

# Investigating the Problematic Use of Cell-Phone in the Relationship by Feelings of Loneliness and Alexithymia with the Mediating Role of Distress Tolerance among Medical Science Students

Saeed Moshtaghi<sup>1\*</sup>, Fatemeh Sameri<sup>2</sup>, Ehsan Mokari Menshadi<sup>3</sup>, Pegah Khorramnia<sup>3</sup>, Vahid Jourasti<sup>4</sup>

<sup>1</sup> Department of Psychology, Dezful Branch, Islamic Azad University, Dezful, Iran.

<sup>2</sup> Master of Psychology, Dezful Branch, Islamic Azad University, Dezful, Iran.

<sup>3</sup> PhD student of Psychology, Dezful Branch, Islamic Azad University, Dezful, Iran.

<sup>4</sup> PhD student of Management, Imam Hossein University, Tehran, Iran.

\*Corresponding Author: Saeed Moshtaghi, Department of Psychology, Dezful Branch, Islamic Azad University, Dezful, Iran.  
Email: [moshtaghi@iaud.ac.ir](mailto:moshtaghi@iaud.ac.ir), Phone: +989036871600.

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## Abstract

**Introduction:** In recent years, the cell-phone use greatly increased throughout the World. In between worrying about the psychological effects of this phenomenon is on the rise. The Present research was aimed to investigate the problematic use of cell-phone in the relationship by feeling of loneliness and alexithymia with the mediating role of distress tolerance among medical science students.

**Methods:** In this cross sectional study employed a correlational method based on causal models. The statistical population of the research included all medical science students of Ahvaz Jondishapur university. The statistical sample included 277 subjects selected by available method. In this research, questionnaires of cell-phone over-use scale (COS), UCLA loneliness scale (ULS), Toronto alexithymia scale (TAS) and distress tolerance scale (DTS) were used. The research data was analyzed using SPSS and AMOS software and with the help of structural equation modeling method.

**Results:** The results showed the direct effect of the variable of alexithymia (0.231), feeling of loneliness (-0.372), and distress tolerance (-0.204) were significant on problematic use of cell-phone ( $p < 0.01$ ). Also, the indirect effect of the distress tolerance variable on problematic use of cell-phone through the role of alexithymia and feeling of loneliness were significant ( $p < 0.01$ ).

**Conclusion:** Based on the findings of the research, it can be concluded that a better clinical understanding of alexithymia, feeling of loneliness and distress tolerance in the pathology of problematic use of cell-phone is a key element in the evaluation and clinical work with medical science students.

**Keywords:** Problematic use of cell-phone, Distress tolerance, Feeling of Loneliness, Alexithymia, Medical Science Students.

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## Introduction

Today, mobile phones play a key role in the communications of various countries and providing extensive features for their users. However, the increased use of mobile phones like any other technological phenomenon, have its consequences<sup>1</sup>. Mobile phones have quickly gained popularity among the younger generation and have become a valued asset for them<sup>2</sup>. This essential communication tool is prevalent in academic environments and is widely used by students in universities<sup>3</sup>. The high usage of mobile phones among

Iranian students of medical science has been reported<sup>4</sup>. While the extensive facilities of mobile phones satisfy individuals' communication needs, they also give rise to numerous problems and dilemmas, with researchers identifying excessive use or even addiction to them as one of the most significant consequences of communication devices<sup>5</sup>. Problematic use of cell-phone is a condition characterized by excessive use and mental preoccupation with them<sup>6</sup>. The detrimental effects of problematic use of cell-phone encompass a wide range of disorders, from

severe addiction to mobile phones, accompanied by quasi-addictive symptoms in users, to psychological and even physical health effects. Studies have shown that problematic use of cell-phone leads to a kind of dependency that gradually turns into a habit and then into a form of addiction in individuals, with symptoms similar to addiction to drugs, alcohol, overeating, computer games, internet, and is equally destructive<sup>7</sup>. Addiction to mobile phones is a type of impulsive behavior in mobile phone use (Behavior without thinking), where the user not only seeks relaxation, but also gradually with increased tolerance levels, requires more usage and relies on more advanced phones to achieve the same previous feeling, leading to a state of isolation in case of deprivation<sup>8</sup>. International studies indicate that 6% of mobile phone users are addicted to this device<sup>9</sup>.

