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Article

Phubbing in Adolescents: Spanish Validation of the Phubbing Scale (PS)

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Abstract: The Phubbing Scale (PS) is an instrument used to measure the frequency and extent of the behaviour of ignoring someone you are with and giving attention to your mobile phone instead. However, there is insufficient evidence about the psychometric adequacy of the Spanish version of the instrument. The main goal of this research was to analyse the psychometric properties of PS in a representative sample of Spanish adolescents and young adults. A total of 1351 participants comprised the sample. (42,78% females, age range = 12-21). The goodness-of-fit indices for the two-factor model were good. The McDonald's Omega coefficient for the total score was 0.787. The phenomenon of phubbing was found to have statistically significant correlations with emotional well-being, other mental health indicators, and with Problematic Internet Use (PIU); with the sole exception of the hyperactivity subscale of the SDQ This study provided validity evidence for the Spanish version of the Phubbing Scale (PS), suggesting that PS is a reliable tool for quantifying phubbing in Spanish adolescents.

Keywords: Phubbing Scale; adolescents; validation; psychometric properties; smartphone

1. Introduction

Smartphones have become one of the primary ways to communicate and to interact socially among adolescents, as well as the main way of accessing to the information regarding the world around them. The age of the current generation means that they are 'digital natives' [1]; meaning they grow up in a world mediated by internet connections. Furthermore, adolescence is a critical period for establishing the foundations of good mental health, healthy social relationships, and well-being for adulthood. It is also a period of great vulnerability, where many psychological problems manifest early - including addictive behaviours such as those related to problematic internet use (PIU) [2,3]. Therefore, it is also a particularly sensitive period for prevention of mental health difficulties [4,5].

The concept of 'phubbing' refers to the behaviour of individuals who pay more attention to their smartphones than to those around them [3]. This form of probably inadvertent social snubbing has been investigated in recent years, primarily focusing on individuals exhibiting it, known as 'phubbers' [6–8], and on those who are phubbed [9]. It is considered by many an inappropriate behaviour that affects social interactions [10]; has negative consequences on interpersonal communications; and affects well-being [11]. Phubbing can occur at any place or time as most people have the device within their reach during meetings, conferences, at school, or in social gatherings with friends and family [12]. Consequently, phubbing indicates to others that the individual is not engaged or not interested in the social environment [13]. This phenomenon is relatively new to research [14], but there is a growing interest in its incidence, the way it occurs, and its consequences for others [15,16]. It is part of a wider context of smartphone use often associated with problematic and addictive behaviors related to internet use [7,17,18], [19]. Several researchers have linked

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phubbing with different mental health problems [20], personal well-being problems [21], and fear of missing out (FoMO) [22].

Several instruments have been developed to measure phubbing both in adolescent and adult populations including the General Scale of Phubbing (GSP) and the General Scale of Being Phubbed (GSBP) [9]. The Phubbing Scale (PS) [7], is a widely used instrument with 10 items divided in two different dimensions: 1) Communication and 2) Obsession. Different studies have studied the psychometric adequacy of the PS across different populations [23–25], [26–28], [29–31]. For instance, Blachnio et al. [8] analyzed the internal structure of the PS across 20 countries and found a two-factor structure as the most adequate, confirming the original structure [7]. In addition, the work of Kim et al. [25] gathered evidence about the internal structure of the PS in a Korean population (PS-K), whereas Hwang et al. [24] validated the PS-K specifically for mothers. Blanca and Bendayan [23] analyzed the psychometric properties of the Spanish PS in adults similarly finding a two-factor structure as the most satisfactory. In addition, they found that phubbing was associated with indicators of internet addiction and FoMO. Overall the PS seems to have a two-factor structure, with correlated factors.

Measurement invariance (MI) across relevant variables, a critical aspect of an instrument, has also been studied [29,32]. For instance, García Castro et al. [32] found that the PS-8 was invariant across gender. Similar results were found in the work of Lin et al. [29], where the PS-8 factor structure was found to be invariant across both gender and country. In this regard, Blachnio et al. [31] found MI in the PS-8, but only after eliminating three countries from the study.

As it can be seen, several studies have gathered evidence about the internal structure, the internal consistency of the scores, and the measurement invariance of the PS. However, knowledge about adolescent and young adult populations are still limited with no reports of this in Spain.

