Salud, Ciencia y Tecnología. 2023; 3:328
doi: 10.56294/saludcyt2023328

ORIGINAL

Psychometric Properties and Measurement Invariance of The Fear of Missing Out Scale (FoMOs) In Chilean University Students

Propiedades Psicométricas e Invarianza de Medida de la Escala de Miedo a Perderse Algo (FoMOs) en Estudiantes Universitarios Chilenos

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Cite as: Martínez-Líbano J, Torres-Vallejos J, Gonzalez Campusano N, Pereira Castillo J, Simkin H, Oya-nedel JC, Yeomans M-M. Propiedades Psicométricas e Invarianza de Medida de la Escala de Miedo a Perderse Algo (FoMOs) en Estudiantes Universitarios Chilenos. Salud Cienc. Tecnol. 2023;3:328. https://doi.org/10.56294/saludcyt2023328

Submitted: 20-02-2023 **Revised:** 10-03-2023 **Accepted:** 01-04-2023 **Published:** 02-04-2023

Editor: Prof. Dr. Javier González Argote

ABSTRACT

Introduction: social networks can harm university students' mental health; therefore, it is urgent to have valid instruments to measure new phenomena such as FoMO.
Objective: this study aimed to examine the psychometric properties of the Fear of Missing Out Scale (FoMOs) in a sample of Chilean university students.
Methods: confirmatory factor analyses (CFA) were carried out and estimated using the Weighted Leasts Square Means and Variance (WLSMV).
Results: the FoMOs evaluation had an internal consistency of 0,863 (Cronbach's Alpha). The confirmatory factor analysis (CFA) showed two factors and good indicators: CFI = 0,991, TLI = 0,987, and an RMSEA of 0,054.
Conclusion: the FoMOs is a good instrument for measuring the fear of missing out in the Chilean University population.

Keywords: FOMO; Fear of Missing Out; Psychometric Properties; University Students.

RESUMEN

Introducción: las redes sociales pueden dañar la salud mental de los estudiantes universitarios; por lo tanto, es urgente contar con instrumentos válidos para medir nuevos fenómenos como el miedo a perderse de algo (FoMO).
Objetivo: el objetivo de este estudio fue examinar las propiedades psicométricas de la Escala de Miedo a Perderse de algo (FoMOs) en una muestra de estudiantes universitarios chilenos.
Métodos: se realizó un análisis factoriales confirmatorios (CFA) y se estimaron utilizando el método de la varianza y los mínimos cuadrados ponderados (WLSMV).
Resultados: la evaluación de FoMOs tuvo una consistencia interna de 0,863 (Alfa de Cronbach). El análisis factorial confirmatorio (CFA) mostró dos factores y buenos indicadores: CFI = 0,991, TLI = 0,987 y un RMSEA de 0,054.
Conclusión: el FoMOs es un buen instrumento para medir el miedo a perderse en la población universitaria chilena.

Palabras clave: FOMO; Miedo a Perderse de Algo; Propiedades Psicométricas; Estudiantes Universitarios.

INTRODUCTION

In August 2022, social network users worldwide represented 4,62 billion, equivalent to 58,4 % of the population. In Chile, in January 2022, there were 17,85 million social network users, equal to 92,8 % of the total population. [1] Studies show that social networks can contribute to developing mental health problems.[2,3,4] Prolonged exposure of adolescents to these networks can cause severe problems in their personal development and generate dangerous addictions and other mental health disorders.[5] Additionally, social networks are designed to produce dependence.[6] Social networks enable individuals to share information, documents, images, videos, and music in virtual worlds, disturbing their lives.[7] Among the most evident consequences of being "trapped" in social networks are forgetting one's identity, losing freedom, and being managed regarding likes, thoughts, and decisions.[8] A recent systematic review on using social networks in university students found that excessive use correlates with depression, anxiety, stress, Internet addiction, learning problems, sleep disorders, and FoMO.[9]