Various psychological factors contribute to the emergence of addictive behaviors such as harmful mobile phone use, with one of these factors being loneliness<sup>10</sup>. Research related to loneliness dates back several decades in literature and media, defining loneliness as "a distressing situation arising from the discrepancy between current social relationships and the type of social relationships the individual desires to have"<sup>5</sup>.

Loneliness is a debilitating psychological state accompanied by feelings of emptiness, worthlessness, lack of control, and personal threat<sup>10</sup>. It is a negative emotion stemming from the disparity between existing social interactions and expected social interactions<sup>11</sup>. From these definitions, it becomes apparent that loneliness is not merely physical isolation or being alone rather experienced social relationships and a low level of satisfaction in contrast to the expected satisfaction from these relationships can be the basis for feeling lonely<sup>5</sup>. It has even been suggested that increased time spent on mobile phone calls corresponds to an increased level of loneliness<sup>12</sup>. A study showed that individuals experiencing higher levels of loneliness tend to use text messaging and phone calls as a less intimate means of communication<sup>13</sup>. In fact, individuals experiencing loneliness tend to alleviate this feeling by frequent phone calls with peers and friends<sup>10</sup>. Research has pointed to the role of loneliness in mobile phone addiction among students of medical sciences<sup>14</sup>. Overall, meta-analysis results have shown a positive relationship between loneliness and mobile phone addiction<sup>15</sup>.

Another psychological factor that can impact problematic use of cell-phone is alexithymia. Alexithymia is associated with a wide range of psychological problems such as anxiety and depression and is perceived as a disorder in cognitive-emotional functioning where the individual is unable to transfer their emotional experiences into feelings and thoughts<sup>16</sup>. The concept of

alexithymia is related to emotion dysregulation disorder, defined as the inability to identify or express emotions, whereas initially viewed as a personality trait, it is now defined as a form of emotional regulation<sup>17</sup>. Research evidence indicates that alexithymia affects problematic use of cell-phone and addiction<sup>18, 19</sup>. Meta-analysis results also show a highly positive correlation between alexithymia and mobile phone addiction among students<sup>20</sup>. Studies have indicated the role of distress tolerance in predicting students' propensity toward addictive behaviors, including problematic use of cell-phone<sup>20</sup>. Distress tolerance is defined as the capacity to experience and endure negative psychological states; while distress may result from physical and cognitive processes, it is experienced as an emotional state, often manifested by a tendency to engage in actions that alleviate the emotional experience<sup>21</sup>. According to the Resource Protection Theory, distress tolerance is considered an individual's internal protective resource, alongside other social protective resources. Distress tolerance is a common construct in research related to affect dysregulation, characterized as a trans diagnostic construct and as the individual's ability to experience and resist negative emotional states<sup>22</sup>. Previous research suggests that variables such as distress tolerance, fatigue, and loneliness play an important role in predicting addictive behaviors such as problematic use of cell-phone among students<sup>23</sup>. Individuals who utilize emotion-focused and avoidant coping strategies, although they may provide temporary relief from stress, are those with low distress tolerance<sup>20</sup>.

Overall, it should be noted that excessive use of mobile phones is associated with health risks<sup>7</sup> and can lead to various personal, social, and psychological problems such as depression, anxiety<sup>6, 24</sup>, sleep disturbances<sup>25</sup>, and social anxiety<sup>26</sup>. A review study examining studies on problematic use of cell-phone and its relationship with health problems in the Iranian community found that sleep problems were at the forefront<sup>27</sup>. Additionally, it creates academic problems for students, resulting in decreased concentration in class and academic performance<sup>28, 29</sup>. Considering that excessive and problematic use of cell-phone falls within the realm of addictive behaviors, it seems that these variables (loneliness, emotional dysregulation, and distress tolerance) can serve as strong predictors of mobile phone addiction as a tool for emotion regulation and a quick way to regulate and improve emotions. Given the importance of the student and youth population in the future of the country and the insufficient attention to the issue of mobile phone addiction as a mental illness of the new century that can lead to its further prevalence, addressing this issue is crucial<sup>30</sup>. Therefore, it is necessary for

indigenous research to identify factors influencing problematic and addictive mobile phone use to provide grounds for the extraction of preventive and therapeutic models. In this regard, the main issue of this research is to investigate a causal model in which problematic use of cell-phone is examined as an endogenous variable, distress tolerance as a mediating variable, and emotional dysregulation and loneliness as exogenous variables in a path model among students of Ahvaz Jondishapur University of Medical Sciences. Alongside this main hypothesis, two categories of hypotheses regarding the direct and indirect relationships of the research variables are considered.

