

The psychometric properties of the general phubbing scale in adolescents

Ergen yaş grubunda genel phubbing ölçeği'nin psikometrik özelliklerinin incelenmesi

Erdal Görkem Gavcar, Ahmet Büber, Murat Balkıs, Çağlar Şimşek

Posted date:11.01.2023

Acceptance date:20.03.2023

Abstract

Purpose: Numerous studies indicate that the use of smartphones among adolescents has increased recently. Studies on phubbing generally focus on how parental phubbing affects adolescents. This study aims to contribute to the literature by revealing the validity and reliability of the scale measuring phubbing behavior in adolescents.

Material and methods: The sample included 206 adolescents aged 12-17 who applied to Pamukkale University Medical Faculty Hospital Child and Adolescent Psychiatry Outpatient Clinics and Kırıkkale Yüksek İhtisas Hospital Child and Adolescent Psychiatry Outpatient Clinic.

Results: To evaluate the construct validity of the General Phubbing Scale (GPS) in adolescents, first and second level confirmatory factor analyses were performed. The data model fit was shown to be at an acceptable level. The general phubbing was negatively related to social connectedness and positively related to internet addiction. Test-retest analysis indicated that the subdimensions nomophobia, interpersonal conflict, self-isolation, problem acknowledgment, and total score were 0.82, 0.80, 0.71, 0.66 and 0.81, respectively. The coefficients of internal consistency for the subdimensions of nomophobia, interpersonal conflict, self-isolation, problem acknowledgment, and total score were 0.78, 0.85, 0.92, 0.77, and 0.94. Furthermore, it has been shown that the GPS structure was identical for both genders.

Conclusion: This study demonstrated that the GPS can be used as a valid and reliable measurement tool for determining general phubbing levels for the clinical adolescent sample.

Key words: Phubbing, adolescent, smartphone.

Gavcar EG, Buber A, Balkıs M, Simsek C. The psychometric properties of the general phubbing scale in adolescents. Pam Med J 2023;16:392-403.

Öz

Amaç: Birçok çalışmada son yıllarda ergenler arasında akıllı telefon kullanımının arttığı gösterilmektedir. Phubbing ile ilgili yapılan çalışmalarda, genellikle ebeveyn phubbing davranışının ergenler üzerindeki etkilerine yoğunlaşıldığı görülmektedir. Phubbing davranışını ölçen ve ergenlerdeki geçerlik ve güvenilirliği yapılmış bir ölçeği ortaya koyarak literatüre katkı sunulması amaçlanmıştır.

Gereç ve yöntem: Çalışmanın örneklemini, Pamukkale Üniversitesi Tıp Fakültesi Hastanesi Çocuk ve Ergen Ruh Sağlığı ve Hastalıkları Poliklinikleri'ne ve Kırıkkale Yüksek İhtisas Hastanesi Çocuk ve Ergen Ruh Sağlığı ve Hastalıkları Polikliniği'ne başvuran 12-17 yaş arası 206 ergen oluşturmaktadır.

Bulgular: Genel Phubbing Ölçeğinin (GPÖ) ergenler için yapı geçerliği test etmek amacıyla birinci ve ikinci düzey doğrulayıcı faktör analizi yapılmış ve veri model uyumunun kabul edilebilir düzeyde olduğu gösterilmiştir. Genel phubbingin, sosyal bağlılık ile olumsuz yönde ve internet bağımlılığı ile olumlu yönde ilişkili olduğu ortaya koyulmuştur. Test tekrar test analizleri korelasyon sonuçları; nomofobi, kişiler arası çatışma, kişisel izolasyon, problem kabulü alt boyutları ve toplam puan için sırasıyla 0,82, 0,80, 0,71, 0,66 ve 0,81 olduğu gösterilmiştir. Ölçeğin iç tutarlılık katsayıları ise; nomofobi, kişiler arası çatışma, kişisel izolasyon, problem kabulü alt boyutları ve toplam puan için sırasıyla 0,78, 0,85, 0,92, 0,77 ve 0,94 olarak saptanmıştır. Ayrıca, GPÖ'nün her iki cinsiyet için de aynı yapıya sahip olduğunu gösterilmiştir.

Sonuç: Bu çalışmanın bulguları GPÖ'nün klinik ergen örneklemini için Genel Phubbing düzeylerini belirlemede geçerli ve güvenilir bir ölçme aracı olarak kullanılabilirliğini göstermektedir.

Anahtar kelimeler: Phubbing, ergen, akıllı telefon.

Gavcar EG, Büber A, Balkıs M, Şimşek Ç. Ergen yaş grubunda genel phubbing ölçeği'nin psikometrik özelliklerinin incelenmesi. Pam Tıp Derg 2023;16:392-403.

Erdal Görkem Gavcar, M.D. Kırıkkale Yüksek İhtisas Hospital Child and Adolescent Psychiatry Clinic, Kırıkkale Türkiye, e-mail: gorkemgavcar@hotmail.com (<https://orcid.org/0000-0002-1661-8759>) (Corresponding Author)

Ahmet Büber, Asist. Prof. Pamukkale University, Faculty of Medicine, Child and Adolescent Psychiatry Department, Denizli, Türkiye, e-mail: ahmetbuber@gmail.com (<https://orcid.org/0000-0001-6293-2565>)

Murat Balkıs, Prof. Pamukkale University, Faculty of Education, Department of Psychological Counseling and Guidance, Denizli, Türkiye, e-mail: mbalkis@pau.edu.tr (<https://orcid.org/0000-0003-2249-1309>)

Çağlar Şimşek, PhD. Pamukkale University, Faculty of Medicine, Child and Adolescent Psychiatry Department, Denizli, Türkiye, e-mail: caglar_simsek_48@hotmail.com (<https://orcid.org/0000-0002-6592-3522>)

Introduction

The role and quality of communication has gained great significance in the modern world. Moreover, with the development of technology, the quality of communication and the speed of communication have also increased [1]. The production of personal devices, such as smartphones, has also expanded the area of communication technology by facilitating human interaction [2]. Smartphones not only provide easy communication, but also allow people to connect with family and friends throughout the day, wherever and whenever they want [3]. In addition, they also allow access to entertainment [4] and online games [5].