Given the crucial importance of this period in the future emotional and mental well-being, and the possible impact of phubbing on their correct social and psychological development [23,33], the main objective of this article was to analyze the psychometric properties of the Spanish version of the PS in a representative sample of adolescents. Therefore, the specific objectives were: a) to estimate descriptive statistics and rates of phubbing behaviours; b) to analyze the internal structure of the PS; c) to study the reliability of scores on the PS; d) to gather evidence about MI of the PS attending to gender and educational level; and e) to analyze the relationship between phubbing and other indicators of mental health, well-being, and socioemotional adjustment.

2. Materials and Methods

2.1. Participants

An initial sample of 1374 adolescents and young adults aged 12 to 21 took part in this research. Those participants with missing values (n = 23) were deleted from the initial sample. Thus, the final sample was composed of 1351 participants. They were attending different levels of education such as secondary school, high school, vocational training, or university. The researchers chose these participants conveniently, meaning they selected them based on availability and accessibility. In terms of gender distribution, there were slightly more males (54.25%) than females (42.78%), with less than 1% identifying as 'other' and almost 2% opting not to specify their gender. About 20% of the participants were balancing their studies with part-time employment or internships, indicating that education wasn't their only or main activity.

2.2 Instruments

The *Phubbing Scale* (PS) [7] comprises 10 items rated on a Likert-type scale with five options (1 = Never: 5 = Always). The assessment of phubbing behaviour was categorized into two factors: Communication Disturbance (CD) and Phone Obsession (PO) [8]. Although the studies have demonstrated satisfactory psychometric properties, they remain somehow limited in terms of diverse sample development [23]. Furthermore, there is not a specifically validated version designed for

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Spanish adolescent students. Blanca and Bendayan adapted and validated the PS for Spanish adult population, and their version has been used for this study.

The Strengths and Difficulties Questionnaire (SDQ) [34] is a self-reported scale consisting of 25 items, distributed across five subscales, which contains five items each: emotional problems, behavior problems, peer problems, hyperactivity, and prosocial behavior. The translated and validated Spanish version of the scale has demonstrated satisfactory psychometric properties in adolescents [35].

The Rosenberg Self-Esteem Scale (RSE), developed by Rosenberg in 1965, is a widely used tool for assessing an individual's self-esteem. Comprising 10 statements related to a person's self-concept and self-evaluation, respondents rate each statement on a four-point scale, ranging from "strongly agree" to "strongly disagree." Generally, a higher score on the RSE indicates a heightened perception of self-esteem [36]. For this research, the Spanish version of the scale was used [37].

The Interpersonal Emotion Regulation Questionnaire (IERQ), developed by Hoffman et al. (2016), comprises 20 items categorized into four factors: Enhancing Positive Affect, Perspective Taking, Soothing, and Social Modeling. These factors are associated with the tendency to seek out others for amplifying feelings of happiness and joy, using interpersonal interactions as a reminder to avoid worries and find comfort, and learning from others how to manage specific situations, respectively [38]. In this research, the Spanish adaptation of the IERQ was conducted [39].

The Compulsive Internet Use Scale (CIUS) is a 14-item self-assessment scale designed to measure the severity of Internet addiction and/or compulsive, pathological, or another problematic Internet use (PIU). Each question uses a 5-point Likert scale, ranging from 0 ('never') to 4 ('very often'), resulting in a total score that indicates severity of PIU [40].

The Personal Wellbeing Index - School Children (PWI-SC) is a self-administered scale create to assess subjective well-being and quality of life (QoL) in school-age children and adolescents. It comprises seven items gauging happiness in various life domains: standard of living, health, personal achievements, relationships, personal safety, community connection, and future security. Participants rate each item on a scale from 0 to 10, with 0 indicating "Very Sad" and 10 reflecting "Very Happy" [41]. The Spanish version of PWI-SC, used in this research, showed adequate psychometric properties in previous studies [42].

2.3. Procedure

The surveys were given to the students while they were at their educational institutions. A trained researcher gave instructions to complete de questionnaires which were completed in about 30 minutes. Most of the participants (81%) used mobile devices to respond to the surveys, while the remaining participants used traditional paper questionnaires. Informed consent was obtained for those participants under 18 years old. The study was conducted with the approval of the Research Ethics Committee at the University of La Rioja. The database will be preserved by the PRISMA research team (a Psychology research group placed in University of La Rioja) for the amount of time necessary to finish the entire research and at least the next 20 years in order to allow for database comparison.