## Methods

In this cross sectional study employed a correlational method based on causal models. The statistical population included all students of Ahvaz Jondishapur University of Medical Sciences, who were studying in seven faculties (Health, Nursing and Midwifery, Medicine, Paramedicine, Pharmacy, Dentistry, and Rehabilitation). Kline<sup>31</sup> suggests a minimum sample size of 200 for modeling studies, but in this research, a sample size of 300 was considered for greater generalizability. After excluding incomplete questionnaires, a total of 277 participants were included in the study. Convenience sampling method was used. Inclusion criteria included: being a student at one of the seven faculties of Ahvaz Jondishapur University of Medical Sciences, and willingness to participate in the research and complete the questionnaires. The exclusion criteria included: incomplete completion of research questionnaires and unwillingness to cooperate. Data analysis was performed using descriptive statistics, correlation coefficient, and model fit indices. The data obtained from the relevant questionnaires were analyzed using AMOS-26 and SPSS-24 software.

## Data Collection

The following tools were used to collect data:

### *Cell-Phone Over-Use Scale (COS)*

This questionnaire was developed by Jenaro et al. (2007) based on ten psychological indicators from the DSM to

measure over-use of cell phones<sup>32</sup>. The Persian version of this scale had been validated in the Iranian community and consisted of 21 items<sup>33</sup>. In the present study, the reliability coefficient alpha was calculated as 0.86.

### *Toronto Alexithymia Scale (TAS)*

This scale, developed by Bagby et al. (1994), consists of 20 items in three subscales. The scoring is based on a 5-point Likert scale (completely disagree to completely agree). The validity of the scale was confirmed by its creators, and its reliability was reported as 0.87 using Cronbach's alpha<sup>34</sup>. The Persian version of this scale has been validated in Iran with a reported reliability coefficient of 0.75<sup>35</sup>. In the present study, the reliability coefficient alpha was calculated as 0.81.

### *UCLA Loneliness Scale, Version 3*

This questionnaire, developed by Russell (1996), consists of 10 negative and 10 positive statements rated on a 4-point scale (never, rarely, sometimes, and always). The scores range from 20 to 80, with higher scores indicating greater loneliness. The Persian version of this scale has a reported reliability coefficient of 0.83<sup>36</sup>. In the present study, the reliability coefficient alpha was calculated as 0.81.

### *Distress Tolerance Scale (DTS)*

This self-report scale was developed by Simons & Gaher (2005) and consists of 15 items rated on a 5-point scale (completely agree to completely disagree)<sup>37</sup>. Higher scores on the scale indicate higher distress tolerance. The Persian version of this scale was administered among students, and a reliability coefficient of 0.71 was reported<sup>38</sup>. In the present study, the reliability coefficient alpha was calculated as 0.76.

## Results

Out of the total 277 students in the sample group, 61.73% (171 individuals) were female, and 38.24% (106 individuals) were male. The average age of the students was 22.63 years. Table 1 presents the descriptive statistics for the research variables, along with Kolmogorov-Smirnov (K-S) test statistics.

**Table 1.** Descriptive statistics of research variables, along with K-S test

Variable	Mean	SD	Skewness	Kurtosis	K-S Test	
					Z	Sig.
Alexithymia	60.91	9.67	0.89	-0.61	0.27	0.21
Loneliness	54.11	10.14	0.51	-0.46	0.33	0.13
Distress Tolerance	46.83	8.58	0.77	0.83	0.41	0.19
problematic use of cell-phone	82.56	7.42	0.90	0.76	0.46	0.16

The statistical assumptions for path modeling include examining sample size, normality, independence of errors, and multi collinearity, which are further discussed below. According to Table 1, since the significance levels of the Kolmogorov-Smirnov (K-S) test statistics in Table 1 are greater than 0.05 ( $P > 0.05$ ), the scores' distributions are normal. The values of skewness and kurtosis of the research variables fall within the range of -1 to +1. Therefore, the distribution of all research variables is normal. Since the Durbin-Watson statistic falls between 1.5 and 2.5, we can accept the independence of errors. Hence, path modeling can be used. Additionally, the

results indicated that none of the tolerance values were less than the permissible limit of 0.10, and none of the variance inflation factors exceeded the permissible limit of 10. Therefore, multi collinearity assumptions can be accepted. Since no multi collinearity was observed among the predictor variables, Pearson correlation coefficient tests and path modeling can be used, and their results are reliable. Since one of the important assumptions in path modeling is the presence of significant correlations between variables, Table 2 presents the correlation matrix of the research variables.

