International Journal of Religion
2024
Volume: 5| Number 5 | pp. 165 – 175
ISSN: 2633-352X (Print) | ISSN: 2633-3538 (Online)
ijor.co.uk
DOI: https://doi.org/10.61707/hy9dwc69

Psychometric Review of the Smartphone Addiction Scale (EAS - IC) in Peruvian Adolescents

Fernando Joel Rosario Quiroz[1], Isabel Catherine Cueva Villanueva[2], Denegri -Velarde María Isabel[3], Tania Quiroz Quesada[4], Felix Cáceres Gálvez[5], Wilmer Infanzón Yaranga[6] and Rafael Romero-Carazas[7]

Abstract

The excessive use of smartphones has raised concerns about their impact on psychological and social well-being. This study developed and validated the Smartphone Addiction Scale (EAS - IC) in Peruvian adolescents. Three dimensions were examined: Smartphone Hobby, Frustration Tolerance, Interpersonal Relationships and Social Perception. A total of 1012 adolescents aged 13 to 17 years were included. Analyses showed that all items met homogeneity and validity criteria. Confirmatory Factor Analysis (CFA) indicated good fit for the original model and for gender groups. However, no overall factor was found, suggesting that the dimensions are independent. The alpha and omega coefficients showed good reliability for all dimensions and sex groups. The scale provides a valid and reliable tool to measure smartphone addiction in Peruvian adolescents, with direct scores and established percentiles. It highlights the importance of addressing this problem in the Peruvian context and adapting measurement tools to better understand its psychological and social implications. This study contributes to the development of instruments adapted to specific cultural contexts, addressing the need to better explore and understand smartphone addiction, especially among adolescents, a population vulnerable to its effects.

Keywords: *Addiction, Smartphone, Students, Psychometrics*

INTRODUCTION

Today, technological innovations have introduced a range of devices that seek to meet people's everyday needs in an increasingly efficient and rapid manner. Among these advances, smartphones, known as smartphones, have experienced exponential growth in both their technological development and global demand over the last two decades. According to data from Teleco (2012), the number of cell phone users in the world has increased significantly from 0.7 billion in 2000 to 6.3 billion during the third quarter of 2012, with China being the country with the largest number of users in that period.

However, this rapid increase in smartphone use has not only generated benefits for society, but has also raised concerns regarding its possible negative effects on the psychological and social well-being of individuals. According to a 2017 report by the Interactive Advertising Bureau (IAB) on device consumption in Mexico, 81% of users constantly use their smartphones to access the internet, which disrupts their daily routine, whether at home or away from home. In addition, 47% of those surveyed said they could not leave home without their device, which shows a strong dependence on these devices. A data that is valuable to mention is that when exploring which is the most used device to browse social networks is the cell phone with 95.8% of adolescents mentioning this (Frutos and Andrade, 2024). This percentage could be explained by the fact that within the mobile device there are intelligent services or apps that provide access to the Internet at any time; additionally,

[1] Cesar Vallejo University, Perú. E-mail: rquirozf@ucv.edu.pe, https://orcid.org/0000-0001-5839-467X

[2] Cesar Vallejo University, Perú, E-mail: icuevavi12@ucvvirtual.edu.pe, http://orcid.org/0000-0002-7314-8546

[3] César Vallejo University, Perú. E-mail: mdenegrive11@ucvvirtual.edu.pe, https://orcid.org/0000-0002-4235-9009

[4] Cesar Vallejo University, Perú. E-mail: taquirozq@ucvvirtual.edu.pe, https://orcid.org/0000-0001-8964-6905

[5] Enrique Guzmán y Valle National University, Perú, E-mail: fcaceres@une.edu.pe, https://orcid.org/0000-0002-7151-8400

[6] Enrique Guzmán y Valle National University, Perú, E-mail: 20210871@une.edu.pe, https://orcid.org/0009-0007-1883-1039

[7] National University of Moquegua, Perú, E-mail: rromeroc@unam.edu.pe, https://orcid.org/0000-0001-8909-7782

it was found that the accessibility of adolescents to electronic devices and applications increases with increasing age (Borrego et al., 2024).

The excessive use of smartphones not only interrupts daily routines, but also impacts teaching and learning processes, as well as family dynamics and social interaction (Macías, 2008). This problem also significantly affects the adolescent and young population in cities such as Lima and Arequipa in Peru. According to Fundación MAPFRE (2016), 56% of young Peruvians use their smartphones to connect to the internet, and excessive use has been associated with problems such as hyperactivity, depression and difficulty concentrating on a task. Among the main problems associated with the pathological use of cell phones are phubbing, which is understood as the act of ignoring the other person when using a cell phone, and nomophobia, referred to as experiencing nervousness, anxiety or discomfort when deprived of a cell phone; At the same time, the increase in nomophobia and related disorders affect the psycho-affective development of adolescents, added to the fact that artificial intelligence and new technologies currently make it necessary to use smartphones and other devices in various activities, so it is vital to know how not to generate dependence on them (Chambi & Sucari, 2017; Cortés & Herrera-Aliaga, 2022). At the same time, there is evidence indicating that there is a link between dependence and addiction to the phone in young people, and that women show greater dependence and addiction to smartphones; it was also found that there is a condition manifesting itself through anxiety, depression, stress, sleep disorders (Aldana-Zavala et. Al 2021); Romero et al. (2019) indicates that time of use is a predictor of smartphone addiction, also age which conditions self-esteem, finding that if students have high self-esteem they will not present problems of smartphone addiction.

