA loneliness scale version 3. In this research, to test variable relationships, the mediation analyzing method by the PROCESS macro 3.5 will be applied. The research concludes that for Vietnam high school students, the mediating role of loneliness was identified in the relationship between nomophobia and stress. It is a suggestion through this research that nomophobia preventive and mitigating measures should reduce loneliness in students.

Keywords: High school students, Loneliness, Nomophobia, Stress

Introduction

In 2019, the emergence of the global pandemic Covid-19 had significant impacts on people's health, economy, and lifestyles. In particular, social distancing is applied in many countries as an urgent measure to prevent the spread of the virus, which has changed people's daily habits and relationships. The stressful situation of Covid-19 also causes pressure and fear for people (Lu et al., 2020; Davico et al., 2021). Such adjustments in living and interacting with life lead to depression, isolation, anxiety, and frustration. Many people face psychological disorders and addictions (Augner & Hacker, 2012; Wang et al., 2020). Recent studies have confirmed the negative impact of the COVID-19 pandemic, especially on stress, anxiety, and depression (Cao et al., 2020; Rajkumar, 2020). According to recent reports, it has been found that curfews and social distancing have an impact on mental health decline (Wang et al., 2020). Stress negatively affects function; prolonged exposure to stress causes physical and mental health problems, affects everyday behavior, and reduces the quality of life (Taylor & Dorn, 2006). In addition to the stress-related mental health effects of the COVID-19 pandemic, individual educational disruptions and mandatory social distancing have increased students' perception of stress. Computers and smartphones have dramatically changed the learning and teaching environment.

In recent times, while phone usage has increased thanks to advances in technology, it is believed that amid the Covid-19 pandemic, time spent on mobile phones has increased due to social isolation, and this is substituted for face-to-face interactions. Some scholars have emphasized that smartphone use can lead to solid psychological attachment, leading to addiction (Lee et al., 2015). Nomophobia is considered a manifestation of excessive phone use (King et al., 2013), seen as equivalent to smartphone addiction (Bragazzi & Del Puente, 2014). According to existing studies, smartphone applications such as social networks, mobile games, and entertainment will induce nomophobia (Jeong et al., 2021). Nomophobia is considered a specific form of phobia defined as a feeling of discomfort or anxiety caused by the absence of a phone, personal computer, or any other communication device virtual. The results of nomophobia can cause problems with concentration, insomnia, decreased performance, and stress (Augner & Hacker, 2012). is considered a way to deal with stress. Recent research has shown a significant positive relationship between increased stress levels and nomophobia (Bano et al., 2021; Farchakh et al., 2021).

In the study on the relationship between nomophobia and depression, anxiety, and stress by cross-sectional study method, Bano et al. (2021) reported higher anxiety and stress scores in students with severe nomadism. Farchakh et al. (2021) also showed a positive correlation between nomophobia and anxiety, depression, stress, insomnia, and impulsivity. The tendency to become addicted to smartphones increases with stress and anxiety. A study of medical students found smartphones addiction tends to
increase with stress and anxiety. The survey concluded that the
internet addiction score was directly proportional to the anxiety
score (Yüçens & Üzer, 2018). Those who scored high for gaming
addiction, compulsive internet use, and social media use also
reported high scores for depression, loneliness, avoidance, poor
sleep quality, and depression-related anxiety (Fernandes et al.,
2020). In the report of Thomée et al. (2011) and Kalaskar (2015),
the conclusions are also highlighted that people who use their
smartphones regularly (from 5-6 hours a day) are more prone to
problems such as stress, anxiety, decreased learning efficiency and
sleep disorders.

In recent years, studies have investigated the relationship between
agoraphobia and loneliness, stress, anxiety, depression, and other
mental health problems (Augner & Hacker, 2012; Bano et al.,
2021; Farchakh et al., 2021; Li et al., 2021). However, research
on loneliness factors of high school students in the relationship
between nomophobia and stress has not been carried out. On the
other hand, during the prolonged Covid-19 pandemic, Vietnam
reports more than 12,000 infections per day as of August 28, 2021
(Ministry of Health, 2021). In that context, the Vietnamese
government has implemented social distancing orders in some
localities; students switch to online learning; do not gather in large
numbers, do not participate in recreational activities in the
community. Because individuals do not lack face-to-face
interaction with friends and do not engage in recreational activities,
the fear of contracting Covid-19 can make people feel lonely,
frustrated, bored, which increases the risk of mental disorders,
especially problematic smartphone use. This study will contribute
more information/research results by testing a theoretical model
that considers loneliness a mediator of the association between
nomophobia and stress.