2.4. Data analysis

We studied the descriptive statistics and the percentage distribution of the PS items. Then we analyzed evidence of internal structure of the questionnaire by means of confirmatory factor analysis (CFA). To this aim, we studied the one-dimensional model, the two-dimensional model [7,8], and a second order factor model. We used the Muthén's quasi-likelihood estimator [42]. We used the Chisquare (X2), Confirmatory Factor Index (CFI), Tucker Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR) as goodness-of-fit indices were. Hu and Bentler [43] proposed that RMSEA values should be under .80 for a good model fit. In addition, CFI and TLI values over .95 or more are preferred, but values over .90 could be considered acceptable. For SRMR, values less than .08 should be accepted. Then, we analyzed the internal consistency of the scores. In addition, we tested the Measurement Invariance (MI) of the PS

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with successive multigroup CFAs. Delta parameterization was used [44]. To this aim, we conducted successive multigroup CFAs across gender and educational level. As the $\Delta\chi 2$ has shown several limitations due to the fact that it is sensitive to sample size, we followed the increase or decrease in CFI values (ΔCFI), suggested by Cheung and Rensvold [45], to determine if nested models are practically equivalent. Once the internal structured was confirmed, we analyzed the internal consistency of the scores. We used McDonald's Omega. Finally, we gathered information about the relationship of the PS with other variables by means of the Pearson's correlation. SPSS 17.0 (IBM Analytics, 2016) and JASP Team (2019) were used for data analyses.

3. Results

3.1. Descriptive Statistics for the PS and Prevalence Rates

The descriptive statistics of the PS and the percentages of different answers options are shown in Table 1.

Table 1. Prevalence and Descriptive statistics of the Phubbing Scale (PS) for the total sample.

		Prevalence (%)					Descriptive Statistics			
Ítem	**n**	**Never**	**Rarely**	**Sometimes**	**Almost always**	**Always**	**Mean**	**SD**	**Skewness (*)**	**Kurtosis(**)**
Communication										
1. My eyes start wandering on my phone when I'm together with others	1351	7.30	40.10	35.80	13.80	2.90	2.65	0.91	0.42	-0.03
2. I am busy with my mobile phone when I'm with my friends	1351	23.30	52.90	20.10	3.10	0.60	2.05	0.78	0.61	0.64
3. People complain about me dealing with my mobile phone	1351	48.93	33.16	11.62	4.52	1.78	1.77	0.95	1.3	1.38
4. I'm busy with my mobile phone when I'm with my family	1345	24.43	47.45	22.06	4.81	0.81	2.1	0.85	0.6	0.28
5. I think that I annoy my partner when I'm busy with my mobile phone (or family, if you do not have a partner)	1350	43.15	28.28	17.17	8.22	3.11	2	1.1	0.93	0.03
Obsession										
6. My phone is within my reach	1347	3.03	4.81	17.54	35.46	38.86	4.03	1.02	-1.03	0.68
7. When I wake up in the morning, I first check the messages on my phone	1341	17.91	19.91	19.62	21.91	20.65	3.07	1.4	-0.07	-1.28
8. I feel incomplete without my mobile phone	1341	31.90	33.68	20.36	10.07	4.00	2.21	1.12	0.72	-0.25
9. My mobile phone use increases day by day	1345	29.61	43.75	20.65	4.44	1.48	2.04	0.9	0.77	0.5

 doi:10.20944/preprints202408.1387.v1

10. The time allocated to social, personal or professional activities decreases because of my mobile phone	135 0	41.8 2	33.23	15.25	6.96	2.52	1.95	1.0 4	1.02	0.42

3.2. Evidence of Validity based on Internal Structure

We studied the goodness-of-fit indices for the unidimensional model and for the two-factor model. As can be seen in Table 2, the unidimensional model did not show an adequate fit. The goodness-of-fit indices for the two-factor model were better but still poor. We then analyzed a second order factor solution and the two-factor model with allowing for correlated errors between items 3 and 5. Both models displayed adequate goodness-of-fit-indices. We discarded the second order-factor as some factor loading were not significant. Therefore, we retained the two-factor model with modifications as the most adequate solution.

We calculated factor loadings of the two-factor model with correlated errors. As shown in Table 3, all factor loadings were statistically significant and ranged from .374 (Item 5: "I think that I annoy my partner when I'm busy with my mobile phone") to .82 (Item 1: "My eyes start wandering on my phone when I'm together with others").

3.3. Measurement Invariance of the PS Scores by Gender and Age-Studies

Once the two-factor model with correlated errors was retained as the most satisfactory solution, we studied the MI of the PS scores attending to gender and age. With the aim to study the MI across educational level, we divided the sample into two different subgroups: non-university and university students. Then, we examined configural and strong MI. Differences in ΔCFI below .01 between the configural model and the strong model supported the hypothesis of strong MI across both gender and educational level (Table 2).

Table 2. Study of the internal structure and measurement invariance of the Phubbing Scale two-factor model across gender and educational level.