FoMO is a pervasive apprehension that others may be having rewarding experiences from which one is absent.[10] Therefore, people constantly worry about what others are doing online and feel unable to disconnect in case they miss something. [11] The above may generate young people to spend more time on social networks interacting and posting their activities as a central element of their life.[12,13] Thus, the fear of missing out on something important generates distress,[14,15] triggering individuals' need to stay connected, regardless of any cost or consequence.[16] Likewise, other studies explain that FoMO mediates a person's mental health, particularly in feelings of loneliness, anxiety, and depression, influencing emotional well-being, sleep quality, and alcohol consumption.[17] FoMO has been correlated with various health problems, such as sleep disorders,[18] depression,[19,20] psychological distress,[21,22] loneliness ,[23,24] problematic use of social networks,[25,26,27] problematic use of smartphones,[28,29] self-esteem issues,[30] eating disorders,[31] and drinking issues,[32] among others. The psychometric properties of the FoMO scale have been studied and validated in populations from several countries, such as Turkey,[11,33] African Americans in the U.S.A.,[34] China,[35,36] Indonesia,[37,38] Peru,[39] and Italy.[40] On the other hand, the degree of reliability from Cronbach's alpha has been reported in various degrees, such as 0,75,[41] 0,82,[42] 0,86,[43] and 0,90.[44] However, FoMO has not been studied in the Chilean population.

The mental health problems of Chileans and the massive globalization of the use of social networks in Chile create the need to investigate and understand the adverse effects that the constant use of these social networks can bring. Therefore, it is necessary to have validated psychological scales that measure phenomena such as FoMO in the Chilean population.

METHODS

Desing

This research design was instrumental as it attempts to analyze the psychometric properties of psychological measurement instruments. [45]

Participants and Procedure

The participants were 357 university students, all over 18 years of age, of whom 253 were women (70,9 %) and 103 men (28,9 %). The mean age was 27,32 years (SD = 7,9), ranging from 18 to 57 years. The sample size was defined under the most demanding recommendations for conducting an EFA, which indicates an ideal number of 300 to 400 participants or 20 participants per item.[46] Before answering the questionnaires, the participants had to approve the informed consent of the research, given that they were freely participating in this reinvestigation. The ethics committee approved the study under registration no. 90 660/2022, of the Universidad Andrés Bello, Chile.

Instruments

A simple sociodemographic questionnaire and two psychometric scales were used in this research.

Fear of Missing Out Scale (FoMOs): [47] this scale consists of 10 items, where statements related to the fears and concerns that the individual may experience concerning being out of touch with the experiences of their extended social environment through Social Networks are applied.[48] Some of the statements used to measure this scale in our sample are "Sometimes I wonder if I spend too much time paying attention to what is going on," "When I miss a meeting with friends, it bothers me," and "When I go on vacation, I keep an eye on what my friends are doing." The original scale was in English,[10] so the back-translation method was used, in which a professional translator translated the initial questionnaire. It was subsequently reviewed by two experienced bilingual researchers, who made minor adjustments to carry out the application. The reliability and validity of the instrument are described in detail in the results section of this article.

Depression, Anxiety, and Stress Scale (DASS – 21):[49] this psychometric scale consists of 21 items, where contextual statements about the mental state that the person has recently experienced are used.[50] Some of the representative statements raised in this questionnaire concerning recent experiences are "I found it hard to motivate myself to do things," "I got out of control in certain situations," "I felt I was very nervous," and "I was

worried about situations in which I could panic and make a fool of myself." In these scales, the variables were posed through Likert scales, with ratings from: "Strongly Agree to Disagree" and self-representation responses, "Not at all to Quite a lot" and "Describes me to Does not describe me."

Data Analysis

The statistical analysis consisted of several stages: first, a descriptive analysis of the items was performed, then a confirmatory factor analysis, and finally, concurrent validity was carried out through the DASS-21.