However, the rapid evolution of communications has generated a shortage in the development of measurement instruments adapted to the diverse cultures and realities of each region. This poses a major challenge in terms of psychological measurement, as tools designed in one cultural context may not be applicable in another. Therefore, it is crucial to carefully develop or adapt new instruments that are relevant to each specific context (Richaud, 2008).

In this sense, there is a need for tools that allow psychology professionals to identify early and accurately any alterations in people's well-being related to smartphone abuse. A prominent initiative in this area is the creation of the Smartphone Dependence and Addiction Scale (EDAS) in Spain in 2016, in response to the significant increase in smartphone use in that country (La información, 2017). Likewise, Sánchez-Villena et al. (2021) conducted an analysis of the 40-item Smartphone Dependence and Addiction Scale (EDAS), finding that the scale presented optimal fit indices CFI = .93; RMSEA = .07 for the unidimensional version with 23 items, this research worked with a mean age of 28.48 years; this same EDAS scale, was reviewed at psychometric level by Garcia-Domingo (2020) also in young people and adults, the NNFI = 0.974, CFI = 0.976, RMSEA = 0.056. showing good model fit, however, they proposed an abbreviated version. However, it is important to note that so far instruments related to unconventional addictions associated with technology have been developed, which highlights the need to continue exploring this topic, in addition to the fact that no instrument is presented for the group of schoolchildren who are in one of the most critical ages of human development, 13 to 17 years, which are the final part of secondary education. Given the relevance of this problem, it is necessary to have instruments adapted to the Peruvian context to address this problem effectively. In addition, due to the growth of the northern area of Lima at the urban level added to its commercial activity and the presence of numerous educational institutions, companies and a growing consumer population, which has changed the dynamics of life of its inhabitants (Municipalidad Distrital de Los Olivos, 2019).

METHOD

Research Design

The design of this research was non-experimental, since the study variable was not manipulated or subjected to experimentation. Likewise, it is instrumental since, as Montero and León (2007) point out, for Alarcón (1991) it is psychometric research.

Participants

The sample of this research consisted of 1012 adolescents of both genders, whose ages ranged from 13 to 17 years old and who met the exclusion and inclusion criteria. The following inclusion criteria were used: Students from public secondary education institutions from 3rd to 5th grade of secondary school.

Table 1 ***Sample distribution***

Feature		Frequencies	of Total
Sex	Female	545	53.9
	Male	467	46.1
Grade of studies	First grade	384	37.9
	Second grade	258	25.5
	Third grade	370	36.6

Instrument

Smartphone Addiction Scale (EAS - IC) developed by Villanueva (2018) of an individual and collective nature, aimed at adolescents aged 13 to 17 years, with three dimensions: Smartphone Hobby; Frustration Tolerance; Interpersonal Relationships and Social Perception, which are based on Griffiths' biopsychosocial addiction model.

Procedure

Permissions were requested from the educational institutions, then the data collection was done in person for the final sample in the selected public educational institutions, so we worked with printed questionnaires, where the first part consisted of informed consent along with sociodemographic data for free participation, finally, the measurement instrument was applied and analyzed, upon reaching the desired sample, all the information was collected in an Excel data, for subsequent coding.

Data Analysis

Data analysis was performed using RStudio 4.1.2 statistical software. For the analysis of the items, the standard deviation, mean, skewness and kurtosis were taken into account, taking as reference the values of ±1.5 (Pérez and Medrano, 2010), for homogeneity index they should be values >0.30 to be acceptable (Rutkowsi & Svetina, 2013) and for communalities, they should present values >0.40 (Ferrando and Anguiano-Carrasco, 2010). To examine the evidence of validity based on the internal structure of the test, a confirmatory factor analysis (CFA) was executed, with the WLSMV estimator suggested for ordinal or categorical data and due to the absence of multivariate normality; the fit indices were taken into account: RMSEA = < .08, CFI = > .95, TLI = > .90, X^2 /gl < 3 these indices allow us to see the viability of the model (Hooper et al., 2008). Reliability was estimated through the alpha (Cronbach, 1951) and omega (McDonald, 1999) coefficients, considering magnitudes > .80 as acceptable (Oviedo & Campo, 2005).

RESULTS

Table 2 *Item metrics analysis*

D	item	Media	DE	IHC	If the element is discarded		h^2	Polycorrelations						
					α	ω		item	P2	P4	P6	P8	P16	P22
AFS	P2	2.01	1.02	0.63	0.90	0.90	0.54	P2	-					
	P4	1.75	0.98	0.78	0.88	0.88	0.73	P4	0.74	-				
	P6	1.87	1.04	0.78	0.88	0.88	0.83	P6	0.64	0.81	-			
	P8	1.83	0.98	0.79	0.88	0.88	0.76	P8	0.68	0.78	0.78	-		