The Mediating Effect of Loneliness on Nomophobia and Stress

Nomophobia and Loneliness

Loneliness is a negative emotional state that arises when a
perceived difference between desired and actual social
relationships (Farchakh et al., 2021). Loneliness is a feeling of
exclusion, disconnection from others, and unhappiness with
relationships (Snape & Manclossi, 2018). Previous studies have
shown that there is a positive correlation between nomophobia and
loneliness, with higher levels of loneliness increasing the risk of
developing nomophobia (Li et al., 2021). Ozdemir et al. (2018)
research on university students has also shown a positive
correlation between nomophobia and self-esteem and loneliness,
whereas subjective happiness and nomophobia are negatively
correlated. Kara et al. (2021) reported that adolescents who use
smartphones for long periods of the day are at increased risk of
developing nomophobia, in which loneliness plays a solid
mediating role. Besides, the daily use of smartphones increases,
adolescents feel more lonely and anxious, thus increasing
nomophobia. In addition, Sum et al. (2008) asserted that there is
an association between loneliness and high levels of Internet use
for social interaction. During a pandemic, loneliness is positively
correlated with anxiety in both direct and indirect ways. Feelings
of loneliness and isolation were predictive of increased social
media use and stress levels. Loneliness can influence one's
decision to use the Internet for entertainment, exacerbating cell
phone addiction (Brand et al., 2019). People who feel lonely often
use smartphones as a tool to combat loneliness (Jiang et al., 2018).
As individuals spend more time at home during the COVID-19
pandemic, smartphone usage increases to pass the time and neglect
other things in an individual's life, an essential component of
addiction (Elhai et al., 2017). As a result, both loneliness and fear
of Covide-19 can increase smartphone use, leading to problematic
and possibly addictive smartphone use.

Loneliness and Stress

Long-term or severe loneliness can cause several emotional
disturbances and impair mental health (Spitzer et al., 2019).
Adolescence is particularly vulnerable to experiencing feelings of
loneliness, which is an essential factor in adolescent health and
quality of life (Danneel et al., 2019). Many studies indicate that
stress is causally related to loneliness (Campagne, 2019). This
mechanism is active not only in the elderly but across many age
groups (Drake et al., 2016). It has been found to have multiple
sources, some related to aging, but all related to loss of appropriate
capacity. Feeling lonely is a risk factor for anxiety and chronic
stress (McHugh & Lawlor, 2013) and high involvement in
maladaptive behaviors (Loades et al., 2020). Glaser et al. (1985)
in the publication of research on stress, loneliness, and
herpesviruses, found that people with high levels of loneliness had
higher stress levels in the student group. Which significantly
affected their immune systems, which provided evidence of a
causal relationship between stress, loneliness, and health. Recent
studies have also found a strong, positive association between
stress and loneliness (Jaremka et al., 2014), thus also a causal
pathway through the abnormal activity of the HPA axis such as a
significant component of the endocrine system (Hawkley et al.,
2012). Social isolation and loneliness increased the risk of
depression and anxiety when measuring loneliness from 0.25 years
to 9 years later. Duration of loneliness was significantly more
positively correlated with mental health symptoms than loneliness
intensity (Loades et al., 2020).

Nomophobia can lead to the development of stress through many
different mechanisms as shown in the analysis above. Therefore,
based on the above discussion, we form Hypothesis 1:

H1. Nomophobia will indirectly affect stress through loneliness
(Nomophobia will positively impact loneliness and loneliness
positively affects stress).

Figure 1. Hypothetical model
Materials and Methods

Participants

The study used a stratified random sampling method to survey 602 students using smartphones from two high schools in Huong Thuy town, Thua Thien Hue province. Applying Sloven’s formula, the study's sample size will be more than 352 when the error rate is 5% and the total number of students in the two schools for the 2020-2021 school year is 2916. Our study had informed consent of the high school principals, and all participants consented to participate in the study. Before answering the questionnaire, we have committed to keeping the personal information provided by students confidential. In the end, there were 556 valid votes with a rate of 92.35%, exceeding the 30% response rate that most students confidential. In the end, there were 556 valid votes with a rate of 92.35%, exceeding the 30% response rate that most researchers require for analysis [20]. In the sample, the age group ranges from 16 to 18 (Mean = 16.99, SD = 0.840); 40.3% male students, 59.7% female students (Table 1).

