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ORIGINAL ARTICLE

Adaptation and Psychometric Evaluation of the Turkish Version of the Reflective Smartphone Disengagement Scale for Nursing Students

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Abstract

Background: Problematic smartphone use among nursing students has been linked to impaired learning and professional performance. While previous research has primarily focused on addictive or compulsive smartphone use, limited attention has been paid to individuals' intentional and reflective efforts to regulate their smartphone use. Moreover, no validated instrument exists to assess reflective smartphone disengagement among nursing students in the Turkish context.
Purpose: This study aimed to adapt and validate the Turkish version of the Reflective Smartphone Disengagement scale among undergraduate nursing students.
Methods: A descriptive, cross-sectional design was employed at a nursing faculty in a public university in the southern region of Türkiye. Using convenience sampling, the study included 376 undergraduate nursing students from all grade levels who owned a smartphone and consented to participate. Sample size adequacy was supported by recommended item-to-participant ratios and an acceptable KMO value. Data were collected using a personal information form, the Reflective Smartphone Disengagement Scale, and the Nomophobia Questionnaire. Face, content, construct, and criterion validity procedures were applied for scale adaptation.
Results: Exploratory Factor Analysis (EFA) revealed that the Turkish version of the Reflective Smartphone Disengagement Scale has a two-factor structure with six items, comprising usage moderation (items related to limiting smartphone use across specific times, places, situations, and life balance) and availability management (items related to controlling reachability and intentional disconnection). Internal consistency was acceptable, with Cronbach's alpha coefficients of .70 and .81, respectively. Confirmatory Factor Analysis indicated a good model fit (CFI = .97, RMSEA = .08).
Conclusion: The Turkish version of the Reflective Smartphone Disengagement Scale is a valid and reliable tool for assessing nursing students' conscious efforts to manage smartphone use and can be utilized in nursing education to identify students' self-regulatory behaviors and inform interventions aimed at promoting healthy smartphone use in academic and clinical settings.

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1. Introduction

Smartphones are now widely used by people of all ages due to ongoing advances in science and technology. Over time, they have become an essential part of everyday life. People use smartphones to communicate, share information, and even meet basic needs. Although smartphones offer numerous benefits, their use is not without drawbacks (Chen et al., 2023). When usage becomes excessive and individuals lose control over their behavior, it can lead to negative consequences (Precht et al., 2023). Excessive smartphone use has recently been examined in the context of behavioral addictions and has been linked to psychological issues and problematic usage patterns (Augner et al., 2023). The widespread availability of smartphones and people's growing reliance on mobile applications have made problematic smartphone use a

significant public health concern (Horwood & Anglim, 2019). This behavior is generally described as compulsive use that interferes with everyday functioning (Busch & McCarthy, 2021). The psychological foundation of such behavior typically involves diminished self-control and obsessive usage patterns (Lin et al., 2017).

In recent years, researchers have shifted their focus from compulsive smartphone use to more intentional aspects of self-regulation and behavioral reflection (Meier & Reinecke, 2021; Radtke et al., 2022). Many individuals express a desire to change their smartphone habits, especially by reducing screen time (Dennison et al., 2013). Previous studies have investigated how smartphone usage tracking can increase awareness of past behavior, support disengagement, encourage goal setting (e.g., daily or session-based app limits), and implement temporary restrictions or deterrents (Olson et al., 2023; Lukoff et al., 2018; Radtke et al., 2022; Syvertsen & Enli, 2020).

Given the health-related risks associated with problematic smartphone use, many users are making intentional efforts to limit or regulate their screen time—a behavior often described as smartphone avoidance. Although terminology is still evolving, researchers have increasingly examined users' deliberate disengagement from smartphones (Zhao et al., 2022). A key concept in this area is reflective smartphone disengagement, which refers to conscious self-regulation regarding when and how smartphones are used. This behavior has become an essential skill for maintaining a healthy balance between digital connectivity and well-being (Matthes et al., 2023). Reflective smartphone disengagement involves creating personal rules for smartphone use that remain stable over time. The term "reflective" highlights the cognitive effort that individuals apply when intentionally forming these behavioral norms, while the term "disengagement" emphasizes the motivation to reduce or avoid smartphone use in particular contexts. Specifically, reflective disengagement refers to users' deliberate limitation of smartphone use to certain times, places, or situations (Matthes et al., 2023).