	P16	1.89	0.99	0.74	0.88	0.89	0.76	P16	0.62	0.73	0.74	0.84	-	
	P22	1.92	1.05	0.69	0.89	0.89	0.54	P22	0.57	0.72	0.77	0.70	0.67	-
	item	Media	DE	IHC	α	ω	h^2	item	P7	P9	P14	P17	P21	P23
	P7	1.78	1.05	0.79	0.83	0.83	0.99	P7	-					
	P9	1.77	1.05	0.80	0.83	0.83	0.99	P9	0.99	-				
TFRU	P14	1.75	0.95	0.66	0.86	0.86	0.55	P14	0.66	0.66	-			
	P17	1.63	0.92	0.63	0.86	0.87	0.57	P17	0.61	0.62	0.67	-		
	P21	1.83	1.05	0.59	0.87	0.87	0.48	P21	0.58	0.59	0.61	0.64	-	
	P23	1.79	1.06	0.60	0.87	0.87	0.40	P23	0.66	0.66	0.58	0.58	0.54	-
	item	Media	DE	IHC	α	ω	h^2	item	P1	P3	P10	P12	P13	P24
	P1	1.95	1.12	0.68	0.89	0.89	0.55	P1	-					
	P3	1.86	1.04	0.67	0.89	0.89	0.99	P3	0.57	-				
RINTE	P10	1.99	1.23	0.76	0.87	0.87	0.75	P10	0.65	0.67	-			
	P12	1.68	1.00	0.69	0.88	0.89	0.88	P12	0.76	0.62	0.64	-		
	P13	1.93	1.12	0.81	0.87	0.87	0.76	P13	0.64	0.77	0.82	0.68	-	
	P24	1.61	1.10	0.73	0.88	0.88	0.64	P24	0.68	0.63	0.82	0.69	0.81	-
	item	Media	DE	IHC	α	ω	h^2	item	P5	P11	P15	P18	P19	P20
	P5	1.77	1.01	0.65	0.87	0.87	0.57	P5	-					
	P11	1.93	1.09	0.67	0.86	0.87	0.65	P11	0.71	-				
PERCP	P15	2.07	1.12	0.74	0.85	0.86	0.70	P15	0.63	0.62	-			
	P18	2.17	1.14	0.74	0.85	0.86	0.71	P18	0.62	0.67	0.74	-		
	P19	1.94	1.04	0.73	0.86	0.86	0.74	P19	0.69	0.66	0.78	0.69	-	
	P20	2.44	1.19	0.63	0.87	0.87	0.51	P20	0.57	0.60	0.65	0.70	0.60	-

Note: AFS=Smartphone fondness; TFRU= Frustration tolerance; RINTE= Interpersonal relationships; PERCP= Social perception; D=Dimensions, IHC= Index of homogeneity.

The metric analysis of each dimension with their respective items was performed, finding that the standard deviation, the skewness coefficient, the kurtosis coefficient, the correlation of the item - corrected test and the communality, all the items presented optimal values, meeting the following criteria the skewness and kurtosis, having as reference the values of ±1.5 (Pérez and Medrano,2010), all the items presented homogeneity values higher than >0.30 (Rutkowsi & Svetina, 2013) and for communalities, they must present values >0.40, only item 23 was in the minimum allowed limit (Ferrando and Anguiano-Carrasco, 2010). At the same time, the correlations between items show an intensity that does not exceed 0.90 when evaluated by dimension (Tabachnick and Fidell, 2001). This indicates that the items of the Smartphone Addiction Scale (EAS - IC) have an optimal performance.

Table 3 *Confirmatory factor analysis*

Models		X^2/gl	IFC	TLI	SRMR	RMSEA	PNFI
Model 1		2.72	0.98	0.97	0.04	0.04	0.86
Model 2		1.67	0.98	0.98	0.05	0.04	0.85
Model 3		2.25	0.98	0.98	0.04	0.03	0.80
Bifactor Model 3 indexes	**PUC**	0.783	**ECV**	0.256	**ωH**	0.389	
	H	0.841	**FD**	0.996			

Model 1= First-order CFA; Model 2= First-order CFA by gender; Model 3: Bifactor

Table 3, shows the confirmatory factor analysis of models 1 and 2, which was performed with the WLSMV estimator, in all cases the fit indices were optimal (Escobedo et al., 2016; Ruiz et al., 2010; Hooper et al., 2008), this indicates that the proposed model works correctly for the general sample and for the female and male sample. Model 3, evaluates the existence of a general factor, with traditional indices optimal indices are found for model 3, however, with specific indices for a bifactor model PUC= 0.783; ECV= 0.256; ωH= 0.389; H=0.841 and FD=0.996 not meeting all the criteria (PUC > 0.70; ECV > 0.70; ωHg > 0.70; H > 0.80 and FD>0.90 proposed by Rodriguez et al., 2016; Gorsuch, 1983; Hancock & Mueller, 2001) indicating that there is insufficient evidence for the existence of a general factor.