These developments in information technology have also led to some undesirable results. According to the study conducted by the Savci and Aysan [6], the most sensitive group to smartphone or internet addiction is youth. Pew Research (2018) report revealed that 95% of youths have attainment to a smartphone, and 45% of youths are online almost constantly [7]. It was found that smartphone addiction among adolescents in India ranged from 39% to 44% in a meta-analysis study [8]. Another review study revealed that problematic smartphone use among children and adolescents ranged from 5% [9] to 50% [10, 11]. With the presence of many technological devices in smartphone models in the last 15 years [12], many addictions such as Short Message/Messaging Service (SMS) addiction [13], internet addiction [14], and game addiction [15] are gathered under a single focal object [1]. Due to all of these reasons, phubbing occurs in the area where these addictions meet and enter our daily lives as a multidimensional phenomenon that can seriously affect daily communication [16].

With the widespread introduction of smartphones into our lives, the concept of phubbing emerged in 2007 in Australia [17] and was included in an advertising campaign in the dictionary of Macquarie [2]. Phubbing is when a person suddenly gets lost in his/her phone during a social interaction and focuses on it [18]. The word phubbing is formed by the combination of the words "phone" and "snubbing". It is described as the act of belittling the person in social environment by focusing on the phone/smartphone during communication, in place of talking to the person directly [19].

Nazir and Piskin [17] define phubbing as the act of disregarding one or more people during social activities, controlling or using WhatsApp, Facebook, WhatsApp or other social media applications using smartphones. According to Aagaard [18], phubbing is an act in which a person suddenly turns their gaze down in the middle of a social interaction and gets lost in their smartphone. Blanca and Bendayan [20] describe phubbing as using smartphone in social environment with two or more people and interacting with the phone instead of communicating with other persons. The concept of phubbing received worldwide media coverage and became popular with the 'Stop Phubbing' campaign [21]. The definition of phubbing shows that there is a behavior pattern that can affect social interaction. Some studies have shown that high levels of phubbing are associated with depressive mood [22]. In other studies, it was found that high social anxiety increased phubbing during peer communication [23], and loneliness played a mediating role between adolescents' problematic smartphone use and parents' phubbing behaviors [24]. In a study conducted in Turkey, it was shown that aggression was one of the predictors of phubbing behavior [25].

Recent studies have investigated the antecedents of phubbing behavior. It has been observed that the most important determinant is smartphone addiction [16, 26]. Studies about phubbing revealed that people perceive their interactions to be of poorer quality [27], be less satisfied with their interactions [28], trust their interaction partners less [29], and feel less close to their interaction partners in the presence of the phone [19, 30]. The results of a study that included 2407 adolescents in China showed that there was a relationship between the level of parental phubbing and depressive symptoms in adolescents [31]. It was found that parent phubbing behavior was positively associated with adolescent mobile phone addiction in another study, which included 726 adolescents in China. This association was mediated by the parent-child relationship [32].

Karadag et al. [16] found that smartphone addiction, SMS addiction, social media addiction and internet addiction predicted phubbing behavior. In addition, Chotpitayasunondh and Douglas [33] found that internet addiction, fear

of missing out and lack of self-control predict smartphone addiction, which in turn predicts the extent to which people phub [26]. It is seen that internet addiction is effective on phubbing behavior both directly and through smartphone addiction. On the other hand, as can be understood from the definition of phubbing behavior, it can be considered as a behavior pattern that may cause problems in social relationships. When previous studies on the relationship between social commitment and phubbing behavior are examined, it is seen that there is a negative relationship between social commitment and phubbing behavior [34].

It is evident that there are studies examining phubbing behavior in the literature. The studies conducted on adolescents are mostly related to the effects of parent phubbing behavior on adolescents. Moreover, the scales used to evaluate phubbing behavior were designed to be used in adults. We found no scale designed for adolescents measuring phubbing behavior in our literature review. In our study, it was aimed to contribute to the literature by performing the validity and reliability of the phubbing scale in the adolescent age group.

Materials and methods

Our research is methodological and cross-sectional study. This study, includes adolescents between the ages of 12 and 17, who applied to Pamukkale University Faculty of Medicine Hospital Child and Adolescent Psychiatry Department and Pamukkale Hospital Child and Adolescent Psychiatry Outpatient Services. The data were collected between August and December 2022. Ethics committee approval of the study was obtained with Pamukkale University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee meeting dated 26.07.2022 and numbered 11. The study contained adolescents aged 12-17 years, whose parents agreed to participate and who completed the scales and did not include adolescents with autism spectrum disorder, mental retardation, psychotic disorder, or who did not agree to participate. Written informed consent was obtained from the participants and their parents before participation in the study.

Dr. Chotpitayasunondh, the co-author of the study who developed the scale, was contacted via e-mail and required permissions were obtained to use the scale. Dr. Naif Ergun, the responsible author of the study that examined the Turkish validity and reliability (TVR) of the scale in adults, was contacted by e-mail and permissions were obtained to use the Turkish version of the scale in adolescents.

In methodological studies, sample size can be calculated by different methods. In terms of sample size, Comrey and Lee [35] evaluated sample sizes between 50 and 1000. 50 is very weak, 100 is weak, 200 is mild, 300 is good, 500 is very good, and 1000 is excellent for determining the sample size in their scale studies. The sample size recommended by Kline [36] was ten times the number of items, while Bryman and Cramer [37] recommended five or ten times the number of items. In this study, a total of 206 adolescents participated, and scales were re-administered to 34 adolescents 4 weeks later for the test-retest.