**Table 2.** Correlation matrix between research variables

	1	2	3	4
1- Alexithymia	1			
2- Feeling of Loneliness	0.72**	1		
3- Distress Tolerance	-0.68**	-0.61**	1	
4- problematic use of cell-phone	0.59**	0.62	-0.55**	1

\*\* $p < 0.01$ , \* $p < 0.05$

Table 2 shows the correlation matrix between the research variables. There is a significant positive correlation between alexithymia, feeling of loneliness, distress tolerance, and problematic use of cell-phone ( $p < 0.01$ ).

To test the conceptual path model, the model's fit was first examined using fit indices. Among the absolute fit

indices, the Chi-square ( $\chi^2$ ) and Root Mean Square Error of Approximation (RMSEA) were used. Comparative fit indices included Comparative Fit Index (CFI), Normed Fit Index (NFI), and Parsimony Adjusted Measures included Parsimonious Comparative Fit Index (PCFI). The analysis results are presented in Table 3.

**Table 3.** Goodness-of-fit indices for the proposed research model

Index	$\chi^2/df$	CFI	NFI	PCFI	RMSEA
Value	2.75	0.98	0.97	0.57	0.06
Acceptable range	Less than 5	0.90-1	0.90-1	0.50-0.60	0-0.10

For the ratio of chi-square to degrees of freedom, it is suggested that if this value is less than 2, it is desirable, and if it is less than 5, it is acceptable<sup>39</sup>. Therefore, the value of 0.752 for this ratio indicates an acceptable fit of the model, showing that the empirical data confirm the theoretical model of the study regarding problematic use of cell-phone. The RMSEA value for models with very good fit is below 0.050, and values above 0.080 indicate reasonable errors in the population. Since this value is 0.570 in the current study, it can be said that relatively

good fit has been observed. For the PCFI index, a specific value for model acceptability is not mentioned, but a minimum of 0.50 and, more strictly, 0.60 are generally agreed upon<sup>39</sup>. The CFI and NFI indices have a range from 0 to 1; the closer their values are to 1, the better the model fit. With values above 0.90 for these indices, the model fit is considered good. In summary, based on the mentioned indices, the main hypothesis of the study has been confirmed.

**Table 4.** Standardized path coefficients for proposed relationships in the path model

Paths		Indirect Effect	Direct effect	Total Effect	Sig.
From:	To:				
Alexithymia	Distress Tolerance	---	-0.482	-0.482	0.001
Alexithymia	Problematic Use	0.099	0.231	0.330	0.001
Feeling of Loneliness	Distress Tolerance	---	-0.322	-0.322	0.003
Feeling of Loneliness	Problematic Use	0.066	0.372	0.438	0.001
Distress Tolerance	Problematic Use	---	-0.204	-0.204	0.004

According to the predicted paths in the model, problematic use of cell-phone has a direct, significant, and positive effect on distress tolerance (0.231), and distress tolerance has a direct, significant, and negative effect on problematic use of cell-phone (0.482). Additionally, problematic use of cell-phone has a direct, significant, and negative effect on loneliness (0.372), and loneliness has a direct, significant, and negative effect on problematic use