The statistical procedure was performed with SPSS version 25 software,[51] and the confirmatory factor analysis was performed using the Mplus 8,7: Base Program and Combination Add-On.[52]

The Confirmatory factor analysis was estimated using the Weighted Leasts Square Means and Variance (WLSMV) estimation method. The goodness of fit was calculated, including the Chi-square statistic, the comparative fit index (CFI > ,90), the Tucker-Lewis index (TLI > ,90), the standardized root mean square residual (SRMR < ,08), and the root mean square error of approximation (RMSEA < ,07).[53]

Invariance between gender (male and female) groups was tested by measuring at three levels: configural, metric, and scalar. To provide evidence for invariance, it was expected a non-significant change in $x^{2(54)}$ or a change in the CFA (ΔCFI) < ,10,[55,57] supplemented by the change in the RMSEA (ΔRMSEA) ≤ ,015.[58]

RESULTS

Descriptive Analysis

Descriptive statistics and polychoric correlations of the FoMOs are summarized as follows (table 1).

Table 1. Descriptive analysis of the items

	Descriptive statistics				Polychoric correlations									
Items	**M**	**SD**	**Skewness**	**Kurtosis**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Item 1	2,93	1,26	0,175	-,920	-									
Item 2	2,39	1,26	0,557	-,703	,352***	-								
Item 3	2,10	1,17	0,806	-,304	,416***	,379***	-							
Item 4	1,76	1,18	1,541	1,296	,412***	,514***	,518***	-						
Item 5	1,34	0,85	2,806	7,45	,421***	,448***	,658***	,788***	-					
Item 6	1,41	0,97	2,59	6,02	,428***	,421***	,481***	,713***	,817***	-				
Item 7	2,22	1,31	0,839	-,394	,402***	,371***	,402***	,579***	,543***	,556***	-			
Item 8	2,02	1,19	1,039	,155	,294***	,573***	,413***	,563***	,557***	,591***	,572***	-		
Item 9	1,51	1,05	2,157	3,637	,471***	,440***	,383***	,640***	,675***	,899***	,613***	,573***	-	
Item 10	1,94	1,13	1,055	,275	,386**	,299***	,358***	,450***	,577***	,564***	,384***	,371***	,486***	-

Note: *** p < ,001

Instrument reliability

Cronbach's alpha was used to analyze the reliability of the instrument. Table 3 shows the correlations between the items. The reliability of the FoMOs, including all items, was ,863, so it would present excellent reliability (table 2).[59,60]

Table 2. Corrected item correlation and Cronbach's alpha if the item is removed

Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	,461	,861
Item 2	,485	,859
Item 3	,513	,856
Item 4	,692	,840
Item 5	,652	,847
Item 6	,689	,843
Item 7	,591	,849
Item 8	,596	,848
Item 9	,663	,844
Item 10	,505	,856

Construct Validity

The Kaiser-Meyer-Olkin value index was 0,895, and Bartlett's test of sphericity was significant (x^2 = 2 862,399; p ≤ 0,001). With these results, we can proceed to perform the confirmatory factor analysis.

Confirmatory Factor Analysis (CFA).

The confirmatory factor analysis is presented in figure 1 and table 3. According to the indicators, we can observe that the FoMOs scale shows two factors, Fear and Social Concern (FSC) and Fear of missing something great (FMS). Good fit indicators after adjusting with a CFI = ,991, TLI = ,987, and an RMSEA = ,054. Therefore, we can assure that the scale has a good fit given that the CFI and TLI are higher than 0,9 and the RMSEA is lower than 0,08.[61]

Table 3. Confirmatory factor analysis goodness-of-fit indicators for the proposed two-factor model

Incremental Fit Measures					Parsimony Fit Measures			
CFI	**TLI**	**IFI**	**NFI**	**RMSEA**	**PRATIO**	**PCFI**	**PNFI**	**AIC**
,991	,987	,953	0,934	,054	,689	,657	,643	148,213