Statistical analysis

Data analysis was applied in three stages using SPSS 22 and AMOS 22. First process, Confirmatory Factor Analysis (CFA) was conducted to test the construct validity (CV) of the GPS. The fit indexes recommended by Kline [38] were used to test the Data-Model fit (DMF). These are: Root Mean Square of Error Approximation (RMSEA), Chi-Square (χ^2), Standardized Root of Mean Errors (SRMR), Chi-Square/Degree of Freedom (χ^2/Sd). As fit indices; Comparative Goodness of Fit Index (CFI), Tucker Levis Index (TLI), Goodness of Fit Index (GFI), Relative Goodness of Fit Index (RFI) and Normized Goodness of Fit Index (NFI) were used.

Testing the latent structure is an important step in validating a measurement instrument or construct. Latent structures refer to the underlying theoretical constructs or dimensions that a set of observed variables are intended to measure. In addition, to test the latent structure because it helps to confirm whether the observed variables are actually measuring what they are intended to measure. In other words, it helps to determine whether the observed variables are good indicators of the underlying construct or dimension.

The second process, Cronbach's Alpha (CA) and test-retest coefficient were calculated to calculate the internal consistency coefficient of the variable. In the third process, the convergent and criterion-related validity (CRV) of the scale was calculated. For convergent validity, the Pearson correlation coefficient was calculated to calculate its relationship with the Internet Addiction scale. For criterion-dependent validity, correlation analysis was used to calculate the relationship between phubbing and social commitment based on the theoretical explanations in the literature. Also, we analyzed the average variance extracted (AVE) value for convergent validity. In the fourth stage, measurement invariance was used to measure whether there was a similarity in terms of male and female gender.

Data collection tools

Sociodemographic Data Form (SDF): SDF was composed by the researchers.

General Phubbing Scale (GPS): Scale developed by Chotpitayasunondh and Douglas [33] in 2018. It was formed as a 7-point Likert scale for phubbing in adults. The scale consists of 15 questions and 4 subdimensions. These subdimensions are nomophobia (NP), self-isolation (SI), interpersonal-conflict (IC), problem-acknowledgment (PA). Low score from GPS defines low level of phubbing, and high score defines a high level of phubbing. The TVR of the scale for adults were performed by Ergun et al. in 2019 [39].

Young's Internet Addiction Test (Y-IAT) short version: Developed by Young [40] and transformed into a short form by Pawlikowski et al. [41]. The scale occurs twelve items, and it is a five-point Likert scale. The outcomes of the validity and reliability studies indicated that the validity and reliability of Y-IAT Short Version was provided. High scores acquired from the scale define that the level of internet addiction is high. The Turkish adaptation of Y-IAT was made by Kutlu et al. in 2016 [42].

Social Connectedness Scale: The scale, developed by Lee and Robbins [43], consists of 8 items that evaluate the level of social connectedness, which is an important part of individuals' sense of belonging, especially during and after adolescence. The scale is a

six-point likert type. High scores acquired from the scale, which does not have a reverse scored item, defines high social connectedness. Turkish adaptation of the scale was made by Duru [44].

Results

Sociodemographic Data

Among the patients included in the study, 61.2% were female and 38.8% were male. The mean age of the cases was 15.13 ± 1.5 years (min:12, max:17). Regarding the family structure of the participants, it was found that 78.2% had nuclear families, 8.3% had extended families, 11.2% had divorced parents, and 2.3% had deceased parents. The income levels of the cases were found to be 7.8% low, 67.5% middle and 24.7% high income.

Validity analysis

The CV and CRV were analyzed inside of content of the validity analysis of the GPS.

Construct Validity (CV)

To test the CV of the GPS for adolescent population, first and second level CFA were performed (Figure 1 and Figure 2). First level CFA results indicated that the DMF was at an acceptable level [$\chi^2(Sd=84, N=206)=187.062, p<.001, \chi^2/Sd=2.227, RMSEA=.08 (.06-.09), SRMR=.05, CFI=.95, TLI=.94, NFI=.91$ ve $IFI=.95$]. In the second stage, second-level CFA was applied to test whether latent structure was confirmed or not. Our findings of the second-level CFA indicated that the DMF was at an acceptable level [$\chi^2(Sd=86, N=206)=198.109, p<.001, \chi^2/Sd=2.304, RMSEA=.08 (.07-.09), SRMR=.05, CFI=.94, TLI=.93, NFI=.91$ ve $IFI=.94$].

Convergent Validity

The convergent validity of General Phubbing Scale was examined in two stages. In the first step, the composite (CR) value and of General Phubbing Scale were tested. The findings indicated that The AVE values for nomophobia, interpersonal conflict, self-isolation, and problem acknowledgment are 0.49, 0.58, 0.75, and 0.54, respectively. According to Fornell and Larcker's [45] standards, AVE values greater than or equal to 0.5 indicate good convergent validity.