Table 4 ***Factor loadings of the proposed models***

Model 1 Model 2																
D	**Item**	**β**		**Sex**	**Item**	**β**	**Sex**	**D**	**Item**	**β**	FG	**Item**	**β**	**D**	**Item**	**β**
AFS	P2	0.64	Female	AFS	P2	0.62	Male	AFS	P2	0.65	FG	P2	-0.18	AFS	P2	0.69
	P4	0.84			P4	0.85			P4	0.83		P4	0.10		P4	0.82
	P6	0.83			P6	0.82			P6	0.84		P6	0.09		P6	0.82
	P8	0.85			P8	0.85			P8	0.85		P8	0.12		P8	0.84
	P16	0.80			P16	0.82			P16	0.77		P16	0.11		P16	0.78
	P22	0.73			P22	0.70			P22	0.76		P22	0.11		P22	0.72
TFRU	P7	0.88		TFRU	P7	0.88		TFRU	P7	0.86		P7	-0.01	TFRU	P7	0.88
	P9	0.89			P9	0.89			P9	0.86		P9	-0.01		P9	0.88
	P14	0.70			P14	0.72			P14	0.69		P14	0.04		P14	0.70
	P17	0.66			P17	0.68			P17	0.64		P17	-0.04		P17	0.66
	P21	0.63			P21	0.66			P21	0.57		P21	0.03		P21	0.62
	P23	0.64			P23	0.68			P23	0.61		P23	-0.02		P23	0.64
RINTE	P1	0.72		RINTE	P1	0.73		RINTE	P1	0.72		P1	0.58	RINTE	P1	0.42
	P3	0.74			P3	0.78			P3	0.68		P3	0.63		P3	0.35
	P10	0.80			P10	0.78			P10	0.83		P10	0.62		P10	0.54
	P12	0.74			P12	0.75			P12	0.73		P12	0.60		P12	0.41
	P13	0.85			P13	0.86			P13	0.85		P13	0.65		P13	0.57
	P24	0.77			P24	0.76			P24	0.76		P24	0.56		P24	0.56
PERCP	P5	0.72		PERCP	P5	0.74		PERCP	P5	0.71		P5	0.49	PERCP	P5	0.50
	P11	0.73			P11	0.73			P11	0.73		P11	0.47		P11	0.54
	P15	0.78			P15	0.79			P15	0.78		P15	0.45		P15	0.67
	P18	0.78			P18	0.80			P18	0.76		P18	0.46		P18	0.65
	P19	0.78			P19	0.78			P19	0.77		P19	0.45		P19	0.65
	P20	0.68			P20	0.70			P20	0.66		P20	0.45		P20	0.51

Note: AFS= smartphone fondness; TFRU= frustration tolerance; RINTE= interpersonal relationships; PERCP= social perception; D=Dimensions; β= factor loadings; FG= general factor.

At the same time in Table 4, Figure 1, 2 and 3 the factor loadings and path diagrams are presented and in all cases the loadings exceed 0.40 which indicates that they contribute to the measured construct (Kaiser,1974; Guerra and Pace, 2017).

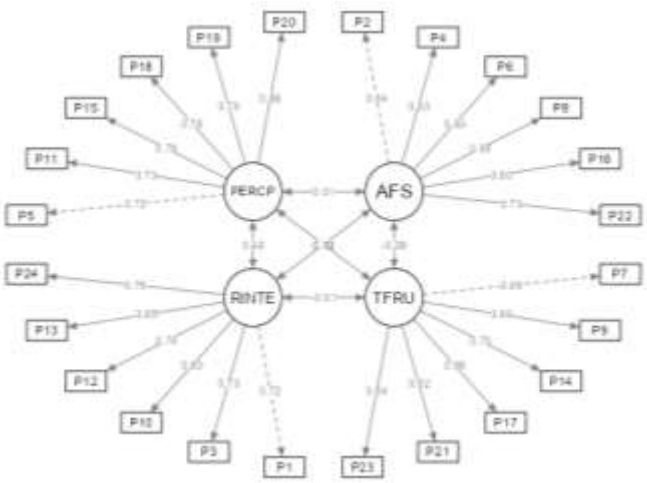

Figure 1 Model 1 of the Smartphone Addiction Scale (EAS - IC)