In this regard, research conducted in Türkiye provides compelling evidence that nursing students are a particularly relevant group for studying this issue. Studies conducted in Türkiye have shown that nursing students often struggle with problematic smartphone use, which may negatively affect their academic performance, concentration during clinical practicums, and the overall quality of patient care. For instance, Semerci and Akgün Kostak (2019) found that 92.1% of nursing students accessed the internet through smartphones, which was linked to lower communication skills. Similarly, Kırca and Kutlutürkan (2019) reported a negative correlation between smartphone addiction and communication abilities among nursing students. These findings demonstrate that while smartphone addiction has been examined, the concept of intentional disengagement remains underexplored in the Turkish context. There is a lack of validated tools that assess how nursing students purposefully regulate their use of smartphones in both academic and clinical settings. Therefore, this study addresses a critical gap by culturally adapting and validating the Reflective Smartphone Disengagement (RSD) Scale for use in Türkiye. Developing a Turkish version of this scale will provide researchers and educators with a valid and reliable instrument to evaluate nursing students' conscious efforts to regulate smartphone use. It will also help identify individuals who struggle with digital self-regulation and inform the design of targeted interventions that promote healthier smartphone habits, digital well-being, academic focus, and improved clinical performance.

Extending beyond national studies, international findings also highlight the broader impact of smartphone overuse in clinical training environments. According to a meta-analysis, around 22% of nursing students report symptoms of smartphone addiction, and many admit to using their phones during clinical practicums, often for communication-related purposes (Osorio-Molina et al., 2021). Excessive smartphone use in these settings can reduce the quality and effectiveness of patient care, highlighting the importance of exploring smartphone-related behaviors in clinical environments. Cho and Lee (2015) found that nursing students with higher mobile phone addiction levels were more likely to be distracted during clinical training, which compromised their learning. In a follow-up study, over half of nursing students reported experiencing such distractions during their clinical practice (Cho & Lee, 2016). These findings reinforce the importance of assessing nursing students' intentional behaviors and self-control related to smartphone use. However, empirical research on tools designed to measure self-regulation and disengagement in this group remains limited. In Türkiye, nursing education involves intensive clinical training and close patient interaction, where smartphone use may have unique implications for learning and patient safety. Cultural norms related to accessibility and

digital communication may further influence how nursing students regulate smartphone use. Therefore, adapting and validating the RSD scale for the Turkish context is essential to ensure cultural relevance and measurement validity. The RSD Scale, developed by Matthes et al. (2023), was specifically created to evaluate deliberate and self-regulated smartphone behaviors. Accordingly, the present study aimed to adapt and validate the Turkish version of the RSD Scale to assess the extent to which nursing students intentionally regulate and limit their smartphone use. The study was guided by the following research questions: (1) How valid and reliable are the psychometric properties of the Turkish version of the RSD Scale? (2) What are the levels of RSD among undergraduate nursing students?

2. Methods

2.1. Research design

This cross-sectional study was carried out with the purpose of adapting the RSDS for use in Turkish. The adaptation followed recognized guidelines for instrument design, revision, and validation (Boateng et al., 2018).

2.2. Setting and samples

The data for this study were collected between April and December 2023 from undergraduate nursing students at a public university in Türkiye. A convenience sampling method was utilized to recruit participants (Creswell, 2012). The inclusion criteria for participation were (1) being an undergraduate nursing student, (2) consenting to participate in the study, and (3) owning a smartphone. Exclusion criteria included refusal to provide informed consent.

The determined sample size in the study ranged between 260 and 420, adhering to the guideline that it should be 10 (Kline, 2015) or 20 (Andrew et al., 2011) times the number of survey items. According to the 2024 report from the Higher Education Council (2024) in YÖK Atlas, approximately 980 undergraduate nursing students (660 female, 320 male) were enrolled in the nursing faculty at the time of data collection. Out of the 393 questionnaires collected, 17 were from participants who did not consent. The analysis continued with the remaining 376 participants. Students from all grade levels and all genders were considered and invited to participate in the study, ensuring broad representation across the undergraduate population.

2.3. Measurement and data collection

The study aimed to assess nursing students' reflective smartphone disengagement behaviours and evaluate the psychometric properties of the Turkish version of the RSD Scale. To achieve these objectives, data were collected using three instruments: a personal information form, the RSD Scale, and the Nomophobia Questionnaire (NMP-Q).