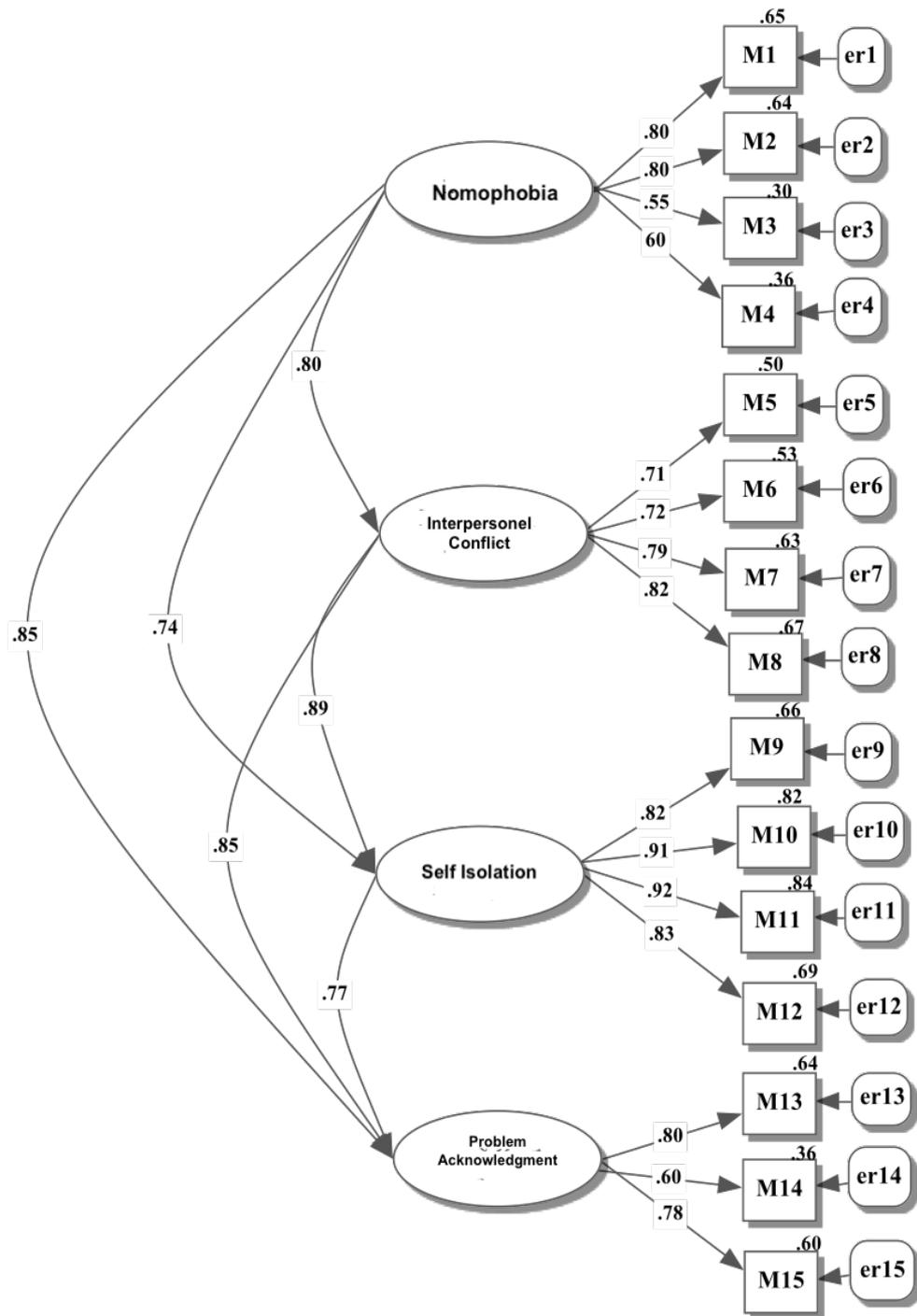


Figure 1. First level confirmatory factor analysis graph

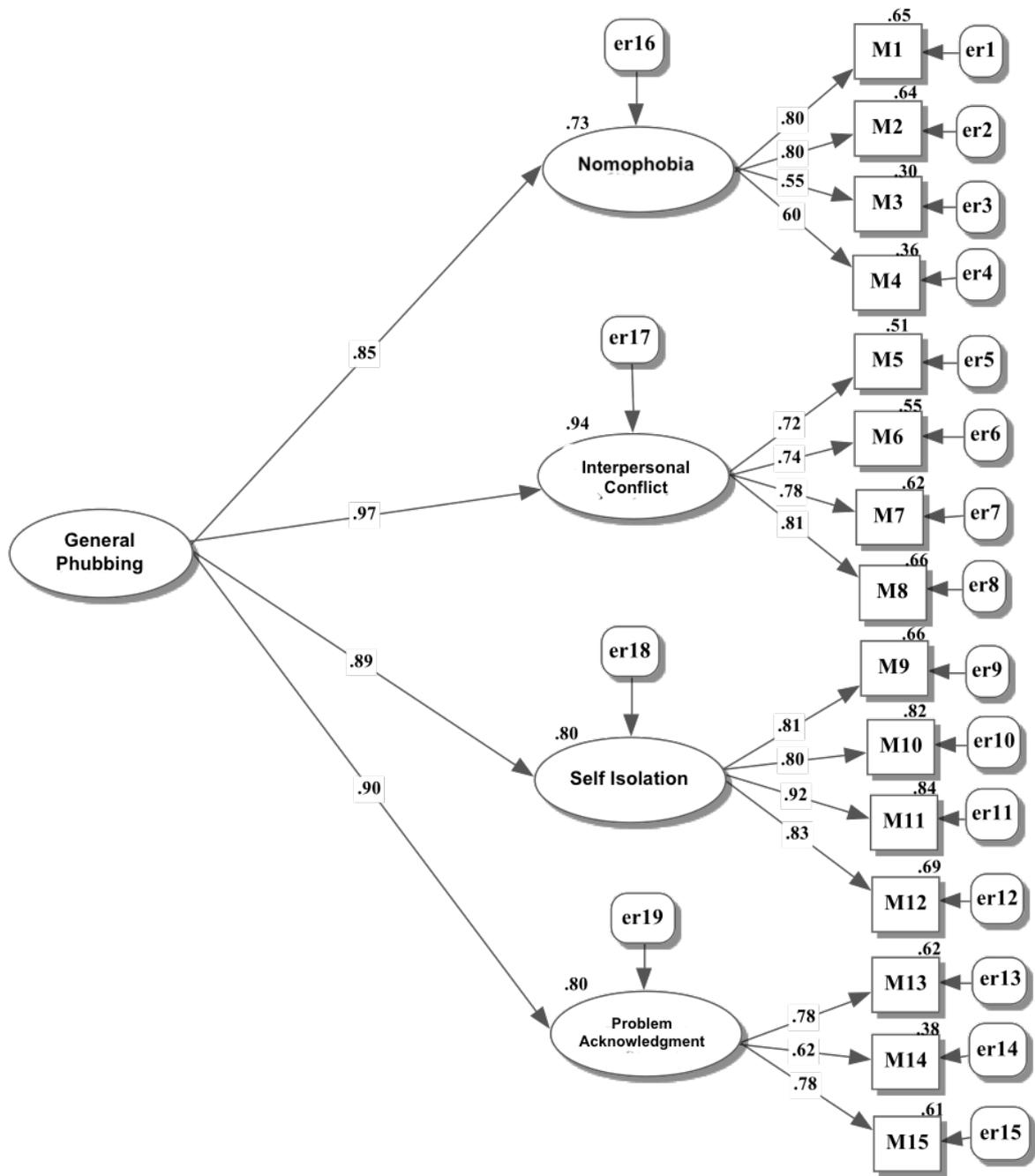


Figure 2. Second level factor analysis graph

The composite reliability values for nomophobia, interpersonal conflict, self-isolation, and problem acknowledgment are 0.79, 0.85, 0.92, and 0.77, respectively. These values suggest good internal consistency reliability for the measures. In the second step, the Pearson correlation coefficient was calculated to calculate its relationship with the Internet Addiction scale. The finding from correlational analysis indicated that general phubbing was positively related to internet addiction ($r=.77, p<.001$)

Criterion Relevant Validity (CRV)

For the CRV of the GPS, the relationships between adolescents' general phubbing mean scores and social connectedness and internet addiction mean scores were calculated through correlation analysis. Our study results indicated that general phubbing was negatively involved to social connectedness ($r=-.65, p<.001$) and positively involved to internet addiction and this relationship was statistically significant ($r=.77, p<.001$) (Table 1).

Reliability analysis

To ensure evidence for the reliability of the GPS, a test-retest application was applied with an interval of four weeks. Pearson product-moment correlation analysis was applied to determine the relationships between the subdimensions and total scores obtained from the first and second application of the scale. In addition, CA reliability coefficients were calculated for the scale and its subdimensions.

Test-retest analyzes, $r=.82, p<0.001$ for nomophobia subdimension, $r=.80, p<0.001$ for interpersonal conflict subdimension, $r=.71, p<0.001$ for self-isolation subdimension, and problem acknowledgement subdimension for $r=.66, p<0.001$. In the first and second applications, it was shown that there was high positive correlation with $r=.81, p<0.001$ in terms of total scores.

In the second process, the CA internal consistency coefficient of the GPS was calculated. Our findings revealed that the internal consistency coefficient of the scale was $\alpha=.78$ for the nomophobia subdimension, $\alpha=.85$ for the interpersonal conflict subdimension, $\alpha=.92$ for the self-isolation subdimension, $\alpha=.77$ for the problem acceptance subdimension. For the whole scale, it was revealed as $\alpha=.94$.

Measurement invariance

