Phubbing in Students: New Evidence for a Spanish Short Form of the Phubbing Scale (PS-6)

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Article

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Abstract: Phubbing - the act of snubbing someone by concentrating on a smartphone - is claimed to be an increasing, even normative, behaviour receiving more research attention. However, evidence about the adequacy of instruments that allow screening for phubbing is limited. Thus, the main purpose of the present study was to analyze the psychometric properties of the Phubbing scale in a sample of adolescents and young adults, and present a reliable and valid short form. The final sample included a total of 1351 adolescent students (54.25% males), aged between 12 and 21. A two-dimensional model of a short version of the PS with 6 items (PS-6) displayed appropriate goodness of-fit indices. Strong measurement invariance for the two-dimensional model across gender and educational level was confirmed. McDonald's Omega coefficients for the Communication, the Obsession, and the Total score of the PS-6 were 0.617, 0.669, and 0.701, respectively. The PS-6 was positively associated with several indicators of psychological difficulties and negatively associated with psychological well-being and self-esteem. The present study contributes valuable information about the psychometric adequacy of the PS-6, a short instrument that allows screening for Phubbing in adolescents and young adults.

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1. Introduction

The term 'phubbing' combines 'phone' and 'snubbing,' defining the behaviour of prioritizing smartphone engagement over interpersonal interactions [1,2]. This phenomenon may be especially problematic during adolescence and young adulthood, lifestages that are formative for social interaction, mental health, and well-being [3]. Various studies have established connections among phubbing and mental health issues, poorer communication quality [4,5], diminished interpersonal interactions [6,7], and tendencies towards addictive behaviors [8].

Several instruments have been developed to measure phubbing [1,9,10]. For instance, the General Scale of Phubbing [GSP), and the General Scale of Being Phubbing (GSBP), both developed by Chotpitayasunondh and Douglas (2018), are two complementary scales that aim to obtained information about the perspective of the phubber, and the phubbee. The Robert´s scale of partner phubbing (Pphubbing), developed by Roberts and David (2016), focusses on measuring perceived phubbing. Finally, the Phubbing Scale (PS) [1], is a ten-item scale that measures phubbing behaviour along the two dimensions of phone obsession and communication disturbance.

Although the PS has been widely used in studies aiming to assess phubbing behavior in different contexts and populations [8,11–16], there is a relative scarcity of studies analyzing the psychometric properties of the PS. For instance, Kim et al. (2022) validated the Phubbing Scale for the Korean population (PS-K), while Hwang et al. (2023) specifically validated the PS-K for mothers. Santos et al. (2023) focused on cultural adaptation of the PS for the Brazilian population, and García-Castro et al. (2022) validated the PS for the Portuguese population. Additionally, Veisuey et al. (2023) examined the psychometric properties of the PS in Iran, and Lin et al. (2023) analyzed the PS across Bangladesh, Iran, and Pakistan. For the Spanish adult population, Blanca and Bendayan (2018) validated the PS

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and investigated the association between phubbing and internet addiction and fear of missing out (FoMO).

Błachnio et al. (2021) conducted an analysis of the factor structure and measurement invariance of the Phubbing Scale (PS) across 20 countries. Initially, they tested both one-factor and two-factor models, each including the original 10 items. However, these two models did not exhibit invariance across all countries. Subsequently, the authors refined the scale to consist of just eight items, henceforth referred to as the PS-8. They provided evidence supporting a two-factor structure (with four items per factor) that remained invariant across 17 countries, including Spain [17]. However, no other studies have analyzed the psychometric properties of shorter versions of the PS, including the PS-8 in its Spanish version.

In many research, clinical, and educational contexts, a brief version of the instrument is of considerable value for speed and ease of use. For example, this may facilitate screening for phubbing behaviours in school contexts where time is a key variable. Furthermore, evidence of validity is central to meaningful results across languages and culture. In this context, we are keen to develop the psychometric adequacy of a shorter version of the PS in representative samples of Spanish adolescent population. Therefore the main objective of this research was to analyze the psychometry adequacy of a short form of the PS Spanish version [8] in adolescent and young student population. The specific objectives were, (a) to study the prevalence of phubbing in adolescent students; (b) to study the internal structure of a shorter version of the PS; (c) To gather evidence about the Measurement Invariance of a shorter version of the PS by gender and educational level; (d) to obtain evidence of the relationship between phubbing scores and socioemotional adjustment and mental-health indicators; and (e) to obtain evidence about the reliability of the scores of the shorter version of the PS scores.

