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A Three-factor Model of Social Media Addiction

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Abstract
Introduction. Social media addiction is one of the most widespread non-medical addictions. Its numerous negative consequences have created a psychological problem, which has made it essential to study factors of social media addiction. The corresponding model can solve the problem and add insight into the factor structure. This study aims to construct such a model. We hypothesized that the 'psychological state' factor plays a dominant role in this model. **Methods**. We used exploratory and confirmatory factor analysis to examine the social media addiction factor structure. Also were used Kendall's nonparametric correlations and Pearson's parametric correlations. Used software: R-based statistic tools, Jamovi, IBM SPSS-22. Respondents: 618 social media users (430 women aged 16–76 years, M = 37.01; 188 men aged 16–67 years, M = 31.3). **Results and Discussion**. The model of social media addiction includes three factors – 'psychological state', 'communication', and 'information receiving'. A reliability index for the model was 0.828 (p-value < 0.001). We confirmed the initial hypothesis. Moreover, correlations of the 'psychological state' factor with anxiety, depression, loneliness, extraversion, self-esteem, and life satisfaction (closely related to social media addiction) exceed the correlations of other factors and the Inventory as a whole. A stronger correlation between the 'psychological state' factor and the personality states mentioned above and traits explains greater social media addiction severity among females. In different societies, the model of social media addiction may have a fundamentally different factor structure. The three-factor model of social media addiction demonstrated a high degree of reliability. The model adequately describes the essence of this kind of addiction and may be used to examine theoretical and practical perspectives of this problem.

Keywords
social media, addiction, addiction inventory, consequences of addiction, factor model, psychological state, communication, information receiving, personality traits, gender factor

Highlights
- We constructed the three-factor model of social media addiction that consists of the following factors: 'psychological state', 'communication', and 'information receiving'.

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- The 'psychological state' factor plays a dominant role in this model, explaining users' main motivations to use social media.
- More social media addiction severity among females has been explained by stronger correlations between the 'psychological state' factor and those personality traits and states closely related to social media addiction.
- The three-factor model demonstrated a high degree of reliability.
- The model explains the essence of social media addiction and may be used to examine theoretical and practical perspectives of this problem.

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Introduction

Social media are increasingly penetrating every aspect of our everyday lives. Today, many individuals spend more time communicating online than offline communication.

The use of social media is increasing and has already reached over one-third of the world's population. The number of social media users is growing by 10 % annually. Besides, during the COVID-19 pandemic, individuals began to spend more time on social media (Kashif, A.-U.-R., & Javed, 2020). Thus, if before the pandemic, the maximum time spent on social media was on Sundays (which is quite natural), now it is on Tuesdays when individuals work and study.

Social media seriously affect the lifestyle and psychology of individuals. This makes studying the phenomenon and its impact on modern life's aspects the most critical issue.

Many studies carried out in the USA, Germany, Great Britain, China, the Republic of Korea, Israel, Turkey, Afghanistan, Bangladesh, and so on, present numerous experimental results on social media addiction and its associations with personality states and traits of their active users.

We only use the reliability results in this study since they were obtained from numerous authors' studies. Social media addiction is associated with depression and anxiety. Moreover, the most addictive and active users of social media tend to develop symptoms of depression and anxiety more quickly (Sheinov, 2021).

In a study involving a sample of German participants, Facebook addiction was associated with personality narcissism and mental health disorders (depression, anxiety, and stress symptoms) (Brailovskaia & Margraf, 2017). The association between social media addiction and anxiety has been shown in other works (Liu & Ma, 2020; Baltaci, 2019). The association between social media addiction and depression has been established in numerous studies (Dailey, Howard, Roming, Ceballos, & Grimes, 2020; Al Mamun & Griffiths, 2019; Dalvi-Esfahani, Niknafs, Kuss, Nilashi, & Afrough, 2019).

Highly neurotic individuals are more likely to experience negative emotions and social anxiety. Therefore, they may prefer online communication where they have the opportunity to portray an idealized image of themselves to seek confirmation of this image, attract social support, and improve their mood. These motives lead to increased social media addiction and its use (Abbasi & Drouin, 2019). For both extroverts and neurotics, receiving positive feedback from the increased activity is associated with an increased risk of social media addiction (Marengo, Poletti, & Settanni, 2020).