To test whether the measurement model of the GPS is similar for boy and girl adolescents, configurational, metric and scalar invariance were tested, respectively. First, the formal invariance was tested for both sexes separately via CFA. CFA results indicated that DMF was acceptable for both genders (For boys: $X^2(83, N=80)=138.892, X^2/df=1.673, p<0.001, RMSEA=.09 (0.07-.12); SRMR=.06; CFI=.93; TLI=.91, NFI=.84$ ve $IFI=.93$; For girls: $X^2(83, N=126)=156.088, X^2/df=1.881, p<0.001, RMSEA=.08 (.06-.10); SRMR=.06; CFI=.94; TLI=.92, NFI=.88$ ve $IFI=.94$). Then, Metric and Scale invariance were tested via Multiple Group Confirmatory Factor Analysis (MGCFA) (Table 2).

Table 1. Descriptive and correlation analysis results

Variables	1	2	3	4	5	6	7
1-Nomophobia	-	.66**	.66**	.66**	.85**	.60**	-.50**
2-Interpersonal Conflict		-	.78**	.71**	.90**	.74**	-.60**
3-Self-Isolation			-	.67**	.90**	.65**	-.62**
4-Problem Acknowledgment				-	.84**	.75**	-.54**
5-General Phubbing					-	.78**	-.65**
6-Internet Addiction						-	-.60**
7-Social Commitment							
Arithmetic means	15.39	11.97	12.20	10.98	50.55	31.83	31.81
Standard deviation	6.37	6.89	7.67	5.12	22.88	11.13	11.64

** $p<.001$

Table 2. Fit indices for MGCFA

	χ^2 (df)	p	χ^2/df	$\Delta \chi^2$ (df)	p
Configurational	312.081 (168)	.001	1.858		
Metric	321.876 (183)	.001	1.759	9.795 (15)	.83
Scalar	324.368 (189)	.001	1.716	2.492 (6)	.87

Discussion

New concepts related to smartphone use have begun to appear, as smartphone using is increasing. Phubbing can also be considered as one of the concepts that may be related to smartphone using. We believe that it is important to measure phubbing, a concept that includes also social relations depending on the use of smartphones, and to investigate its possible effects on children and adolescents. There are scales that measure the phubbing behavior of individuals in adulthood. However, there was no scale measuring the concept of phubbing in the adolescents, where smartphone use is intense. For this reason, in our study, we planned to make a new contribution to the literature by aiming to investigate the psychometric properties of the GPS in adolescents.

In this study, the psychometric properties of the GPS were tested for adolescents in a clinical sample. The construct and criterion validity of the scale were analyzed, respectively, and then the test-retest and internal consistency coefficients were calculated to determine the reliability of the scale.