2. Materials and Methods

2.1. Participants

A total of 1351 adolescent students, aged between 12 and 21, participated in this study. Among the participants, 54.25% identified as male, 42.78% as female, less than 1% selected 'other' as their gender identity, and nearly 2% chose not to specify. In terms of educational attainment, 58.40% were enrolled in non-university studies, including secondary education, high school, and vocational training, while the remaining participants were pursuing university degree programs.

2.2. Instruments

The Phubbing Scale (PS) [1] comprises 10 items rated on a Likert-type scale with five options from 1 (never) to 4 (always). The assessment of phubbing behavior was categorized into two factors: Communication Disturbance (CD) and Phone Obsession (PO) (17). Although the studies have demonstrated satisfactory psychometric properties, they remain limited in terms of diverse sample development [8,18].

The Strengths and Difficulties Questionnaire (SDQ) [19] 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. [20].

The Rosenberg Self-Esteem Scale (RSE) [21] 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. For this research, the Spanish version of the scale was used [22]; and we found that the McDonalds' Omega, of the total score was 0.798.

The Interpersonal Emotion Regulation Questionnaire (IERQ) (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

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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 [23]. In this research, the Spanish adaptation of the IERQ was conducted [24]. The internal consistency of the total score, calculated with McDonalds' Omega was 0.918).

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 [25], and an internal consistency, measured with McDonalds' Omega, that was 0.912 in the present study.

The Personal Wellbeing Index - School Children (PWI-SC) [26] 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 (Very sad) to 10 (Very Happy). The Spanish version of PWI-SC, which has shown adequate psychometric properties, has been used in this research [27].

2.3. Procedure

Participants aged 12-21 were conveniently selected from educational institutions and universities. Each participant individually completed the questionnaires. The time required to complete the survey was around 20 minutes, responding at their educational centre, with previous explanations about the questionnaire. This study was conducted with the approval from the Research Ethics Committee of the University of La Rioja (Code: inf_CE_46_2023).

2.4. Data Analysis

We studied the descriptive statistics and the percentage distribution of the PS' items. Then, we conducted a Confirmatory Factor Analysis (CFA) attending to the unidimensional model of 8 items (items 1,2,3,4,6,7,8, and 9) proposed by Blachnio et al., (2021) in order to gather evidence about the internal structure of the PS. In addition, considering the lack of adequacy of this model, we tested a unidimensional model with 6-items and a two-dimensional model with 6 items. Item reduction was based on the study of factor loadings (lower than .30) and the discrimination indices (lower than .30). We used the Muthen's quasi-likelihood estimator. The goodness-of-fit indices used were: Chi-square (X2), Confirmatory Factor Index (CFI), Tucker Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). Attending to Hu and Bentler (1999) RMSEA values should be under .80 for a good model fit. In addition, CFI and TLI over .95 are preferred. With regards to SRMR, values less than .08 can be considered as adequate. We also analysed the MI by gender and educational level. We conducted multigroup comparisons through structural equation modelling under the measurement models [28]. Cheung & Rensvold (2002) proposed that the change in CFI values (ΔCFI) was a valuable criterium to determine if nested models were practically equivalent, instead of $\Delta\chi 2$, as this one was more affected to changes in sample size. We, then, studied the internal consistency of the scores using McDonald's Omega. We also gathered sources of validity evidence of the PS based on the correlations between the PS scores and different indicators of well-being and mental health by means of Pearson's correlations. SPSS 24.0 (IBM, 2016) and JASP (JASP, 2019) were used for data analyses.

3. Results

3.1. Descriptive statistics for the PS-6 and prevalence rates

Descriptive statistics for the six-item bidimensional model are depicted in Table 1, showing the prevalence of all the answer options for the SP-6, means and standard deviations (SD).

Table 1. Prevalence rates for the 6 items Phubbing Scale (PS-6) and descriptive statistics for the different items in the total sample.