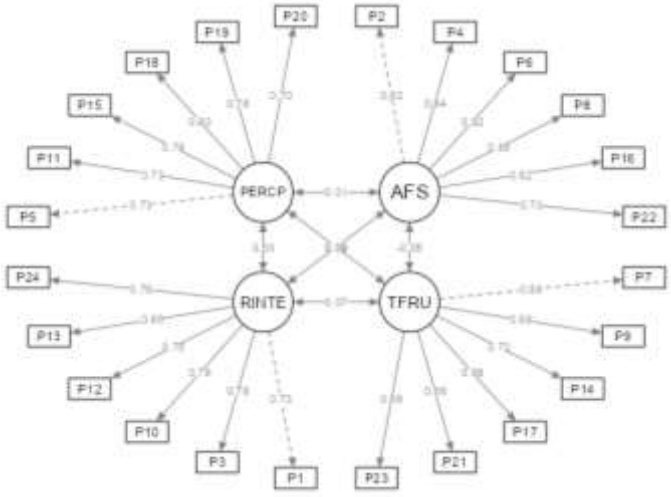

Figure 2 *Model 2 of the Smartphone Addiction Scale (EAS - IC)-Female Sex.*

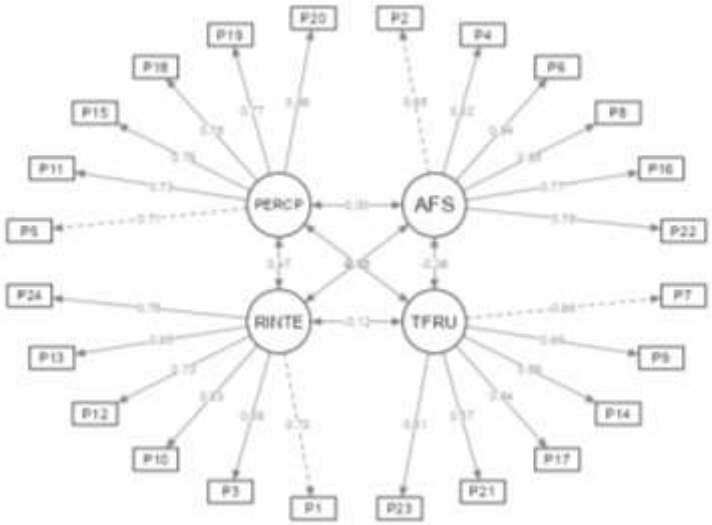

Figure 3 *Model 2 of the Smartphone Addiction Scale (EAS - IC)-Male Sex.*

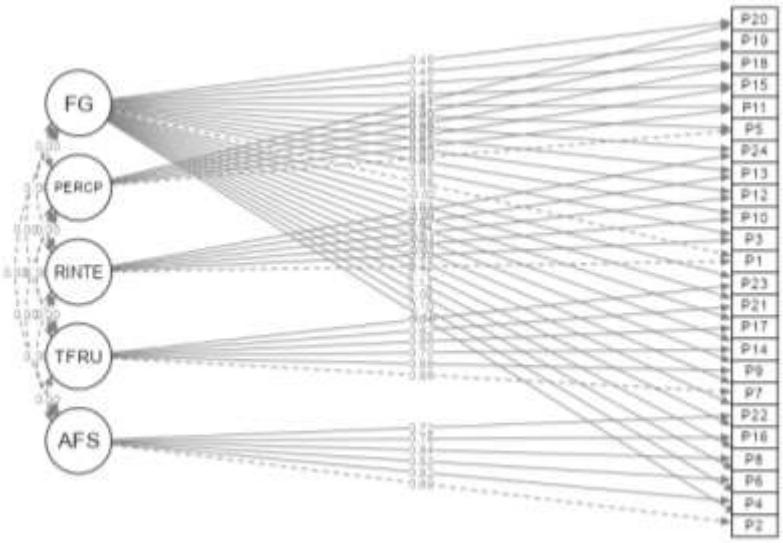

Figure 3 Model 2 Bifactor of the Smartphone Addiction Scale (EAS - IC).

Table 5 *Reliability indexes*

Group	Dimension	α	ω	AVE
General sample	AFS	0.90	0.90	0.61
	TFRU	0.87	0.88	0.55
	RINTE	0.90	0.90	0.60
	PERCP	0.88	0.88	0.56
Female	AFS	0.90	0.90	0.61
	TFRU	0.89	0.89	0.58
	RINTE	0.90	0.90	0.61
	PERCP	0.89	0.89	0.57
Male	AFS	0.90	0.91	0.62
	TFRU	0.86	0.86	0.52
	RINTE	0.89	0.90	0.59
	PERCP	0.87	0.88	0.54

Note: AFS= smartphone fondness; TFRU= frustration tolerance; RINTE= interpersonal relationships; PERCP= social perception; α=Alpha; Ω= Omega.

Table 5 shows the alpha and omega coefficient for the original model with the general sample and the sample for female and male sex had acceptable values (Kiliç, 2016 and Viladrich et al., 2017), this implies that there is evidence to mention that the Smartphone Addiction Scale (EAS - IC) presents precision of the measures obtained (Campo-Arias & Oviedo, 2008; Katz, 2006). The average variance extracted (AVE) is also presented, and in all the domains the scores are higher than .50, which indicates an adequate convergence of the items in all the dimensions. This summary information is evidence of adequate convergent and discriminant validity of the dimensions (Fornell & Larcker, 1981; Hair et al., 2014).

Table 6 *Equivalence between percentiles and direct scores*

Standard scores (SP)	Smartphone hobby	Tolerance to frustration	Interpersonal relationships	Social perception
	Direct scores (PD)			
1 a 20	6 to less	6 to less	6 to less	6 to less
21 a 40	7 a 9	7 a 8	7 a 8	7 a 10
41 a 60	10 a 12	9 a 10	9 a 11	11 a 12
61 a 80	13 a 15	11 a 15	12 a 15	13 a 15
81 a 99	16 to more	16 to more	16 to more	16 to more
Media	11.3	10.6	11	12.3
Standard deviation	4.97	4.77	5.38	5.23

Table 6 shows a table of interpretation and equivalence between direct and standard scores which could provide a diagnosis, where the standard scores in percentiles are equivalent to 1 to 20 (Very low); 21 to 40 (Low); 41 to 60 (Average); 61 to 80 (High) and 81 to 99 (Very high).