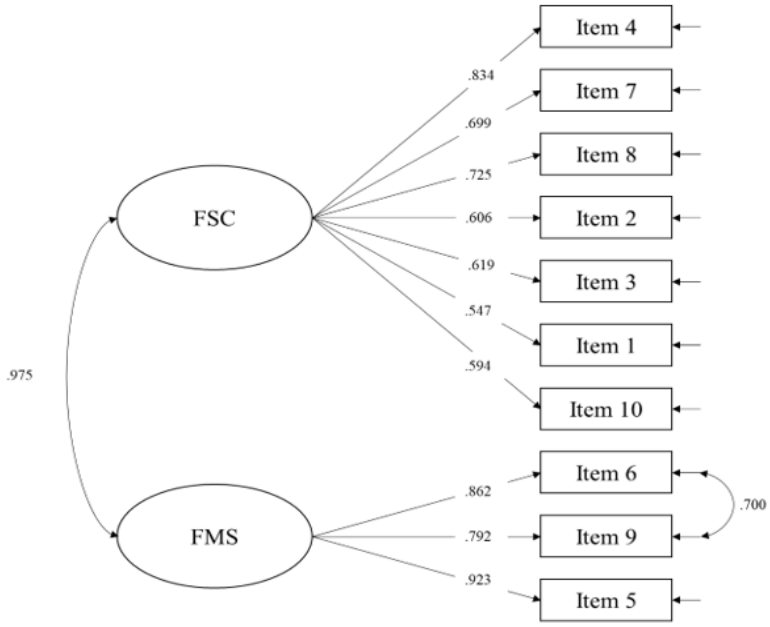

Figure 1. Confirmatory Factor Analysis Graphic

As we can see, the fit of the proposed Chilean version of FoMOs presents better goodness of fit indices compared to the original version[10] and the Arabic version.[48] Such results and comparisons can be seen in table 4.

Table 4. Model comparisons of the FoMOs based on confirmatory analyses

	x^2 (df)	CFI	TLI	RMSEA	SRMR
Single-factor model Original (a)	136,778*** (35)	,972	,964	,090 [,075, ,107]	,048
Two factors model Arabic Version (b)	131.020*** (34)	,973	,964	,090 [,074, ,106]	,048
Proposed two-correlated factors (Item 6 ↔ Item 9)	91.628*** (33)	,984	,978	,071 [,054, ,088]	,039

(a)[47] (b) [48]

Measurement Invariance

Measurement invariance evidence is necessary for meaningfully comparing groups. The measurement invariance of the proposed two-correlated factors was tested between gender (male and female). The fit for the configural model was good (x^2 = 137,097, p > ,001; CFI = ,982; RMSEA = ,078). When the factor loadings are constrained to be equal across groups, the metric model also showed a good fit (x^2 = 142,549, p > ,001; CFI = ,983; RMSEA = ,072). According to the threshold described in the data analysis, CFI and RMSEA changes are lower than ,01, assuming the metric invariance of the model. Later, scalar invariance was assessed, showing an excellent fit (x^2 = 158,886, p > ,001; CFI = ,986; RMSEA = ,056). A scalar invariance for the proposed two-factor model can be assumed according to the expected threshold. See table 5.

Table 5. Measurement invariance test for the proposed two-correlated factor model for the FoMO Scale

	x^2 (df)	CFI	RMSEA	SRMR	ΔCFI	ΔRMSEA	x^2 p-value
Configural	137,097*** (66)	,982	,078 [,059, ,096]	,047			
Metric	142,549*** (74)	,983	,072 [,054, ,090]	,048	,001	,006	> ,05
Scalar	158,886*** (102)	,986	,056 [,038, ,072]	,050	,003	,003	> ,05

Convergent Validity

For the convergent validity of the FoMOs scale, the DASS-21, widely validated for the Chilean population, was used,[50,62,63] where it was found to be significant (p < ,001) (table 6).

Table 6. Correlations between the FoMOS and the DASS-21

	DASS-21		
	Depression	Anxiety	Stress
Total FoMO Scale	,423***	,442***	,439***
Fear and Social Concern (FSC)	,969***	,442***	,450***
Fear of missing something great (FMS)	,832***	,337***	,309***

Note. *** p < ,001.