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There was a moderate negative correlation among life satisfaction, self-esteem, and social media addiction (Guven, 2019). For example, Facebook addiction was associated with lower self-esteem and negatively affected life satisfaction (Acar, Avcılar, Yazıcı, & Bostancı, 2020; Andreassen, Pallesen, & Griffiths, 2017; Błachnio, Przepiorka, & Pantic, 2016; Şahin, 2017).

Other studies have also shown that overuse of social media is negatively associated with self-esteem, which, in turn, is negatively associated with life satisfaction. Moreover, self-esteem mediates the impact of social media addiction on life satisfaction (Hawi & Samaha, 2017). Besides, the coefficient of negative correlation between the level of self-esteem and social media addiction is significantly higher for users who have more than 500 subscribers (Köse & Doğan, 2019).

Loneliness and depression are the most important predictors of social media addiction (Dalvi-Esfahani et al., 2019). Indeed, the risk of Facebook addiction is higher if an individual experiences loneliness (Al Mamun & Griffiths, 2019; Andreassen et al., 2017). In general, there is a positive relationship between social media addiction and the level of loneliness (Baltaci, 2019).

The negative consequences of social media addiction (depression, anxiety, stress symptoms, loneliness, low self-esteem, neuroticism, and dissatisfaction with life) may lead to the exploitation of the victims of this addiction (Sheinov, 2019a). Social media addiction makes an individual vulnerable to cyberbullying (Sheinov, 2019b) and other manipulations on the Internet.

Thus, social media addiction has created an urgent psychological problem that still awaits investigation.

Understanding the psychological mechanisms of such an addiction may be facilitated by identifying its factors and their roles. This approach may be implemented by developing and analyzing a factor model of social media addiction.

The analysis of the current state of the subject area showed that in the Russian-speaking society, there are no studies on factor models of social media addiction, which (in combination with the above-stated considerations) indicates the importance of this study.

The *object* of this study is social media addiction; the *subject* is a factor model of social media addiction.

This *study aims* to identify factors of social media addiction and analyze the model of this addiction.

This *paper aims* to develop and analyze a factor model of this addiction.

We *hypothesized* that social media users' 'psychological state' factor exerts the most significant influence on social media addiction.

Research objectives were as follows: (a) to construct a factor model of social media addiction; (b) to analyze its factors; (c) to determine the degree of reliability of the model; (d) to find out the role of factors in the model of social media addiction; (e) to examine the impact of the factors among men and women; (f) to find out whether society affects the factor structure of the model of social media addiction.

These objectives are consistent with the aim of the study. The first two objectives meet this aim directly, and the research logic dictates the following purposes. Thus, having received and analyzed the factor model of social media addiction, we must be sure of its reliability and find out the role of its factors, including the influence that gender and social environment exerts on them.

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Methods

Sample

A large group of active social media users agreed to participate in our study in response to the following invitation: "Dear colleague! We invite you to participate in the study examining the influence of social media on the psychological states of their users. Your answers to the test questions will help a psychologist discover and inform you about your personality traits that you do not even know. You will explore yourself anonymously and completely for free while facilitating psychological science development. The program will process your responses. Therefore, you will receive information about your traits no later than 1 hour after you sent your last response. We wish you success in self-knowledge!"

The study sample comprised 618 respondents, 430 of whom were women aged 16–76 years (M = 37.01; SD = 9.6) and 188 of whom were men aged 16–67 years (M = 31.3; SD = 9.5).

Assessment tools

This study used the Social Media Addiction Inventory (Sheinov & Dziavitsyn, 2021).

We assessed *anxiety* and *depression* using the Hospital Anxiety and Depression Scale (HADS), developed by A. S. Zigmond and R. P. Snaith and modified by M. Yu. Drobizhev (see Belova et al., 2002, pp. 80–82).

Life satisfaction was assessed using the questionnaire by E. Diener, R. A. Emmons, R. J. Larsen, and S. Griffin, modified in Russian and validated by E. N. Osin and D. A. Leont'ev (Osin & Leont'ev, 2008).