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	Prevalence					Descriptive Statistics			
Ítems	**Never**	**Rarely**	**Sometimes**	**Almost always**	**Always**	**Mean**	**SD**	**Skewness (*)**	**Kurtosis (**)**
Communication									
1	7.30	40.10	35.80	13.80	2.90	2.65	0.91	0.42	-0.03
3	48.93	33.16	11.62	4.52	1.78	1.77	0.95	1.3	1.38
4	24.43	47.45	22.06	4.81	0.81	2.1	0.85	0.6	0.28
Obsession									
6	17.91	19.91	19.62	21.91	20.65	3.07	1.4	-0.07	-1.28
7	31.90	33.68	20.36	10.07	4.00	2.21	1.12	0.72	-0.25
8	29.61	43.75	20.65	4.44	1.48	2.04	0.9	0.77	0.5

*Skewness SE ,067. ** Kurtosis SE ,133

3.2. Evidence of validity based on internal structure

Table 2 shows the goodness-of-fit indices for the dimensional models tested. Firstly, we analyzed the one-dimensional and the two-factor model for the 8-items model. As can be seen, goodness-of-fit indices did not reach to the proposed cut-off indices. Then we analyzed a one-dimensional and a two-factor solution with six items, after item reduction was conducted. The adequacy of the one-dimensional model was still questionable. In the case of the two-dimensional solution, all of the goodness-of-fit indices were adequate. In addition, the study of factor loadings for this version revealed that all of them were statistically significant and over .30 (see Table 3).

Table 2. Goodness of fit indices for the hypothetical model tested and measurement invariance across gender and age for the PS-6 two-dimensional model.

Model	χ^2	*df*	**CFI**	**TLI**	**RMSEA (IC 90%)**	**SRMR**	**ΔCFI**
8-items 1 factor	987.258	9	.803	.821	0.123 (0.116-0.131)	0.094	
8-items 2 factor	589.687	8	.86	.854	0.120 (0.112-0.127)	0.072	
6-items 1 factor	173.927	9	.935	.891	0.118 (0.103-0.134)	.060	
6-items 2 factor	65.223	8	.977	.957	0.073 (0.058-0.091)	0.039	
Measurement Invariance							
Gender							
le (*n* = 733)	48.970	5	.975	.954	.068 (.061-.075)	.033	
nale (*n* = 578)	47.872	5	.974	.969	.069 (.062-.075)	.029	
nfigural invariance	69.977	16	.979	.960	.0072 (.055-.089)	.040	
tric invariance	66.569	20	.982	.972	.060 (.044-.076)	.043	-.01
Scalar invariance	96.611	36	.976	.98	.051 (.039-.063)	.042	-.01
Educational Level							
Non-University (n = 755)	48.264	5	.977	.955	.066 (.043-.072)	.032	
University (n = 556)	47.823.	5	.976	.951	.063 (.045-.080)	.026	
Configural invariance	46.391	10	.977	.954	.064 (.046-.083)	.027	
Metric invariance	49.585	14	.978	.968	.053 (.038-.070)	.030	-.01

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Scalar invariance	51.787	18	.966	.962	.059 (.045-.073)	.032	-.01

Table 3. Factor loadings for the PS-6 two-dimensional model.

	Factor Loadings	**SE**	**CI 95%**	
Item			**Lower**	**Upper**
Factor 1				
1	0.805	0.024	0.758	0.852
3	0.438	0.029	0.381	0.495
4	0.652	0.024	0.606	0.698
Factor 2				
6	0.600	0.025	0.551	0.649
7	0.796	0.023	0.651	0.740
8	0.695	0.023	0.649	0.741

3.3. Measurement invariance of the PS-6 by gender and studies

Once we confirmed that the two-factor solution with 6 items was the most adequate, we proceeded to analyze the measurement equivalence of this structure across gender and educational level. To test this, we considered male and female participants for gender, and non-university and university students for educational level. As it is shown in Table 2, the ΔCFIs lower than .01 confirm strong MI both by gender and educational level.

3.4. Relation of the PS-6 with different indicators of well-being and mental health problems

We studied the correlations between the PS-6 scores and variables related to socio-emotional adjustment (see Table 4). PS-6 scores were significantly correlated with indicators of well-being and mental health with the exception of 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). Moreover, the PS-6 scores were very strongly associated with the PS original form (r = 0.927).

Table 4. Pearson's Correlations between the PS-6 two-dimensional model and different indicators of well-being and mental health problems.