The personal information form was used to record participants' demographic characteristics and background variables relevant to smartphone and internet use. The RSD Scale was administered to measure nursing students' deliberate and self-regulated efforts to control and limit smartphone use across different contexts, forming the primary construct of interest in this study. Meanwhile, the NMP-Q was included to assess participants' levels of nomophobia and evaluate criterion-related validity of the RSD Scale through its association with an established measure of smartphone-related anxiety.

The questionnaire was administered via Google Forms. Upon receiving their consent, participants began filling out the questionnaire. To ensure data integrity, the e-questionnaire was configured to allow submission only when fully completed, and each participant was restricted to a single submission. Responses were downloaded and securely stored in a password-protected Microsoft Excel file on the researcher's personal computer, which was not accessible to third parties. A backup copy of the data was retained in the researcher's private Google Drive account.

2.3.1. Personal information form

The personal information form consisted of eight questions designed to collect demographic characteristics and internet usage patterns of the participants. These included gender, age, grade level (e.g., first to fourth year), and self-reported Grade Point Average (GPA) on a 4.0 scale. In addition, internet usage was examined in four dimensions, based on the Internet Use Pattern (IUP) framework developed by Caner-Yildirim and Yildirim (2022). Participants were asked to report their total daily internet usage in hours, as well as specify how much of this time was spent

on (1) academic internet use which refers to activities such as attending online classes, accessing learning management systems, conducting research, reading articles or textbooks, writing assignments, or preparing for exams, (2) social media use (e.g., Facebook, Twitter/X, Instagram, YouTube, WhatsApp), and (3) entertainment purposes (e.g., watching Netflix, playing online games, browsing for leisure).

2.3.2. Reflective smartphone disengagement scale (RSDS)

The RSD scale was developed by Matthes et al. (2022) to measure individuals' deliberate efforts to control and limit their smartphone usage. The scale consists of a single factor with six items, which utilizes a 5-point Likert scale ranging from 1 – "strongly disagree" to 5 – "strongly agree". The total score on the RSDS can range from 6 to 30, with higher scores indicating greater smartphone usage regulation. In the original development study, the RSDS demonstrated a Cronbach's alpha internal consistency coefficient of .76 (Matthes et al., 2023). The current research will undertake the Turkish adaptation of the scale.

2.3.3.Nomophobia questionnaire (NMP-Q)

The NMP-Q was developed by Yildirim and Correira (2015) to measure individuals' nomophobia scores, which was adapted into the Turkish language by Yildirim et al. (2016). This 20-item questionnaire consists of four subscales involving "not being able to communicate" (NBC, 6-item), "losing connectedness" (LC, 5-item), not being able to access information (NBAI, 4-item), and giving up convenience (GC, 5-item). It employs a 7-point Likert scale, ranging from 1 – "strongly disagree" to 7 – "strongly agree". The total score on the NMP-Q can range from 20 to 140, with higher scores indicating a higher nomophobia level. The internal consistency coefficient for the Turkish version varies from α = .74 to .94 across the subscales and is α = .92 for the entire questionnaire, as Yildirim et al. (2016) noted. In the current study, the internal consistency coefficient of the questionnaire for nursing undergraduate students was found to range from α = .79 to .92, reaching α =.92 for the total questionnaire. In this study, the NMP-Q was also used as an external criterion to assess the concurrent validity of the Turkish version of the RSDS.

2.4. Translation procedure

The scale translation procedure followed the guidelines proposed by Merenda (2006). Accordingly, three key steps were followed to ensure both item-level and test-level equivalence. In the first step, all scale items and response options were examined from both etic (universal) and emic (culture-specific) perspectives. This initial review helped identify culturally bound concepts related to smartphone use—particularly around availability expectations and personal boundaries—that might not translate directly into the Turkish context. Next, two bilingual translators independently translated the original English scale into Turkish. Then, a second pair of bilingual experts performed a back-translation into English. The back-translated version was compared with the original to ensure semantic and conceptual consistency. The researchers made the final decision on the scale by including the suggested translations for the items. Consequently, the initial Turkish version of the RSD draft was prepared for data processing.