DISCUSSION

This section presents the results obtained in the research, together with the limitations identified and some suggestions for future studies. The scale developed has a significant relevance, considering the increasing use of smartphones among young people of all ages and the problems associated with the uncontrolled use of these devices. The analysis of the items was performed all criteria were met for these to belong to the measurement instrument under study (Perez and Medrano,2010; Rutkowsi & Svetina, 2013; Ferrando and Anguiano-Carrasco, 2010; Tabachnick and Fidell, 2001). Which indicates that the items of the smartphone addiction scale (EAS - IC), have an optimal performance, this is an indicator that the factorial solutions of either an AFE or AFC will be adequate and will surely present optimal adjustment indexes. Another element to take into account is that the EAS - IC proposal considers an extension of 24 items, a smaller number than that used by Basteiro, Robles, Juarros and Pedrosa (2013) who consider 36 items in their test on addiction to social networks in a similar group, however, in the proposal of Sánchez-Villena (2021) a structure of 23 items was presented for a scale that measures the same construct, however, it is aimed at a sample of university students and not at schoolchildren. At the same time, it is found that the items are correlated with each other, which denotes the assumptions of the framework would be relevant for validity (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. - APA; AERA & NCEM, 2014).

Regarding the confirmatory factor analysis (CFA) it is worth mentioning that this analysis went through 2 models, with the same structure only that in a second moment the analysis was run dividing the group by gender; also for all cases, with the WLSMV estimator, the fit indices were optimal (Escobedo et al., 2016; Ruiz et al., 2010; Hooper et al., 2008), this denotes that the relationships between items of the proposed instrument and the dimensions fit the construct on which the proposed score interpretations are based; it is also partially corroborated that the internal structure of the scale shows items that can function similarly for female and male subgroups (APA; AERA and NCEM, 2014). In addition, it can be mentioned that in comparison with the works of Sánchez-Villena et al. (2021); García-Domingo (2020) and Basteiros, Robles, Juarros and Pedrosa (2013) where the instruments studied by these researchers also show suitable fit indices, such as the EAS - IC scale, but the advantage is that the proposal of Cueva (2018) is directed for a specific sample of schoolchildren. In the AFC of this scale the dimensions are not significantly related to each other, this is an indicator that there is no general factor, from which it follows that each dimension has its own interpretation and that these configure indicators of smartphone addiction if they have high scores (Reise, 2012; Rodriguez, Reise, & Haviland, 2016a; Rodriguez, Reise, & Haviland, 2016b; Bonifay, Lane, & Reise, 2017; Dueber, 2020), based on this it can be stated that it is not feasible to calculate an overall score of the EAS - IC scale, moreover an overall reliability index should not be calculated.

The alpha and omega coefficient for the original model with the general sample and the sample for the female and male sex had acceptable values for all dimensions (Kiliç, 2016 and Viladrich et al., 2017), i.e. this scale provides accurate scores of the measures obtained (Campo-Arias & Oviedo, 2008; Katz, 2006). Globally, it can be affirmed that the scale correctly measures the dimensions raised in it according to the cut-off point of George and Mallery (2003), who indicates that a scale is reliable from 0.80.

The present research presents some limitations regarding the lack of information on instruments that measure the construct of interest in a sample of schoolchildren; an additional instrument was not considered to calculate the evidence of validity with other variables. Cognitive interviews are suggested to evaluate the comprehension of the items in the study sample, due to the presence of negations in some items.

CONCLUSIONS

The items of the Smartphone Addiction Scale (EAS - IC) have a suitable metric performance, the instrument shows evidence of validity based on the internal structure with the initial structure. The dimensions of the scale have adequate reliability indices; there is no overall score on this scale, which is why it is not necessary to calculate the overall reliability.

REFERENCES

Alarcón, R. (1991). Métodos y diseños de investigación del comportamiento. Lima: UPCH

Aldana-Zavala, J.; Vallejo, P.; Isea-Arguelles, J. and Colina-Ysea, F. (2021). Smartphone dependence and addiction in university students. Formación Universitaria 14 (5) http://dx.doi.org/10.4067/S0718-50062021000500129

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education.APA; AERA; NCEM (2014) . Standards for Educational and Psychological Testing. American Educational Research Association.

Basteiro, J. Robles, A. Juarros, J. and Pedrosa, I. (2013). Addiction to Social Networks: Creation and Validation of a Measurement Instrument. Faculty of Psychology - University of Oviedo, https://www.researchgate.net/publication/258934148_Adiccion_a_las_redes_sociales_creacion_y_validacion_de_un_instrumento_de_medida_Social_networks_addiction_development_and_valida World Health Organization. (2010). addictions. Healthy University Rafael Londival, 12,14. tion_ofanassessment_instrument.

Borrego, I., Cuadrado, I., & Márquez, R. (2024) Do Factors Such As Sex and Playing Sports Influence Social Network Addiction in Adolescents? Do Factors Such As Sex and Playing Sports Influence Social Network Addiction in Adolescents? American Research Journal of Humanities Social Science (ARJHSS) 7 (1) 64-73 https://www.grada.es/wp-content/uploads/2024/02/10_186_quepaso_isabel2.pdf

Bonifay, W., Lane, SP and Reise, SP (2017). Three concerns with the application of a bifactor model as a structure of psychopathology. Clinical Psychological Science, 5 (1), 184-186. 10.1177/2167702616657069

Campo-Arias, A., & Oviedo, H. (2008). Psychometric properties of a scale: internal consistency. Revista de Salud Pública, 10(5), 831-839. https://revistas.unal.edu.co/index.php/revsaludpublica/article/view/96741/80029