We assessed the *degree of loneliness* using the UCLA Loneliness Scale by D. Russell and M. Ferguson (Raigorodskii, 2002, pp. 77–78).

Extraversion, neuroticism, and *social desirability* of responses were diagnosed using the well-known Eysenck Personality Inventory, EPI (see Rimskii & Rimskii, 1995, pp. 217–224). We assessed *self-esteem* using the diagnostic tool by R. V. Ovcharova (Assessing self-esteem of adolescents..., n.d.).

Statistical analysis was carried out using the SPSS-22 package, the R-based open-source software Jamovi), and specialized statistical modules. The accepted level of significance was p = 0.05.

Results and Discussion

This section is structured following the sequence of the objectives: (a) to construct a factor model of social media addiction; (b) to analyze its factors; (c) to determine the degree of reliability of the model; (d) to find out the role of the factors in the model of social media addiction; (e) to examine the impact of the factors among men and women; (f) to find out whether society affects the factor structure of the model of social media addiction.

1. Constructing the factor model

Testing 618 social media users with the Social Media Addiction Inventory (Sheinov & Dziavitsyn, 2021) was the initial material for constructing the model. These materials have been analyzed using descriptive statistics and tested for the distribution of values.

The variables in this Inventory have the same scales, and the overall score is calculated of their sum. Therefore, all these variables are within predictable boundaries. The standard deviation of the variables is close to 1, which indicates that the results are grouped relative to the mean

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scores and that they have a low degree of uncertainty. All these criteria indicate the reliability of the subjects' answers.

The distribution of questions answers is close to normal, which is confirmed by the quantile-quantile plot and the Shapiro–Wilk test. That indicates that the data may be subjected be factor analysis.

Exploratory factor analysis. Exploratory factor analysis was carried out using the R-based open-source software Jamovi and specialized statistical modules.

For modeling, we chose the method of minimum residuals factor extraction using oblique rotations. This choice may be explained by the fact that the questions in the Inventory have hidden connections, and the general system is far from orthogonality.

Exploratory factor analysis underlay an initial three-factor model (Table 1).

Table 1
General (initial) three-factor model

Inventory items	Factor 1	Factor 2	Factor 3
4	**0.685**		
2	**0.661**		
6	**0.592**		
15	**0.552**		
12	0.512		
1	0.507		
11	0.369		
8		**0.564**	
5		0.473	
3		0.380	
7		*0.310*	*0.305*
14		*0.274*	
10			**0.644**
13			**0.585**
9			0.421

Note: different types rank variables according to the degree of their influence on the result – the highest one is in bold, the lowest one is in italics.

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The initial three-factor model describes more than 36 % of the total variance. We tested this model using four statistical tests.

The *Bartlett test* showed the following: Chi-square = 2365, Df = 105, p-value < 0.001. According to the test results, we can conclude that the model has a significant 'margin of safety', and the compatibility scores are tens of times higher than those sufficient to pass the test successfully.

In the *Kaiser-Meyer-Olkin test*, we obtained KMO = 0.915, which is remarkable (Kaiser, 1974, p. 33). Such a high measure indicates that the resulting description of the factors is the best possible.

The *RMSEA* (root mean square error of approximation) value is 0.0386 (acceptable value < 0.08), which indicates an excellent fit index.

The TLI/NNFI test value is 0.957 (acceptable value 0.95), which indicates an excellent fit index.

Thus, checking against all the available tests has shown the reliability of our model.

2. Analyzing the identified factors

Variables (test questions) were distributed according to 3 factors; insignificant variables were not considered at this stage. Significant variables (with their numbers in the Inventory and content) were distributed as follows:

Factor 1:

4. How often do you use social media to get away from personal problems?
2. How often do you feel an irresistible urge to access social media platforms?
6. How often do you feel irritable and anxious when you cannot visit your page on a social media platform?
15. How often do you suffer because your favorite social media platform does not work?
12. How often do your visits to social media platforms improve your mood?
1. How often do you stay online for more than 2 hours a day?
11. How often are you late for work or study after a night spent on social media?