Validity of the GPS in adolescent age group

TVR of the scale was conducted by Ergun et al. [39]. In our study, CV analysis was used as a method to define the validity of the scale. In the broadest sense, function of CV is to test the relationships between constructs. For this purpose, CFA is used [46]. This method measures whether there is a sufficient level of relationship between the determined factors, whether they are independent of each other, which variables are related to which factors, and whether they are sufficient to explain the model [47]. According to Kline [38], a value of $\chi^2/s.d$ below 3 defines a perfect fit, while values equal to or less than 0.05 for RMSEA and SRMR indicate a perfect fit. Values below 0.08 define

an acceptable fit. TLI, RFI, GFI, NFI and CFI take values from 0 to 1. Values of 0.95 and above correspond to perfect fit, while values between 0.90 and 0.94 indicate acceptable fit. To test the CV, first and second level CFA were performed, respectively. First level CFA results indicated that the DMF was excellent and the four-factor structure of the scale was valid for the clinical adolescent sample. The findings of the second level CFA defined that the items and subdimensions of the scale represented general phubbing latent variable at a statistically significant level (Figure 1 and Figure 2).

The CRV was also tested within the extent of the validity analyses of scale. In this context, relationship between the general phubbing mean scores of adolescents and the mean scores of social connectedness and internet addiction were examined. We found that general phubbing was negatively related to social connectedness and positively related to internet addiction. The internet addiction scale [40-42], was used for the convergent validity of the scale, and the social commitment scale [43, 44] was used for the criterion-related reality. We found that the correlation coefficient of GPS with internet addiction in the adolescents was statistically significant as $+0.77$ ($p < .001$). The correlation coefficient of GPS with the social commitment scale was -0.65 ($p < .001$), which is statistically significant. The findings are consistent with research findings showing positive relationships [20, 33, 39] between phubbing and internet addiction, whereas there are negative relationships with social commitment [48, 49]. AVE values for nomophobia, interpersonal conflict, self-isolation, and problem acknowledgment are 0.49, 0.58, 0.75, and 0.54, respectively. Therefore, all of these findings demonstrate that the GPS has both construct and criterion validity for the clinical adolescent sample.

Reliability of the GPS in the adolescent age group

The reliability of the scale is defined as the fact that the results correctly reveal the phenomenon regarding the conceptual structure, and that similar results are obtained when the measurement tool is applied at different times, in different places, and in different sample groups selected from the same population [50]. The alpha coefficient was developed by Lee CA as an evaluation of the internal consistency of a test and a scale. It is stated as a number between 0 and 1 [51, 52]. According to the generally accepted classification; ≥ 0.9 CA is excellent, $0.7 \leq CA < 0.9$ is good, $0.6 \leq CA < 0.7$ is acceptable, $0.5 \leq CA < 0.6$ is weak, and CA less than 0.5 is unacceptable [53]. The study in which the GPS was developed found that the CA were 0.84, 0.87, 0.83, 0.82, 0.93 for respectively NP, IC, SI, PA and the whole of scale [33]. In the TVR of the GPS in adults, the CA were 0.82, 0.84, 0.86, 0.74, 0.91 for respectively NP, IC, SI, PA and the whole of scale [39]. The reliability of the scale for adolescent was determined CA were 0.78, 0.85, 0.92, 0.77, 0.94 for respectively NP, IC, SI, PA and the whole of scale. Based on findings, it can be said that GPS and its subdimensions have sufficient reliability for the clinical sample of adolescents.

To investigate the invariance of the scale in terms of time factor, we examined test-retest reliability. For this purpose, 34 adolescents who filled out the scales were asked to complete the same scales 4 weeks later. The correlation coefficient obtained as a result of the test-retest reliability analysis provides information about the level and direction of the relationship between the two variables. The correlation coefficient ranges from -1 to +1, and as it gets closer to 1 on the minus and plus sides, it means that the relationship is perfect. If the obtained value is (-), the relationship is negative, and (+) indicates that the relationship is positive. In test-retest analyses, the correlation coefficient is required to be positive and close to 1. This situation reveals that the scale is stable and unchanging over time [54]. A correlation analysis was applied to determine the relationships between the first and second application of the scale, subdimensions, and total scores. The results indicate that there are high positive correlations between the subdimensions in both applications, varying between 0.66 and 0.82.

Measurement invariance aims to show that the structure of a measurement tool is similar in different groups [55]. Formal invariance was tested by CFA, and metric and scale invariance was tested separately for both genders by MDFA. Findings from the MDFA based on the chi-square difference proposed by Chen [56] showed that formal, metric and scale invariances can be accepted for the measurement model of the GPS. Our findings indicated that the GPS had the same structure for both genders.

The limitations of this study should be considered when evaluating the findings. The psychometric properties of the GPS were only investigated for the clinical adolescent sample in the current study. This may limit the generalizability of the present findings to all adolescents. Investigating the psychometric properties of the scale in population based sample may provide important contributions to the validity and usefulness of the scale.

In summary, the findings of this study demonstrate that the GPS can be used as a valid and reliable measurement tool to determine the general phubbing levels for the clinical adolescent sample. This study revealed the measurement invariance of the scale according to gender. With this result, it made a significant contribution to GPS validity by providing evidence that the scale can be used in gender comparisons.

Conflict of interest: No conflict of interest was declared by the authors.

References

1. Erzen E, Odaci H, Yeniçeri İ. Phubbing: which personality traits are prone to phubbing? *Soc Sci Comput Rev* 2019;39:56-69. <https://doi.org/10.1177/0894439319847415>
2. Capilla Garrido E, Issa T, Gutiérrez Esteban P, Cubo Delgado S. A descriptive literature review of phubbing behaviors. *Heliyon* 2021;7:07037. <https://doi.org/10.1016/j.heliyon.2021.e07037>
3. Anshari M, Alas Y, Hardaker G, Jaidin JH, Smith M, Ahad AD. Smartphone habit and behavior in Brunei: personalization, gender, and generation gap. *Comput Human Behav* 2016;64:719-727. <https://doi.org/10.1016/j.chb.2016.07.063>
4. Zhang K, Chongyang C, Zhao S, Lee M. Understanding the role of motives in smartphone addiction. Paper presented at: Proceedings of the 18th Pacific Asia Conference on Information Systems 24-28 June 2014; Chengdu, China