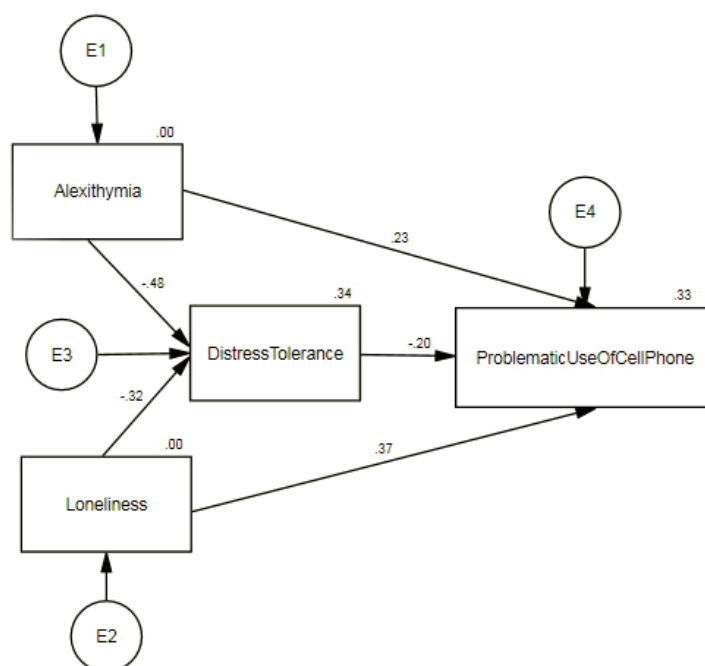
of cell-phone (0.322). Moreover, there is an indirect effect of alexithymia on problematic use of cell-phone through distress tolerance (0.099), and an indirect effect of loneliness on problematic use of cell-phone through distress tolerance (0.066). To determine the significance of these indirect relationships, the bootstrapping test (with a boot value of 1000 and a confidence level of 95%) was used, the results of which are presented in Table 5.

**Table 5.** Bootstrapping results for indirect (mediation) relationships in the proposed path model

Independent Variable	Mediating Variable	Dependent Variable	Boot Strapping	Bias	Standard Error	95% Confidence Interval	
						Lower bound	Upper bound
Alexithymia	Distress Tolerance	Problematic Use of cell-phone	0.2733	-0.0031	0.0728	0.1262	0.4068
Feeling of Loneliness	Distress Tolerance	Problematic Use of cell-phone	0.2430	0.0032	0.0585	0.1338	0.3716

As Table 5 shows, the confidence intervals for both paths do not include zero. Therefore, the mediating role or indirect relationship of distress tolerance in the relationship between alexithymia and loneliness with

problematic use of cell-phone is confirmed. Finally, the proposed path model tested in accordance with the software output is presented in Figure 1. It is worth noting that the paths mentioned are standardized coefficients.



**Figure 1.** Standardized Path Coefficients of the Proposed Model Corresponding to Software Output

## Discussion

The aim of this study was investigating the fit of a causal model of problematic use of cell-phone based on alexithymia and loneliness, with distress tolerance as a mediator, among university students using empirical data. Based on the obtained indices, it can be concluded that the fit of the proposed model is acceptable, and the findings support the main hypothesis of the research regarding the model's fit with the data. In this model, the external variable of alexithymia directly explained 23.1% of the variance in problematic mobile phone use among students; this explanation was 37.2% for the variable of internal loneliness and inversely 20.4% for the distress tolerance variable. The mediating role of distress tolerance in the relationship between alexithymia and loneliness with harmful mobile phone use among students was confirmed.

The influence of loneliness on problematic use of cell-phone can be explained by similarities in phone dependency and obsessive behaviors<sup>12</sup>. From this perspective, harmful and excessive mobile phone use is considered akin to obsessive-compulsive disorder. In which, some form of worry or compulsive behavior to remove unpleasant stimuli occurs<sup>8</sup>. While there is a distinction between compulsive behavior and excessive use of mobile phones, both serve as a means of reducing or eliminating anxiety<sup>5</sup>. Individuals who feel lonely turn to the virtual space and mobile phones with all their features to alleviate their perceived loneliness or gain satisfaction, trying to alleviate their loneliness through frequent virtual interactions and calls. Essentially, these individuals turn to virtual interactions to fill emotional voids and avoid negative emotions<sup>14</sup>. Students, due to the sensitive conditions they face in terms of age (according to Erikson's life cycle theory, youth is a period when individuals are in the stage of independence from the family and seeking intimacy and marriage, and the lack of realization of the positive aspect of this stage leads young people to become more withdrawn) and because in our country students face tough conditions in terms of marriage, career, and academic future, as well as dormitory life pressures such as loneliness, experience increased stress, which increases negative emotions such as depression, excessive anxiety, and anger in this segment of society. Among these, students, in order to escape from negative feelings and pressures caused by negative emotions or to gain a sense of satisfaction, turn to the virtual space and mobile phones with various facilities, trying to mitigate their perceived stressors through avoidant coping strategies. In other words, weak emotional control leads students to engage in avoidant

experimental behavior, which helps them temporarily distance themselves from perceived stressors.