Factor 2:

8. How often do you feel the need to add photos to your social media album?
5. How often do you update your page?
3. How often do you spend time thinking about social media and planning actions in it?

Factor 3:

10. How often do you get all the news via social media?
13. How often do you discuss news on social media with friends?
9. How often do you check your phone for updates on social media?

From this grouping, we may conclude the purpose of the factors:

1. Factor 1 – 'psychological state' of a social media user.
2. Factor 2 – 'communication' of a social media user.
3. Factor 3 – 'receiving information' by a social media user.

This three-factor model was taken as the basis for further research.

Assessing insignificant variables. To confirm the results, we carried out a confirmatory analysis of male and female samples using the values of the factors as the sums of the variables included in them; the correlations were verified by multivariate modeling and reliability analyses.

As a result, insignificant variables were distributed as follows: variable no. 7 – into the 'information' factor, variable no. 14 – into the 'psychological state' factor.

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Therefore, we obtain a logical model for the formulation of questions, which is confirmed by correlation analysis and multivariate modeling.

3. Determining the degree of reliability of the constructed model

Confirmatory factor analysis of the *model refined on the entire sample*, composed of male and female samples, showed an average factor loading of the variables equal to 0.561 and an average standard deviation of 0.039. Testing the model on the entire sample showed Chi-square = 210, Df = 87, and p-value < 0.001. The standard deviation of the RMSEA was equal to 0.0479, which is a good indicator, as it is significantly below the threshold value of 0.08.

Confirmatory factor analysis of the *model refined on the male sample* also showed a good average factor loading (0.504) and an average standard deviation of 0.074. Testing the model on the male sample showed Chi-square = 182, Df = 87, and p-value < 0.001. The standard deviation of the RMSEA was equal to 0.0764.

Confirmatory factor analysis of the *model refined on the female sample* also showed a higher average factor loading of 0.577 and an average standard deviation of 0.046. Testing the model on the female sample showed Chi-square = 184, Df = 87, and p-value < 0.001. The standard deviation of the RMSEA was equal to 0.0510.

Thus, the model passed all statistical tests on the entire, male, and female samples. However, the model coefficients are different in the male and female samples, being more stable in the female sample, and a more excellent distribution of values characterizes the male sample.

The following coefficients characterize the reliability of the three-factor model: Cronbach's alpha = 0.805 and McDonald's omega = 0.828, which indicates a *high degree of reliability* (McDonald's omega turned out to be higher than Cronbach's alpha since the model has various factor loadings – in such cases, Cronbach's alpha is calculated with underestimation, and McDonald's omega shows the actual value of Cronbach's alpha).

The study presented above was initially carried out on a sample of 514 respondents, then on a sample of 618 respondents (this option is described above). With an increase in the number of respondents, the model's coefficients improved, which indicates that when constructing the model, we made correct assumptions and is an additional confirmation of its statistical validity.

Thus, the analysis and testing of the three-factor model fully confirmed its consistency and reliability, including data with a different structure of connections (male and female samples). Using correlation analysis, this model makes it possible to answer the question about associations between social media addiction and personality traits and states of their users.

4. The role of factors in the social media addiction model

The choice of methods of correlation analysis. Before identifying possible relationships, it is necessary to determine which methods are acceptable to use. We answered this question using the one-sample Kolmogorov–Smirnov test, which identifies the correspondence of the experimental samples to normal distribution.

Applying this criterion showed that the distribution of some of the studied variables differs from the normal distribution. Therefore, it would be better to identify correlations between variables using the nonparametric Kendall coefficient, which establishes linear and nonlinear relationships. For comparison, we also calculated Pearson correlations.

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Tables 2–3 show Kendall's correlations of the identified factors and the social media dependency questionnaire with states and personality traits that are closely related (Sheinov & Dziavitsyn, 2021) with social media addiction.