Carpio-Delgado, F. D., Romero-Carazas, R., Pino-Espinoza, G. E., Villa-Ricapa, L. F., Núñez-Palacios, E. L., Aguilar-Cuevas, M. M., & Espiritu-Martinez, A. P. (2023). Telemedicine in Latin America: a bibliometric analysis. EAI Endorsed Transactions on Pervasive Health and Technology, 9. https://doi.org/10.4108/eetpht.9.4273

Carpio-Delgado, F. D., Bernedo-Moreira, D. H., Espiritu-Martinez, A. P., Aguilar-Cruzado, J. L., Joo-García, C. E., Mamani-Laura, M. R., & Romero-Carazas, R. (2023). Telemedicine and eHealth Solutions in Clinical Practice. EAI Endorsed Transactions on Pervasive Health and Technology, 9. https://doi.org/10.4108/eetpht.9.4272

Chambi, S., & Sucari, B. A. (2017). Internet addiction, cell phone dependence, impulsivity and social skills in pre-university students of the Institución Educativa Privada Claudio Galeno, Juliaca 2017 (Undergraduate thesis). Peruvian Union University.

Cortés, Manuel E., & Herrera-Aliaga, Eduardo (2022). Nomophobia: Smartphone addiction. Impact in young people and recommendations for its appropriate use in learning activities in the health area. Revista médica de Chile, 150(3), 407-408. https://dx.doi.org/10.4067/S0034-98872022000300407

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16, pp. 297-334.

Dueber, David Michael, " A bifactor approach to dimensionality assessment " (2020). Theses and Dissertations-Educational Science. 59. https://uknowledge.uky.edu/edsc_etds/59

Escobedo, T., Hernández, J., Estebané, V. and Martínez, G. (2016). Structural equation models: characteristics, phases, construction, application and results. Revista Ciencia & trabajo, 18(55), 16-22. https://scielo.conicyt.cl/pdf/cyt/v18n55/art04.pdf. https://scielo.conicyt.cl/pdf/cyt/v18n55/art04.pdf

Espíritu-Martínez , A. P., Romero-Carazas, R., Mamani-Jilaja, D., FLores-Chambilla, S. G., Espinoza-Véliz, M. Z., Espinoza-Egoavil, M. J., Gomez-Perez, K. K., Espinoza-Véliz, K. L., Carpio-Delgado, F. D., & Quesada, T. Q. (2023). Latin American

research on cardiovascular diseases: A bibliometric-network approach. EAI Endorsed Transactions on Pervasive Health and Technology, 9. https://doi.org/10.4108/eetpht.9.3582

Ferrando, P. and Anguiano-Carrasco, C. (2010). Factor analysis as a research technique in psychology. Papeles del psicólogo, 31(1), 18-33 https://www.papelesdelpsicologo.es/pdf/1793.pdf

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error: Algebra and statistics. Journal of Marketing Research, 18(3), 39-50. https://doi.org/10.2307/3151312

Frutos, N. and Andrade, V. (2024). Addiction to social networks and anxious symptomatology in adolescents aged 15 and 16 years of an educational unit of the city of Quito in the period 2023-2024. Degree dissertation prior to obtaining a degree in psychology. https://dspace.ups.edu.ec/bitstream/123456789/26910/1/TTQ1369.pdf

Fundación MAPFRE (2016). Prevalence of risk of internet addictive behavior: among adolescents in Metropolitan Lima and Arequipa. Prevensis SAC

García-Domingo, Marta, Fuentes, Virginia, Pérez-Padilla, Javier, & Aranda, María (2020). EDAS-18: validation of the short version of the smartphone dependence and addiction scale. Terapia psicológica, 38(3), 339-361. https://dx.doi.org/10.4067/S0718-48082020000300339

Guerra, T and Pace, A. (2017). Confirmatory factor analysis of the Appraisal of Self Care Agency Scale - Revised. Rev. Latino-Am. Enfermagem 7 e2856 https://doi.org/10.1590/1518-8345.1378.2856

Gorsuch, R. L. (1983). Factor analysis (2nd ed.). Erlbaum.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). Multivariate data analysis (7th ed.). Pearson

Hancock, G. R., & Mueller, R. O. (2001). Rethinking Construct Reliability Within Latent Variable Systems. In R. Cudeck, S. H. H. C. du Toit & D. Sörbom (Eds.), Structural Equation Modeling: Past and Present. A Festschrift in Honor of Karl G. Jöreskog (pp. 195- 261). Scientific Software International.

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. The Electronic Journal of Business Research Methods, 6(1), 53-60 https://arrow.tudublin.ie/buschmanart/2/

Interactive Advertising Bureau (IAB) 2017. Device consumption. https://iabperu.com/

Kaiser, H. F. (1974). An index of factor simplicity. Psychometrika, 39, 31-36.

Katz, M. (2006). Multivariable analysis (2nd ed.). Cambridge University Press.

Kiliç, S. (2016). Cronbach's alpha reliability coefficient. Psychiatry and Behavioral Sciences, 6(1), 47. https://doi.org/10.5455/jmood.20160307122823

Kline, P. (1986). A Handbook of Test construction: Introduction to psychometric design. London: Methuen.

Iuga, M. M., Romero-Carazas, R., Espada-Salgado, F., Oprea, B., Stefanescu, S. V., & Lavado-García, M. (2023). Role of biodentine in endodontics: a bibliometric and scientometric analysis. EAI Endorsed Transactions on Pervasive Health and Technology, 9. https://doi.org/10.4108/eetpht.9.3849

McDonald, R.P. (1999). Test theory: A unified treatment. Erlbaum.