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>224</td>
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</tr>
<tr>
<td>Female</td>
<td>332</td>
<td>59.7</td>
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<table>
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<td>11th grade</td>
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<tr>
<td>12th grade</td>
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<tr>
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<td>16</td>
<td>199</td>
<td>35.8</td>
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<td>17</td>
<td>164</td>
<td>29.5</td>
</tr>
<tr>
<td>18</td>
<td>193</td>
<td>34.7</td>
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</table>

Family structure

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<th>Divorced or separated parents</th>
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<th>2.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deceased father/mother</td>
<td>21</td>
<td>3.8</td>
</tr>
<tr>
<td>Another situation</td>
<td>7</td>
<td>1.3</td>
</tr>
<tr>
<td>Birth mother</td>
<td>519</td>
<td>93.3</td>
</tr>
<tr>
<td>Stepmother</td>
<td>6</td>
<td>1.1</td>
</tr>
<tr>
<td>Foster mother</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Other cases</td>
<td>30</td>
<td>5.4</td>
</tr>
<tr>
<td>Birth Father</td>
<td>531</td>
<td>95.5</td>
</tr>
<tr>
<td>Stepfather</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>Foster father</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Other cases</td>
<td>21</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Live with academic performance

<table>
<thead>
<tr>
<th>Poor</th>
<th>5</th>
<th>0.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below average</td>
<td>167</td>
<td>30.0</td>
</tr>
<tr>
<td>Average</td>
<td>265</td>
<td>47.7</td>
</tr>
<tr>
<td>Good</td>
<td>99</td>
<td>17.8</td>
</tr>
<tr>
<td>Excellent</td>
<td>20</td>
<td>3.6</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Academic performance</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Grade point average, GPA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>5</td>
<td>0.9</td>
</tr>
<tr>
<td>Below average</td>
<td>167</td>
<td>30.0</td>
</tr>
<tr>
<td>Average</td>
<td>265</td>
<td>47.7</td>
</tr>
<tr>
<td>Good</td>
<td>99</td>
<td>17.8</td>
</tr>
<tr>
<td>Excellent</td>
<td>20</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Note: n: Number of participants; %: Percentage

Table 1. An overview of survey participants

Instruments

Nomophobia Scale (NMP-Q): In this study, the Nomophobia Questionnaire (NMP-Q) of Yildirim (2014), including 20 items, is designed in the form of a 7-point Likert scale, from 1 = “Strongly disagree” to 7 = “Strongly agree.” The scale consists of 4 factors: factor 1: Unable to communicate - feeling of losing immediate contact with people and not being able to use services that allow instant communication; factor 2: Disconnected - feeling disconnected and disconnected online (especially on social media); Factor 3: Information inaccessibility - upset at losing the ability to access information via smartphones, unable to retrieve and search information on smartphones; Factor 4: Inconvenience, feeling no longer as convenient as having a phone. The total score was calculated by summing the responses for each question, ranging from 20 to 140, with higher scores corresponding to a more severe fear of lack of phones. The score from the NMP-Q questionnaire is interpreted as follows: the NMP-Q score of 20 indicates that there is no fear of missing a phone; NMP-Q scores greater than 20 and less than 60 correspond to a slight fear of lack of phones; NMP-Q scores greater than or equal to 60 and less than 100 correspond to the average fear of missing phones, and NMP-Q score greater than or equal to 100 corresponds to a severe fear of lack of phones (Yildirim & Correia, 2015). Reliability test results show that the reliability of the scale in our study is quite high with α = 0.898, with the component sentences all satisfying the condition with weight greater than 0.3, the results KMO index results meet the standard, Barlett test with p < 0.05 and extracted variance > 50%. This result proves that the scale has high reliability, meeting research requirements. CFA confirms the 4-factor structure derived from EFA because all the regression weights show positive, highly significant (above 0.4) relevant indices: Chi-Square = 543.365, CMIN/ DF =3.354, P < 0.001, CFI = 0.911, GFI = 0.914 and RMSEA = 0.065 (≤ 0.08) Based on revised indices, several covariance paths between entries 2 and 4, entries 3 and 7 was added, which improved the model fit.

Depression Anxiety Stress Scales 21 (DASS 21): DASS 21 will be shorter than DASS which includes 42 items. To evaluate stress status, the stress component (7 questions) of the 21-item Depression, Anxiety and Stress Scale (DASS-21) was used. To get the final score, it is necessary to double the score on the stress sub-scale. Scores were divided into increased stress (with scores greater than 14) and everyday stress (with scores between 0 and 14). Increased stress was also classified into highly extreme stress (with scores greater than 33), mild (with scores between 15 and 18), severe (with scores between 26 and 33), and moderate (with scores between 19 and 25). In Vietnam, Dass 21 scale shows good reliability (Tran et al., 2013). In this study, the scale achieved a good level of reliability (α = 0.761).