Table 2
Kendall rank correlation coefficients for the factors of social media addiction and personality traits and states among women

Factors	A	D	LS	SE	L	Ex	N	SDR
Psychological state	**0.285****	**0.256****	**–0.169****	**–0.089****	**0.206****	**0.281****	**–0.096****	**–0.072***
Communication	**0.130****	**0.094****	–0.056	0.004	0.047	**0.149****	**0.107****	–0.009
Information	**0.176****	**0.108****	**–0.071***	–0.057	**0.114****	**0.173****	–0.047	**–0.090***
Social media addiction	**0.249****	**0.200****	**–0.135****	–0.061	**0.168****	**0.251****	–0.045	**–0.072***

Notes (in tables 2–3): A – anxiety, *D* – dispersion, *LS* – life satisfaction, *SE* – self-esteem, *L* – loneliness, *Ex* – extraversion, *N* – neuroticism, *SDR* – socially desirable responding, *social media addiction* – values from the Social Media Addiction Inventory; ** – the correlation is statistically significant at *p = 0.01*; * – the correlation is statistically significant at *p = 0.05*; statistically significant correlations are in bold.

Table 3
Kendall rank correlation coefficients for the factors of social media addiction and personality traits and states among men

Factors	A	D	LS	SE	L	Ex	N	SDR
Psychological state	**0.196****	**0.207****	**–0.151****	**–0.105***	**0.140****	**0.247****	–0.033	0.015
Communication	**0.212****	0.055	–0.016	–0.052	0.076	**0.132***	0.098	0.091
Information	**0.152****	0.096	–0.075	–0.066	**0.145****	**0.133***	0.040	0.031
Social media addiction	**0.215****	**0.158****	**–0.104***	–0.090	**0.153****	**0.214****	0.026	0.051

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We present only Kendall rank correlation coefficients here because Pearson correlations, exceeding them quantitatively, show the same relationships as in Tables 2 and 3.

These tables demonstrate a clear predominance of the 'psychological state' factor in the associations of women and men. Moreover, the association of the 'psychological state' factor with personality states and traits closely related to social media addiction is more potent than in the Social Media Addiction Inventory, which indicates the leading role of the psychological factor in the development of social media addiction.

The associations of social media addiction presented in Tables 2 and 3 emphasize the importance of this problem and provide new insights into this subject area. Our findings are in line with those of many researchers from different countries. Thus, numerous studies have shown that social media addiction has positive correlations with *depression* and *anxiety* (Sheinov & Dziavitsyn, 2021; Al Mamun & Griffiths, 2019; Baltaci, 2019; Brailovskaia & Margraf, 2017; Dailey et al., 2020; Dalvi-Esfahani et al., 2019; Liu & Ma, 2020), negative correlations with *life satisfaction* and *self-esteem* (Sheinov & Dziavitsyn, 2021; Acar et al., 2020; Andreassen et al., 2017; Błachnio et al., 2016; Şahin, 2017), and a positive correlation with *loneliness* (Sheinov & Dziavitsyn, 2021; Al Mamun & Griffiths, 2019; Andreassen et al., 2017; Baltaci, 2019; Dalvi-Esfahani et al., 2019).

The above result on the dominant role of the 'psychological state' factor of social media addiction (and, accordingly, in its factor model) is explained by the highly significant correlations established in Tables 2 and 3 with personality traits directly related to psychological states, including depression, anxiety, low self-esteem, loneliness, and dissatisfaction with life.

The 'communication' factor is more decisive in women; it is associated with depression, extraversion, and neuroticism. The 'information' factor is associated with anxiety, depression, and extraversion. In men, the 'information' factor is more strongly associated with loneliness.

Particular attention should be paid to the 'self-esteem' variable, which demonstrated associations with the 'psychological state' factor for men and women. However, the associations between the Inventory and this variable are statistically insignificant because this association is absent for two other factors. What explains why there was a discrepancy with negative associations between social media addiction and self-esteem established in numerous studies (Andreassen et al., 2017; Błachnio et al., 2016; Guven, 2019).

The situation is similar to the female sample's 'neuroticism' variable (Abbasi & Drouin, 2019; Marengo et al., 2020). There were no associations with neuroticism in the male sample for social media addiction and all the factors forming this addiction. In the female sample, the associations between neuroticism and the factors of 'psychological state' and 'communication' are multidirectional and neutralize each other.