From the perspective of acceptance and commitment therapy (ACT), some individuals choose avoidance to reduce life pressures and stress, which helps them temporarily distance themselves from perceived stressors by engaging themselves in less stressful activities such as mobile phones. Thus, by turning their attention away from perceived stressors and negative emotions, students are less likely to feel stressed. In this way, problematic and excessive mobile phone use acts as a negative reinforcement, as it reduces the stress and negative emotions of students, and as a result, with further reinforcement (reduced negative emotions and increased positive emotions), mobile phone use becomes addictive behavior, so that otherwise the individual may fall back under the pressures and distress caused by negative emotions surrounding their life<sup>40</sup>.

In line with the above discussions, the results of the present study showed that alexithymia had a significant and positive relationship with the level of problematic use of cell-phone. Alexithymia is a structure that is likely related to emotion regulation, as alexithymia reflects a deficiency in processing, regulating, or consciously inhibiting the expression of emotions, ultimately resulting in the individual's inability to manage appropriate behavioral responses and, as a result, the linkage between symbolic representations of emotions and mental images and weak language will be less cognitively manageable<sup>17</sup>. Thus, cognitive processing of emotional information and regulation of emotions in various ways are impaired<sup>18</sup>. Some theories on the examination of the temporal stability of alexithymia have confirmed this construct as a stable personality trait that indicates a deficit in cognitive processing of emotional information. Based on the trait-focused approach, alexithymia is merely a coping mechanism for self-protection against emotional breakdowns related to highly stressful situations, and ultimately, these paths lead to a tendency toward excessive and addictive use of the virtual space on mobile phones<sup>20</sup>.

Students with lower distress tolerance are more likely to engage in problematic and excessive use of mobile phones. In explaining this, it can be said that as various research results indicate, individuals with higher distress tolerance are better able to cope with anxiety resulting from perceived stress<sup>22</sup> and are also more likely to use positive emotions to deal with difficult experiences<sup>21</sup>. It is likely that students, due to various academic stressors they face, experience more frustration and distress and therefore resort more to emotional and avoidant strategies such as excessive use of mobile phones. Confronting

various issues in life creates stress and discomfort, and the inability to adapt and tolerate these discomforts leads to various avoidance or ineffective coping mechanisms. This way of dealing with stressful issues has many negative consequences for them. In fact, the more students use mobile phones excessively, the more depression they experience, as well as increased anxiety, lower self-esteem, and higher scores on addiction assessments (such as addiction to mobile phones or the Internet), and they encounter numerous academic problems<sup>20</sup>.

## Conclusion

Many students, due to the attractiveness and various practical applications of mobile phones, overlook its negative aspects such as time wasting, cognitive and psychological capacity occupation, and loss of study time, and become dependent on mobile phones and the resulting anxiety when dealing with academic matters and the like. In line with the results of this research and similar studies, it is necessary to intervene behaviorally and cognitively with the aim of changing the pattern of mobile phone use in students and also improving psychological abilities such as training in enhancing distress tolerance and teaching emotion regulation skills. Additionally, it is recommended that attractive sports, cultural, and recreational programs aimed at preventing addictive behaviors to mobile phones in students be considered by university authorities. Since a significant portion of problematic mobile phone use is allocated to the virtual space, it is suggested that the influential factor in the field of new media such as the internet and social networks in the virtual space be more thoroughly examined by researchers regarding its cognitive and academic performance implications for students.

## Highlights

### What Is Already Known?

The use of mobile phones is common among medical sciences students. Sometimes, students suffer problematic effects from mobile phone usage.

### What Does This Study Add?

Loneliness, alexithymia and distress tolerance have a direct relationship with problematic use of cell-phone. Distress tolerance indirectly affects the relationship between feeling loneliness, alexithymia and problematic use of cell-phone.

## Authors' Contributions

First author: study design, data collection, data analysis, manuscript revisions.

Other authors: study design, data analysis, draft preparation, manuscript revisions.

Five authors have read and approved the final version of the manuscript.

## Consent For Publication

We consent to the publication of this paper.

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## Conflict of Interest

The authors declare no conflicts of interest.

## Ethics approval

Principles of confidentiality, informed consent, and respect for participants' rights were observed in this study. Before completing the questionnaires, oral informed consent was obtained from the participants. The personal information of the participants was kept confidential throughout the study. All data were analyzed and reported without including any information that could reveal the participants' identity.

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