The UCLA loneliness scale version 3 (UCLA III): The UCLA III Scale (Russell, 1996) was used to evaluate the loneliness of Vietnamese high school students who have nomophobia. There are 20 items in the UCLA III scale to measure the subjective feelings of survey participants about isolation and loneliness. The UCLA III scale includes 11 sentences in the negative direction (lonely) and nine in the positive order (not lonely). For each question, participants will rate from 1 to 4 on a Likert scale with 1 corresponding to “never” and 4 corresponding to “often”. The total score for loneliness will be from 1-80 where higher scores mean higher levels of loneliness. In Vietnam, the internal reliability of the UCLA III Scale was reported to be equal to 0.85 by Ho (2021). In this study, it achieved (α = 0.792) which means good internal reliability.
Data Analysis

SPSS 25.0 was used in this study to perform descriptive statistics and correlation analysis between Pearson’s variables. The mediating role of loneliness in the relationship between nomophobia and stress will be examined by the Process macro for SPSS (Model 1).

Results and Discussion

Rates of Nomophobia in High School Students

Research results show that most high school students participating in the survey experience nomophobia to varying degrees, accounting for 99.3%. Specifically, 23.6% of students have severe nomophobia, 63.5% have moderate nomophobia, 12.2% have mild nomophobia, and only 0.7% have no nomophobia (Table 2).

Table 2. Degree of nomophobia in high school students

<table>
<thead>
<tr>
<th>Degree of nomophobia</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absence of nomophobia (0-20 score)</td>
<td>4</td>
<td>0.7</td>
</tr>
<tr>
<td>Mild level of nomophobia (21 - 59 score)</td>
<td>68</td>
<td>12.2</td>
</tr>
<tr>
<td>Moderate level of nomophobia (60 - 99 score)</td>
<td>353</td>
<td>63.5</td>
</tr>
<tr>
<td>Severe nomophobia (100 – 140 score)</td>
<td>131</td>
<td>23.6</td>
</tr>
<tr>
<td>Total</td>
<td>556</td>
<td>100</td>
</tr>
</tbody>
</table>

Correlations among Study Variables

The results show that nomophobia has a positive correlation with stress ($r = 0.196$, $p < 0.01$) and loneliness ($r = 0.097$, $p < 0.05$) (Table 3). Loneliness was proved to be positively correlated with stress ($r = 0.460$, $p < 0.01$)

Table 3. Pearson correlations, mean, and standard deviations among study variables

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>Stress</th>
<th>Nomophobia</th>
<th>Loneliness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress</td>
<td>16.93</td>
<td>8.709</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nomophobia</td>
<td>82.70</td>
<td>21.175</td>
<td>0.196**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loneliness</td>
<td>44.78</td>
<td>8.212</td>
<td>0.460**</td>
<td>0.097*</td>
<td></td>
</tr>
</tbody>
</table>

Note: **. Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Mediation Analyses

We hypothesized that loneliness has a mediating role in the relationship between nomophobia and stress level in hypothesis 1. As shown in Table 4 and Figure 2, the direct paths from nomophobia to loneliness ($β = 0.0628$, SE = 0.0154, 95% CI [0.0326, 0.0930]) were significant. The mediator’s paths from loneliness to stress ($β = 0.4716$, SE = 0.0397, 95% CI [0.5496, 0.2366]) were significant. The direct path from nomophobia to stress were ($β = 0.0628$, SE = 0.0154, 95% CI = [0.0326, 0.0930]). From Table 4, it is implied that the unstandardized regression coefficients of the indirect effect were significant ($β = 0.0178$, SE=0.0081, 95% CI= [0.0021, 0.0337]). Therefore, loneliness partially mediated the effect on the relationship between nomophobia and stress (Figure 2), which supports hypothesis 1 (Figure 1).

Table 4. Bias-corrected bootstrap test on mediating effects

<table>
<thead>
<tr>
<th>Paths</th>
<th>β</th>
<th>SE</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nomophobia – Stress</td>
<td>0.0628***</td>
<td>0.0154</td>
<td>0.0326 - 0.0930</td>
</tr>
<tr>
<td>Nomophobia – Loneliness</td>
<td>0.0378***</td>
<td>0.0164</td>
<td>0.0055 - 0.0700</td>
</tr>
<tr>
<td>Loneliness – Stress</td>
<td>0.4716***</td>
<td>0.0397</td>
<td>0.3937 - 0.5496</td>
</tr>
<tr>
<td>Nomophobia – Loneliness – Stress</td>
<td>0.0178</td>
<td>0.0081</td>
<td>0.0021 - 0.0337</td>
</tr>
<tr>
<td>Age – Loneliness</td>
<td>0.0179</td>
<td>0.4136</td>
<td>-0.7945 - 0.8303</td>
</tr>
<tr>
<td>Age – Stress</td>
<td>0.0679</td>
<td>0.3860</td>
<td>-0.6903 - 0.8261</td>
</tr>
</tbody>
</table>

Note: * $p < 0.05$, *** $p < 0.001$.