DISCUSSION

This study aimed to analyze the psychometric properties of the Fear of Missing Out Scale (FoMOs) in a sample of Chilean university students.

Cronbach's alpha for the FoMOs was 0,863; the range between 0,8-0,9 is considered excellent,[60] so we can say that the scale has good reliability and also had convergent validity with the DASS-21 (p < ,001), which measures depression, anxiety, and depression validated for the Chilean population.

The confirmatory factor analysis showed good results after modifications with a CFI = 0,991, TLI = 0,987, and an RMSEA of 0,54. Therefore, we can assure that the scale has a good fit given that the CFI and TLI are higher than 0,9 and the RMSEA is lower than 0,054.[61]

In addition, two relevant factors can be found in the Chilean version of the FoMO. The first was fear and social concern (FSC); this can be understood given that the concern about being permanently present in social life is relevant for young people. Otherwise, the non-presence in social networks can generate anxiety.[64] Likewise, the above may be associated with anxiety disorders and depression,[65,66] eating disorders,[67] self-regulation, and social skills problems in life offline.[68]

A second factor was the fear of missing something great (FMS). The feeling of losing something fantastic in social networks and the exaltation of the relevance of what happens on them can generate in young people obsessive thoughts related to Internet use and lead to compulsive use of the Internet.[68]

These two factors, previously detected, can cause an increase in the excessive use of social networks and a higher level of FoMO, which can increase as the daily time that students spend on social networks increases,[69] even more so if university students are in the presence of the worst pandemic in history, it profoundly affects their mental health.[70] According to some research, this appears to contribute to smartphone addiction. Likewise, smartphone addiction can further increase social media overuse and the level of FoMO.[71] Some studies have described abstinence syndrome in young people who do not use their phones and social networks.[72]

Findings suggest that excessive social media use needs to be detected and addressed to prevent social media addiction and mental distress among youth.[73] These results should motivate us as researchers to continue delving into the Fear of Missing Out phenomenon, given that the FoMOs is a reliable scale for the Chilean university student population.

Limitations

One of the study's significant limitations is that the sample was drawn from a specific segment of the Chilean population, so the results of the psychometric analyses could not be extrapolated to others. Similarly, since an adequate number of samples is required to conduct the confirmatory factor analysis, taking samples with greater representativeness in higher education is essential. As a result, more instruments must be validated for psychological measures to be as specialized and specific as possible.

Furthermore, it is critical to begin with field studies on FOMO because, as demonstrated, it can profoundly affect university students' social, interpersonal, and personal lives; thus, we must continue studying this phenomenon within Chilean and Latin American culture.

CONCLUSIONS

The FoMOs is a self-applied scale, which showed a good reliability validity index in the Chilean population (0,863), with high convergent validity with the DASS-21 ($p < ,001$). The FoMOs showed good psychometric properties in a sample of Chilean university students. The confirmatory factor analysis (CFA) showed two factors and good indicators: CFI = 0,991, TLI = 0,987, and an RMSEA of 0,054. Finally, we can say that the FoMOs is a good instrument for measuring the fear of missing out on something in the Chilean population.

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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Informed consent was obtained from all patients to be included in the study and published in an open-access journal. The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee no. The ethics committee approved the study under registration no. 90 660/2022, of the Universidad Andrés Bello, Chile.

CONSENT FOR PUBLICATION

NA (Not applicable — no identifying human images were used in the study).

AVAILABILITY OF DATA AND MATERIALS

Data supporting reported results can be found as supplementary material.

COMPETING INTERESTS

The authors declare no conflict of interest.

FUNDING

This research received no external funding.

ACKNOWLEDGMENTS

We thank all the volunteer participants in this study.

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Funding acquisition: J.M.L., and M.M.Y.

All authors have read and agreed to the published version of the manuscript.