Variable	**PS Communication**	**PS Obsession**	**PS-6 Total**
PS Obsession	0.452**	—	
PS-6 Total	0.802**	0.895**	—
Rosenberg TOTAL	-0.145**	-0.130**	-0.159**
CIUS TOTAL	0.417**	0.363**	0.450**
SDQ EMO	0.159**	0.167**	0.189**
SDQ_COND	0.160**	0.039	0.109**
SDQ PEER	0.009	0.027	0.025
SDQ HIPER	-0.009	-0.045	-0.034

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SDQ PROS	0.081*	-0.044	0.010
SDQ TOTAL	0.162	0.104**	0.152**
PWI TOTAL	-0.080*	-0.115**	-0.115**
IERQ TOTAL	0.099**	0.105**	0.120**
PS-10 Total	0.817**	0.795**	0.940**

**The correlation is significant at 0.01 level (bilateral). * The correlation is significant at 0.05 level (bilateral). PS-6 Total = Total score of the Phubbing Scale 6 items; Ps Communication = Phubbing Scale Communication; PS Obsession = Phubbing Scale Obsession; SDQ Emo = SDQ Emotional Problems; SDQ Con = SDQ Conduct Problems; SDQ Peer = SDQ Peer Problems; SDQ Hyper = SDQ Hyperactivity; SDQ Pros = SDQ Prosocial; PS-10 Total = Total score of the Phubbing Scale 10 items; IERQ Total = Internal Emotion Regulation Questionnaire Total Score; PWI Total = Personal Well-being Index- School Children.

3.5. Study of the reliability of the scores of the PS-6

Finally, we calculated the McDonald's Omega coefficient as an index of internal consistency of the scales. The total score displayed a coefficient of 0.701, and the Communication and Obssesion dimensions revealed coefficients of 0.617 and 0.669 respectively. All the discrimination indices were over .30.

4. Discussion

Smartphone access and use among adolescents and young adolescents is becoming, in European countries, almost ubiquitous [30]. Time spent on electronic devices such as smartphones has increased during and since the world pandemic COVID-19, not only for adults but also for adolescents. Consequently, Phubbing is receiving more attention and research with the aim to better understand and screen for a behaviour that has been linked with psychological difficulties like, among others, poorer communication quality [4,5], diminished interpersonal interactions [6,7], and tendencies towards addictive behaviors [8]. Therefore, screening at early stages seems relevant, and, consequently, assessment tools with adequate evidence of validity and reliability are highly necessary. Thus, the main goal of the present study was to analyse the psychometric adequacy of a short form of the PS in its Spanish version.

The results found in the present study about the internal structure of the PS, allow affirming that the PS-6 two-dimensional model showed adequate goodness-of-fit indices. Blachnio et al., (2021) in their study across 20 countries including Spain, indicated that a shorter form of the PS with 8 items better fit the data than the original 10 items version. Similarly, the study conducted by Barbed-Castrejón et al., (2024) revealed that the PS 10 items version had adequate evidence of internal structure but only after adding some correlated errors. Barbed-Castrejón et al., (2024) also indicated that the 8-item version was not adequate.

After the PS-6 two-factor structure was confirmed as the most satisfactory solution, we, further confirmed that the dimensional structure could be replicated with measurement invariance across gender and educational level. Previous studies, similarly to our results, revealed MI of the PS in the original version [13,31] and in the 8-items shorter version [16,17]. Nonetheless, information about the measurement equivalence of the instrument in shorter forms across variables like gender, age, or educational stages is not available. This information is critical to be able to compare male and female scores or samples of high school and university students, for example.

In addition, we also found consistent evidence of the relationship of the PS-6 with different indicators of mental health and psychological well-being. Thus, higher scores on phubbing were related with higher levels of psychological difficulties and problematic internet use. Also, phubbing

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was associated with lower levels of psychological well-being and self-esteem. This is consistent with previous studies [5,32–38]. Overall, the PS-6 showed acceptable reliability, consistent evidence of construct validity, and almost perfectly linear relationships with the original PS.

There are several limitations such as the use of self-report measures, especially in adolescent populations. Therefore, future research should consider the inclusion of objective measures of phubbing behaviour. Moreover, the cross-sectional nature of the study limits the establishment of cause-effect relationships. Thus, longitudinal studies could extend our understanding of the causes and consequences of phubbing among adolescents. Finally, we studied adolescent and university students from a specific region using convenience sampling, so results found may not be equivalent to other cultural contexts or entirely representative. Therefore, future studies on the psychometric properties of the PS in different areas are necessary.

Notwithstanding these limitations, the present study work contributes valuable information to understand phubbing among adolescents' and young adults' populations. In addition, and to the best or our knowledge, this is, the first study providing evidence of the psychometric adequacy of a short form of the PS in its Spanish version and in adolescents' and young adult's populations. To sum up, the PS-6 is a brief and easy to use screening instrument that allows to study Phubbing, a phenomenon that is receiving more attention due to its implications in mental health and psychological well-being.

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