Figure 2. Moderated mediation model of the indirect effect of Nomophobia on the Stress

This study analyzes the impact of nomophobia, loneliness on stress symptoms in Vietnamese high school students. Specifically, the research will study a mediation model in which loneliness is considered a mediator in the relationship between nomophobia and stress.

Firstly, our study showed that most (99.3%) students have nomophobia at different levels. Of which 12.2% had mild nomophobia, 63.5% moderate, and 23.6% severe. Our research results are similar to Nguyen Phuong Hong Ngoc and Tran Van Cong's (2017) studies on nomophobia. Research results of Nguyen Phuong Hong Ngoc and Tran Van Cong (2017) on 365 students from 2 high schools in the inner city and suburbs of Hanoi show that most (90.6%) students have nomophobia at different levels. Gezgin et al. also found that the nomophobia of high school students was at an average level (Grade average score of 3.61), where a score of 3 to less than 5 has a mean are described to be moderate (Gezgin et al., 2018). Farooqui et al. (2018) study on 145 first-year students also showed that 17.9% had a mild nomophobia, 60% was moderate, and 22.1% was heavy. Or a study by N. Sharma et al. (2015) on 130 students (22-24 years old) had 73% had nomophobia, and 83% had panic attacks when they couldn’t find their mobile device. A cross-sectional study of 1386 high school students aged 14 to 17 years by M. Sharma et al., (2019) showed that 41.05% had mild nomophobia, 21.86% moderate, and 5.1% is severe.
Second, we agree with previous findings stating that nomophobia positively predicted stress symptoms (Kalaskar, 2015; Yüçens & Üzer, 2018; Fernandes et al., 2020; Bano et al., 2021; Farchakh et al., 2021). Recent literature has reported that increased stress levels and nomophobia have a significant positive relationship (Bano et al., 2021; Farchakh et al., 2021). Bano et al. (2021) reported higher anxiety and stress scores in students with severe nomophobia. There was a significant positive correlation between nomophobia and anxiety, depression, stress, and impulsivity (Farchakh et al., 2021). On the other hand, the tendency to be addicted to phones increases with stress and anxiety. Those with higher Internet addiction scores were more anxious than students with lower (Yüçens & Üzer, 2018). Those who scored high for nomophobia, in which loneliness plays a solid mediating role. People who feel lonely often use smartphones as a tool to combat loneliness and nomophobia are negatively correlated. The study by Kara et al. (2021) reported that adolescents who use smartphones for long periods of the day are at increased risk of developing nomophobia, in which loneliness plays a solid mediating role. People who feel lonely often use smartphones as a tool to combat loneliness (Jiang et al., 2018). Smartphone use may increase as a way to pass the time as individuals spend more time at home during the COVID-19 pandemic. This will raise smartphone use and cause the individual to neglect everything else in his/her life. This is an important part of addiction (Elhai et al., 2017). People who have higher levels of loneliness often face stress risks (Jarema et al., 2014; Campagne, 2019). Feeling lonely has been reported to be a factor that leads to anxiety and chronic stress (McHugh & Lawlor, 2013), as well as being heavily involved in maladaptive behaviors (Loades et al., 2020). In the study of Boursier et al. (2020), they assert that feelings of loneliness caused by Covid-19 positively affect anxiety, both indirectly and directly. In addition, feeling lonely can also lead to anxiety and social media abuse. Recent studies have also found a strong, positive correlation between stress and loneliness (Jarema et al., 2014). The above analysis demonstrated that nomophobia indirectly affects stress through loneliness. Therefore, reducing loneliness may prevent adolescents with high levels of nomophobia from being at risk of stress.

Conclusions

This study has extended insights into the relationship between nomophobia, loneliness, and stress among high school students. The mediating role of loneliness has identified the internal mechanism between nomophobia and stress. The present study results may provide valuable guidelines in implementing psychological interventions to improve nomophobia and stress in high school students. The results of the present study may provide valuable guidelines in implementing psychological interventions to improve claustrophobia and stress in high school students. Preventing and minimizing cell phone phobia can be used as a preventive therapy to help reduce symptoms of stress. Accordingly, interventions to prevent cell phone deprivation should focus on measures to reduce loneliness. However, limitations of cross-sectional research still exist in this study, so a longitudinal study is needed following to determine cause-and-effect relationships between variables.

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