5. Mérelle SYM, Kleiboer AM, Schotanus M, et al. Which health-related problems are associated with problematic video-gaming or social media use in adolescents? A large-scale cross-sectional study. *Clin Neuropsychiatry J Treat Eval* 2017;14:11-19.
6. Savcı M, Aysan F. Technological addictions and social connectedness: predictor effect of internet addiction, social media addiction, digital game addiction and smartphone addiction on social connectedness. *Dusunen Adam J Psychiatry Neurol Sci* 2017;30:202-216.
7. Anderson M, Jiang J. Teens, social media & technology 2018. Available at: <https://www.pewresearch.org/internet/2018/05/31/teens-social-media-technology-2018/>. Accessed December 25, 2022
8. Davey S, Davey A. Assessment of smartphone addiction in indian adolescents: a mixed method study by systematic-review and meta-analysis approach. *Int J Prev Med* 2014;5:1500-1511.
9. Lopez Fernandez O. Problem mobile phone use in Spanish and British adolescents: first steps towards across-cultural research in Europe. In: Giuseppe R, Brenda K, Pietro C, ed. *The Psychology of Social Networking Vol.2*. De Gruyter Open Poland 2015;2:186-201. <https://doi.org/10.1515/9783110473858-015>
10. Yen CF, Tang TC, Yen JY, et al. Symptoms of problematic cellular phone use, functional impairment and its association with depression among adolescents in Southern Taiwan. *J Adolesc* 2009;32:863-873. <https://doi.org/10.1016/j.adolescence.2008.10.006>
11. Fischer Grote L, Kothgassner OD, Felnhofer A. Risk factors for problematic smartphone use in children and adolescents: a review of existing literature. *Neuropsychiatr* 2019;33:179-190. <https://doi.org/10.1007/s40211-019-00319-8>
12. Pendergrass WS, Town C. Phubbing: communication in the attention economy. Paper presented at: Proceedings of the Conference on Information Systems 2017; Texas, USA.
13. Hassanzadeh R, Rezaei A. Effect of sex, course and age on SMS addiction in students. *Middle-East J Sci Res* 2011;10:619-625.
14. Tao R, Huang X, Wang J, Zhang H, Zhang Y, Li M. Proposed diagnostic criteria for internet addiction. *Addiction* 2010;105:556-564. <https://doi.org/10.1111/j.1360-0443.2009.02828.x>
15. Wood RTA. Problems with the concept of video game "addiction": some case study examples. *Int J Ment Health Addict* 2008;6:169-178. <https://doi.org/10.1007/s11469-007-9118-0>
16. Karadağ E, Tosuntaş Ş B, Erzen E, et al. Determinants of phubbing, which is the sum of many virtual addictions: a structural equation model. *J Behav Addict* 2015;4:60-74. <https://doi.org/10.1556/2006.4.2015.005>
17. Nazir T, Pişkin M. Phubbing: a technological invasion which connected the world but disconnected humans. *Int J Indian Psychol* 2016;3:2348-2396. <http://dx.doi.org/10.25215/0304.195>
18. Aagaard J. Digital akrasia: a qualitative study of phubbing. *Ai Soc* 2020;35:237-244. <https://doi.org/10.1007/s00146-019-00876-0>
19. Chotpitayasunondh V, Douglas KM. The effects of "phubbing" on social interaction. *J Appl Soc Psychol* 2018;48:304-316. <https://doi.org/10.1111/jasp.12506>
20. Blanca MJ, Bendayan R. Spanish version of the Phubbing Scale: internet addiction, Facebook intrusion, and fear of missing out as correlates. *Psicothema* 2018;30:449-454. <https://doi.org/10.7334/psicothema2018.153>
21. Ugur NG, Koc T. Time for digital detox: misuse of mobile technology and phubbing. *Procedia-Social Behav Sci* 2015;195:1022-1031. <https://doi.org/10.1016/j.sbspro.2015.06.491>
22. Ivanova A, Gorbaniuk O, Blachnio A, et al. Mobile phone addiction, phubbing, and depression among men and women: a moderated mediation analysis. *Psychiatric Quarterly* 2020;91:655-668. <https://doi.org/10.1007/s11126-020-09723-8>
23. Sun J, Samp J. Phubbing is happening to you: examining predictors and effects of phubbing behaviour in friendships. *Behaviour Information Technology* 2022;41:2691-2704. <https://doi.org/10.1080/0144929X.2021.1943711>
24. Geng J, Lei L, Ouyang M, Nie J, Wang P. The influence of perceived parental phubbing on adolescents' problematic smartphone use: a two-wave multiple mediation model. *Addictive Behaviors* 2021;121:106995. <https://doi.org/10.1016/j.addbeh.2021.106995>
25. Parmaksız I, Kılıçarslan S. Aggression and emotional intelligence as predictors of phubbing. *Psycho-Educational Research Reviews* 2021;10:189-203. https://doi.org/10.52963/PERR_Biruni_V10.N3.12
26. Chotpitayasunondh V, Douglas KM. How "phubbing" becomes the norm: the antecedents and consequences of snubbing via smartphone. *Comput Human Behav* 2016;63:9-18. <https://doi.org/10.1016/j.chb.2016.05.018>
27. Rainie L, Zickuhr K. Americans' views on mobile etiquette 2015. Available at: <https://www.pewresearch.org/internet/2015/08/26/americans-views-on-mobile-etiquette/>. Accessed December 25, 2022
28. Abeele MMP Vanden, Antheunis ML, Schouten AP. The effect of mobile messaging during a conversation on impression formation and interaction quality. *Comput Human Behav* 2016;62:562-569. <https://doi.org/10.1016/j.chb.2016.04.005>