5. The impact of factors of social media addiction in men and women

We have previously found that the female gender is associated with higher levels of social media addiction (Andreassen et al., 2017; Chung, Morshidi, Yoong, & Thian, 2019; Turel, Poppa, & Gil-Or, 2018; Sheinov & Dziavitsyn, 2021). It is natural to determine the role of the predominant factor of social media addiction – 'psychological state'.

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Table 4
Kendall rank correlation coefficients for the factor 'psychological state' and personality traits and states among women and men

	A	D	LS	SE	L	Ex	N	SDR
Women	**0.285****	**0.256****	**–0.169****	**–0.089****	**0.206****	**0.281****	**–0.096****	**–0.072***
Men	**0.196****	**0.207****	**–0.151****	**–0.105***	**0.140****	**0.247****	–0.033	0.015

Table 4 shows that a higher level of social media addiction among women is explained by stronger associations of their 'psychological state' factor with personality states and traits closely related to this addiction.

In the female sample, we observed strong associations of the 'psychological state' factor with anxiety, depression, dissatisfaction with life, and loneliness, with the most difficult mental states.

6. The impact of society on the factor structure of social media addiction

The analysis of the current state of the subject area related to the aim of this paper – a factor model of social media addiction – revealed the presence of three relevant studies and the absence of Russian-language publications.

When starting the study, we did not make any assumptions about the number of possible factors in the model of social media addiction. The three-factor model was revealed by exploratory analysis and confirmed by confirmatory analysis. Meanwhile, some researchers showed that a two-factor model is the most suitable for their society (Vintilă, Tudorel, Goian, & Bărbat, 2021), and others demonstrated that the five-factor model is more suitable for respondents from their countries (Hassim, Arifin, Kueh, & Yaacob, 2020; Pavia, Cavani, Di Blasi, & Giordano, 2016).

For the Russian-speaking society, the factor model of social media addiction includes three factors. Therefore, we conclude that this model may have a fundamentally different structure for different cultures, which may be explained by the manifestation of differences in the mentality of respondents.

Conclusion

The *implications of this study* include theoretical hypotheses and aims and research hypotheses for empirical research.

Most of the users log in to social media sites via their smartphones. That is, social media addiction should give rise to smartphone addiction (theoretical *hypothesis* no. 1). Will the factorial model of smartphone addiction reproduce the factorial model of social media addiction? Preliminary results suggest that this will be a fundamentally different model. It is theoretical hypothesis no. 2. Both hypotheses define the objectives and research hypotheses for relevant empirical research.

In practical terms, the result of this study, showing that in the model, the dominant role is played by the factor of the social media user's 'psychological state', may be used by teachers and psychologists of educational institutions, contributing to tremendous success in explaining dangers of excessive enthusiasm for social media use among schoolchildren and students.

Conclusions

Summarizing the results obtained above, we state the following.

We constructed and analyzed the model of social media addiction that includes three factors – 'psychological state', 'communication', and 'information'.

The analysis of the model showed the predominant influence of the factor of 'psychological state' on social media addiction, which confirms the validity of the research hypothesis.

The association of the 'psychological state' factor with anxiety, depression, loneliness, extraversion, self-esteem, and life satisfaction (closely related to social media addiction) is the strongest among the factors, exceeding the correlation of other factors and the Inventory as a whole.

Women's more significant social media addiction is explained by stronger associations of their 'psychological state' factor with the personality traits and states mentioned above.

We proved that our model is reliable and fully represents all the factors contributing to social media addiction. This model may be a valuable tool in studying social media addiction in theoretical and practical terms.

For different societies, the factorial model of social media addiction may have a fundamentally different structure.

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Author Contributions

V. P. Sheinov contributed to the design and implementation of the research, developed research aims, objectives, hypotheses, and methods, collected the data, determined the role of the factors revealed by the study, performed the analysis, made conclusions, and compiled the list of references.

A. S. Dziavitsyn collected the data, developed the factor model, determined the role of the factors revealed by the study, assessed the reliability of the three-factor model, performed the analysis, and made conclusions.

The authors declare no conflicts of interest.