Model	χ2	df	CFI	TLI	RMSEA (CI 90%)	SRMR	ΔCFI
Baseline one-factor model	918.164	35	0.842	0.797	0.139 (0.132-0.147)	0.101	
Two-Factor model	507.926	34	0.915	0.888	0.104 (0.096-0.112)	0.064	
Second Order Factor	506.987	33	0.967	0.955	0.085 (0.077-0.093	0.066	
Two-factor model (correlated errors 3-5)	321.121	33	0.95	0.932	0.081 (0.073-0.089)	0.053	
Gender							
Male (n = 733)	252.466	33	.962	.957	.080 (.071-.085)	0.052	
Female (n = 578)	272.351	33	.958	.953	.081 (.073-.090)	0.057	
Configural Invariance	327.156	66	.955	.953	.078 (.069-.086)	0.054	
Strong Invariance	401.067	102	.948	.954	.067 (.060-.074)	0.057	-.01
Educational Level							
Non-University (n = 755)	257.11	33	.961	.958	.081 (.072-.086)	0.053	
University (n = 556)	264.68	33	.951	.908	.082 (.074-.091)	0.056	

 doi:10.20944/preprints202408.1387.v1

Configural Invariance	329.604	66	.953	.952	.081 (.073-.091)	0.055	
Strong Invariance	400.658	102	.949	.950	.080 (.074-.092)	0.056	-.01

Note. $\chi 2$ = Chi square; df = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; WRMR = Weighted Root Mean Square Residual; CI = Confidence Interval; ΔCFI = Change in Comparative Fit Index;

Table 3. EstimatEed saturation item parameters for the two-factor model with modifications.

Items	Estimate	Error	Lower	Upper
Communication				
1	0.832	0.017	0.800	0.865
2	0.739	0.016	0.703	0.771
3	0.485	0.017	0.516	0.519
4	0.673	0.016	0.641	0.704
5	0.374	0.018	0.421	0.408
Obsession				
6	0.544	0.017	0.510	0.577
7	0.621	0.016	0.589	0.653
8	0.719	0.016	0.687	0.755
9	0.739	0.017	0.706	0.771
10	0.571	0.017	0.538	0.603

3.4. Study of the Reliability of the PS scores

We studied the internal consistency of the PS scores by means of McDonald's Omega coefficient. The Communication dimension showed a coefficient of 0.705, whereas Obsession revealed a coefficient of 0.709. The McDonald's Omega for the Total score was 0.787. In addition, we calculated discrimination indices that were all over .30. We also studied the internal consistency of the scores for the paper and computer-based forms. In the paper-form were 0.72, 0.714, and 0.781, whereas in the computer-form were 0.711, 0.712, and 0.789 respectively for the Communication, the Obsession, and the Total Score.

3.5. Relation of the PS Scores with Well-Being and Mental Health Variables

The study of the correlation between PS scores and different indicators of mental-health and PIU are shown in Table 4. As can be seen, PS scores were statistically significant correlated with indicators of well-being and mental health except for the hyperactivity subscale of the SDQ. The PS dimensions and the PS Total score were positively correlated with the Total score of the SDQ and with difficulty's subscales of the SDQ and with the total score of the CIUS, and negatively associated with indicators of psychological well-being (total score of the PWI-SC) and self-esteem (total score of the Rosenberg).

Table 4. Correlation between the Phubbing Scale and different indicators of mental health and well-being.

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
PS Total (1)												
PS Communication (2)	.834**											
PS Obsession (3)	.885**	.480**										

 doi:10.20944/preprints202408.1387.v1

PWI-SC Total (4)	-.123**	-.065*	-.142**									
IERQ Total (5)	.133**	.102**	.126**	.064*								
Rosenberg Total (6)	-.165**	-.127**	-.154**	.441**	.098**							
CIUS Total (7)	.504**	.410**	.455**	-.187**	.165**	-.256**						
SDQ Emo (8)	.177**	.125**	.179**	-.212**	.097**	-.369**	.226**					
SDQ Cond (9)	.135**	.182**	.056*	-.112**	-0.01	-.089**	.165**	.066*				
SDQ Peer (10)	0.047	0.021	.055*	-.142**	-0.054	-.174**	.133**	.145**	.103**			
SDQ Hyper (11)	-0.022	-0.002	-0.037	-0.007	-0.012	-0.044	-0.014	.138**	.098**	0.038		
SDQ Pros (12)	0.041	.097**	-0.015	-0.05	-.108**	-0.017	.087**	-.062*	.126**	-.082**	-.064*	
SDQ Total (13)	.171**	.160**	.134**	-.226**	0.032	-.330**	.248**	.696**	.530**	.515**	510**	-0.034