29. Cameron AF, Webster J. Relational outcomes of multicommuting: integrating incivility and social exchange perspectives. *Organ Sci* 2011;22:754-771. <https://doi.org/10.1287/orsc.1100.0540>
30. Misra S, Cheng L, Genevie J, Yuan M. The iPhone effect: the quality of in-person social interactions in the presence of mobile devices. *Environ Behav* 2016;48:275-298. <https://doi.org/10.1177/0013916514539755>
31. Wang X, Gao L, Yang J, Zhao F, Wang P. Parental phubbing and adolescents' depressive symptoms: self-esteem and perceived social support as moderators. *J Youth Adolesc* 2020;49:427-437. <https://doi.org/10.1007/s10964-019-01185-x>
32. Niu G, Yao L, Wu L, Tian Y, Xu L, Sun X. Parental phubbing and adolescent problematic mobile phone use: the role of parent-child relationship and self-control. *Child Youth Serv Rev* 2020;116:105247. <https://doi.org/10.1016/j.chilyouth.2020.105247>
33. Chotpitayasunondh V, Douglas KM. Measuring phone snubbing behavior: Development and validation of the generic scale of phubbing (GSP) and the generic scale of being phubbed (GSBP). *Comput Human Behav* 2018;88:5-17. <https://doi.org/10.1016/j.chb.2018.06.020>
34. Sansevere K, Ward N. Linking phubbing behavior to self-reported attentional failures and media multitasking. *Future Internet* 2021;13:100. <https://doi.org/10.3390/fi13040100>
35. Comrey AL, Lee HB. A first course in factor analysis. 2nd ed. New York: Psychology press 2013. <https://doi.org/10.4324/9781315827506>
36. Kline P. An easy guide to factor analysis. 1st ed. London: Routledge 1994. <https://doi.org/10.4324/9781315788135>
37. Bryman A Cramer D. Quantitative data analysis with SPSS release 10 for Windows. 1st ed. London: Routledge 2001. <https://doi.org/10.4324/9780203471548>
38. Kline RB. Handbook of methodological innovation. In: M. Williams, ed. Convergence of structural equation modeling and multilevel modeling. Thousand Oaks, CA: Sage Publications 2011.
39. Ergün N, Göksu İ, Sakız H. Effects of phubbing: relationships with psychodemographic variables. *Psychol Rep* 2019;123:1578-1613. <https://doi.org/10.1177/0033294119889581>
40. Young KS. Caught in the net: how to recognize the signs of internet addiction--and a winning strategy for recovery. New York: John Wiley & Sons 1998.
41. Pawlikowski M, Altstötter Gleich C, Brand M. Validation and psychometric properties of a short version of Young's internet addiction test. *Comput Human Behav* 2013;29:1212-1223. <https://doi.org/10.1016/j.chb.2012.10.014>
42. Kutlu M, Savcı M, Demir Y, Aysan F. Turkish version of Young's internet addiction test short form: a validity and reliability study in university students and adolescents. *Anadolu Psikiyat Derg* 2016;17:69-76. <http://dx.doi.org/10.5455/apd.190501>
43. Lee RM, Robbins SB. Measuring belongingness: the social connectedness and the social assurance scales. *J Couns Psychol* 1995;42:232-241. <http://dx.doi.org/10.1037/0022-0167.42.2.232>
44. Duru E. Sosyal bağıllık ölçeğinin türk kültürüne uyarlanması. *Eurasian J Educ Res* 2007;26:85-94.
45. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* 1981;18:39-50.
46. Erkorkmaz Ü, Etikan İ, Demir O, Özdamar K, Sanisoğlu SY. Confirmatory factor analysis and fit indices. *Türkiye Klin J Med Sci* 2013;33:210-223. <https://doi.org/10.5336/medsci.2011-26747>
47. Özdamar K. Paket programlarla istatistiksel veri analizi-1. 5th ed. Eskişehir: Kaan Kitapevi; 2004.
48. Savcı M, Aysan F. Technological addictions and social connectedness: the predictive effect of internet addiction, social media addiction, digital game addiction and smartphone addiction on social connectedness. *Dusunen Adam* 2017;30:202-216. <https://doi.org/10.5350/DAJPN2017300304>
49. Ang CS, Teo KM, Ong YL, Siak SL. Investigation of a preliminary mixed method of phubbing and social connectedness in adolescents. *Addict Heal* 2019;11:1-10. <https://doi.org/10.22122%2Fahj.v11i1.539>
50. Şencan H. Sosyal ve davranışsal ölçümlerde güvenilirlik ve geçerlilik. 1. Baskı. Ankara: Seçkin Yayıncılık, 2005.
51. Tavakol M, Dennick R. Making sense of Cronbach's alpha. Vol. 2, *Int J Med Educ England*; 2011.
52. Cronbach LJ. Coefficient alpha and the internal structure of tests. *Psychometrika* 1951;16:297-334.
53. George D, Mallery P. SPSS for Windows Step by Step: a simple guide and reference, 11.0 Update. Michigan: Allyn and Bacon, 2003.
54. Tavşancıl E. Tutumların ölçülmesi ve SPSS ile veri analizi. 5th ed. Ankara: Nobel Yayın Dağıtım, 2005.
55. Başusta NB, Gelbal S. Examination of measurement invariance at groups' comparisons: a study on PISA student questionnaire. *Hacettepe Üniversitesi Eğitim Fakültesi Derg* 2015;30:80-90.
56. Chen FF. Sensitivity of goodness of fit indexes to lack of measurement invariance. *Struct Equ Model a Multidiscip J* 2007;14:464-504. <https://doi.org/10.1080/10705510701301834>

Ethics committee approval: Approval for the research was obtained from the Pamukkale University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee (dated 26/07/2022 and numbered 11).

Contributions of the authors to the article

E.G.G., A.B. designed the research study. E.G.G., A.B., C.S. collected the data. M.B. analyzed the data. E.G.G. wrote the manuscript. A.B. and M.B. assisted in writing and editing the manuscript. E.G.G., A.B., M.B. and C.S. read and approved the final manuscript.