Macías, A. (2008). Effects of the accelerated development of technology on education. Odysseus: Electronic journal of pedagogy [online] (Accessed March 29, 2018). Retrieved from https://www.odiseo.com.mx/bitacora-educativa/efectos-acelerado-desarrollo-tecnologia-sobre-educacion

Montero, I. and León, O. (2007). Guide to Naming Studies in Psychology. International Journal of Clinical and Health Psychology.

District Municipality of Los Olivos (2019). Plan de desarrollo concertado de Los Olivos 2004-2019. http://www.imp.gob.pe/images/IMP%20-%20PLANES%20DE%20DESARROLLO%20MUNICIPAL/los_olivos_plan_de_desarrollo_concertado.pdf

Oviedo Celina, H., & Campo-Arias, A. (2005). Approach to the use of Cronbach's alpha coefficient. Revista Colombiana de Psquiatría, 34(4), 572-80.

Pérez, E. R. and Medrano, L. (2010). Exploratory factor analysis: conceptual and methodological bases. Revista argentina de ciencias del comportamiento, 2(1), 58-6 https://doi.org/10.32348/1852.4206.v2.n1.15924

Reise, SP (2012). The rediscovery of bifactor measurement models. Multivariate Behavioral Research, 47 , 667-696. doi: 10.1080/00273171.2012.715555.

SARWAT, N., HUSSAIN, A., & KHAN, T. I. Investigating the Relationship between Work-family Enrichment and Psychological Well-being: The Mediating Role of Meaningful Work.

Richaud, M. (2008). Building or adapting psychological tests? Different answers to a controversial question. [Methodological article of the Argentine Congress of Psychology, 2018]. Evaluate. 10, pp. 60-74. https://revistas.unc.edu.ar/index.php/revaluar/article/download/459/428.

Romero Rodríguez, J. M., & Aznar Díaz, I. (2019). Analysis of smartphone addiction in university students: Influencing factors and correlation with self-esteem. Revista de Educación a Distancia (RED), 19(60). https://doi.org/10.6018/red/60/08

Romero-Carazas, R., La Cruz-Arango, O. D., Torres-Sánchez, J. A., Torres Cheje de Manchego, V., Suclla-Revilla, J. L., Gutiérrez-Monzón, S. G., … Bernedo-Moreira, D. H. (2023). Gestión del conocimiento y capital intelectual según variables sociodemográficas en docentes Universitarios. Encontros Bibli: Revista eletrônica De Biblioteconomia E Ciência Da informação, 29, 01–29. https://doi.org/10.5007/1518-2924.2024.e96253

Romero-Carazas, R., Espiritu-Martinez, A.P., Villa-Ricapa, L.F. y Núñez-Palacios, E.L. (2023). Financial literacy transdisciplinary approach in education: bibliometric analysis of scopus. Bibliotecas, Anales de Investigacion. 19(3) 1-15

Ruiz, M., Pardo, A. and San Martín, R. (2010). Structural equation modeling. Papeles del psicólogo, 31(1), 34-45. https://www.redalyc.org/pdf/778/77812441004.pdf

Rutkowsi, L. & Svetina, D. (2013). Assessing the Hypothesis of Measurement invariance in the context of Large-Scale International surveys. Educational and Psychological Measurement, 74(1), 31-57. https://doi.org/10.1177/0013164413498257

Rodriguez, A., Reise, SP and Haviland, MG (2016a). Application of bifactor statistical indices in the assessment of psychological measures. Journal of Personality Assessment, 98, 223-237. doi: 10.1080/00223891.2015.1089249

Rodriguez, A., Reise, SP and Haviland, MG (2016b). Evaluation of bifactor models: Computation and interpretation of statistical indices. Psychological Methods, 21, 137-150. doi: 10.1037/met0000045.

Sánchez-Villena, A. R., Domínguez-Lara, S., Aranda, M., Fuentes Gutiérrez, V., & García-Domingo, M. (2021). Structural analysis of the smartphone dependence and addiction scale (EDAS) in Peruvian university students. Health and Addictions/Salud y Drogas, 21(2), 93-113. https://doi.org/10.21134/haaj.v21i2.572.

Tabachnick, B. and Fidell, L. (2001). Using multivariate statistics. Allyn & Bacon.

Teleco. (2012). Cellular statistics in the world [online]. from http://www.teleco.com.br/es/pais/es_celular.asp

Information (2017). 82% OF SPANIARDS USED THE INTERNET IN 2016. https://www.lainformacion.com/estilo-de-vida-y-tiempo-libre/ESPANOLES-USO-INTERNET_0_1029797430/

Villanueva, I. (2018). Construction of a Scale of smartphone addiction in students from 3rd to 5th grade of high school from educational institutions in the district of Los Olivos, 2018. Thesis to obtain the degree of Bachelor in Psychology https://repositorio.ucv.edu.pe/handle/20.500.12692/29869

Viladrich, C., Angulo, A., & Doval, E. (2017). A journey around alpha and omega to estimate internal consistency reliability. Annals of Psychology, 33(3), 755-782. Doi: 10.6018/analesps.33.3.268401.