**The correlation is significant at 0.01 level (bilateral). * The correlation is significant at 0.05 level (bilateral). PS Total = Total score of the Phubbing Scale, Ps Communication = Phubbing Scale Communication; PS Obsession = Phubbing Scale Obsession; PWI Total = Personal Well-being Index- School Children; SDQ Emo = SDQ Emotional Problems; SDQ Con = SDQ Conduct Problems; SDQ Peer = SDQ Peer Problems; SDQ Hyper = SDQ Hyperactivity; SDQ Pros = SDQ Prosocial

4. Discussion

Phubbing behaviour among adolescents and young adults is becoming a global issue [46]. This conduct affects quality of social interactions [10], personal well-being [47], and can be related to mental health problems [20]. Nonetheless, the research about this phenomenon is at an early stage, especially during the critical period of adolescence. Therefore, the present research aimed to analyze the psychometric properties of the PS as pertains to the current generation of digitally native young people.

Results of the present study indicate that phubbing is a highly prevalent behaviour among adolescents and young adults. Prevalence rates were high for both dimensions of phubbing: obsession and communication. In addition, participants selected the options always or almost always in the majority of PS items. International studies indicated that phubbing was a prevalent problem which needed further research [48–50], and our findings are similar. Providing evidence about this phenomenon can allow to stablish a starting point to compare results of other research in different countries and populations and to better understand the growing phenomenon of phubbing and its implications for developing strategies to correct the consequences of a bad use of smartphones.

 doi:10.20944/preprints202408.1387.v1

Attending to factorial structure, CFA confirmed a bi-dimensional structure, as shown by previous research in different countries performed by Blachnio et al. [8] consistent with the two dimensions defined by Karadag et al. [7]. The same structure was confirmed with Spanish adults [23]. Thus, the results found in the present study contribute valuable information in order to use the PS in school and university setting with the aim to study phubbing behaviours among these populations. Worth noting, the two-factor model did not show adequate goodness and a model with the correlated errors of items 3 and 5 had to be considered. We also gathered evidence about the MI of the instrument. We found strong evidence of MI by gender and educational level what contributes valuable information about the structural equivalence of the instrument across relevant variables. Studies about the MI of the PS are still limited [8,29,32]. Similarly to the results found in the present study, García Castro et al. [32], revealed that the PS was invariant across gender, although the PS-8 was used in their study. In addition, the PS-8 has been found to be invariant across countries, although no information is still available about the measurement equivalent with regard to age or educational level. It is very useful to confirm MI by educational level, thus enabling comparison among, for instance, high-school and university students.

With regards to the evidence of the relationship with other variables, the results indicated that PS scores were significantly associated with various indicators of well-being and mental health, including the SDQ difficulty subscales and the prosocial behaviour subscale. The PS scores were also positively related with SDQ Total Score, and with the CIUS total score, which indicates that higher scores on phubbing were related with more psychological difficulties and with PIU. Moreover, a negative correlation was found with the total score of the PWI-SC and the total score of Rosenberg Scale, suggesting that psychological well-being, a good self-esteem, and social adjustment could be protective factors for the phubbing conduct. These results confirm previous findings about the positive correlation between phubbing and social interactions [10,13,15], [16], mental health and personal well-being [20,21], and PIU and addictive conduct [17,19,51]. The study has several limitations including the use of self-report questionnaires and single timepoint of measurement that present inherent problems to drawing causal conclusions. Therefore, the inclusion of experimental data and other sources of information, such as neuroimaging, behavioural and social context data, could extend our understanding. Finally, the results are obtained from a particular region, so results should not be generalized for other cultural contexts, being necessary to conduct future studies of the psychometric properties of the PS in different areas.

5. Conclusions

Notwithstanding these limitations, the present study contributes relevant information about the understanding of a phenomenon that is becoming prevalent in the last years [6–8] and has negative consequences on psychological well-being [11]. To date, evidence about instruments that allow measuring phubbing, with adequate psychometric properties, is still limited. The present work contributes valuable information about the evidence of the PS for its use in diverse educational levels in Spanish adolescence and young adult populations. Results of the present work can be taken forward to promote mental health. Early detection of behavioural and psychological issues, like phubbing, may allow stablishing prevention strategies, specifically those related to mental health, social adjustment, and personal well-being as part of academic programs in educational contexts. Future research should continue confirming the psychometric adequacy of the PS in different regions and/or cultures and study the relationship of this phenomenon with different variables of mental health and well-being.

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