2.5. Data analysis

This study focused on the adaptation and validation of the Turkish version of the RSD Scale by examining its psychometric properties. For this purpose, four widely utilized approaches for assessing the validity of constructs, namely face validity, content validity, construct validity, and criterion-based validity, were employed (Carmines & Zeller, 1979). This study assessed construct validity through exploratory factor analysis (EFA), confirmatory factor analysis (CFA), convergent validity, and discriminant validity. The internal consistency reliability of the Turkish version of RSD was calculated using Cronbach's alpha coefficients (Plichta & Kelvin, 2012).

The participants of the study were randomly divided into equal sub-samples for performing EFA (n_1 = 188) and CFA (n_2 = 188) based on the suggestion of Cudeck and Browne (1983). Before conducting analyses, the assumptions, including missing data, sample size, univariate and multivariate normality, and outliers, were checked. The e-questionnaire was designed in a way that allowed submission only when all the required fields were completed, thereby ensuring that there was no missing data. The appropriateness of carrying out EFA was confirmed through the correlation matrix and Bartlett's test of sphericity. Many correlations between the items in the

matrix exceeded the threshold of .30, which indicates the suitability of EFA (Tabachnick & Fidell, 2014). The appropriateness of the EFA was validated by Barlett's test of sphericity, which yielded a statistically significant result ($\chi2(15) = 378.78$, $p < .001$) at the .05 level. Given the existence of correlated factors, oblique rotation was chosen as the factor rotation method (Preacher & McCallum, 2003). We assessed the adequacy of the sample size using two methods. Firstly, the sample size was verified by applying Hatcher's (1994) rule of thumb, which recommends a minimum ratio of 10:1 for variables to participants. With 188 participants, this criterion was met. Secondly, the Kaiser-Mayer-Olkin (KMO) value was calculated to be .68, indicating that the sample size was sufficiently large for the analysis, as it exceeded the recommended threshold of .60 (Hair et al., 2019). We examined both univariate and multivariate outliers and found no outliers in the dataset. The univariate normality assumptions were satisfied by checking skewness and kurtosis values, histograms, and Q-Q plots. However, we detected a violation of multivariate normality, as evidenced by the significant result ($p < .001$) obtained from Mardia's test. Therefore, it was decided to use the Principal Axis Factoring (PAF) extraction method, as recommended by Fabrigar et al. (1999). All statistical analyses were carried out using IBM SPSS Statistics 28 and IBM AMOS 20 software.

2.6. Ethical considerations

The required ethical approval was secured from the relevant university Research Ethics Committee (February 14, 2023; Approval no. 579074). The first page of the electronic questionnaire presented an informed consent form, which explained to the nursing students that involvement in the study was entirely voluntary and confidential. It assured them that whether they chose to participate would not affect their subsequent educational journey or academic achievements. The nursing students could access and complete the questionnaire only after acknowledging the consent form on this initial page. Moreover, participants were informed that they could opt out at any point while completing the online questionnaire.

No personally identifiable information was collected, and all responses remained anonymous. In accordance with ethical standards, the data will be securely stored for five years and then permanently deleted. Participants were informed that they could opt out at any point while completing the online questionnaire.

3. Results

3.1. Characteristics of the participants

Of the 376 undergraduate nursing students (Table 1), the majority were female, accounting for 293 (77.9%), while 83 (22.1%) were male. Their mean age was 20.64 ± 2.45, ranging from 17 to 40. Table 1 also illustrates the distribution of students across different study years: 33.5% were freshmen, 23.7% were sophomores, 22.1% were juniors, and 20.7% were seniors and others (those taking courses across different grade levels). Regarding Internet usage patterns, different purposes exhibited varying trends: Social Internet use had a slightly higher mean of 3.21 ± .22 hours, recreational Internet use showed a mean of 2.337 ± 2.170 hours, and academic-related Internet usage had a mean of 2.00 ± 1.79 hours. The students reported a mean daily Internet use of 6.08 ± 3.16 hours.

3.2. Adaptation study

3.2.1. Face validity

Cognitive interviews were conducted with a psychiatric nursing expert and five nursing students to evaluate the scale's face validity. The student participants were selected purposively to ensure diversity in academic year (1st to 4th year) and gender (3 female, 2 male). This process aimed to identify possible response errors and understand the underlying causes of these errors within the scale (Willis, 2004). Following these insights, the researchers made minor modifications to several items. No major issues were identified, and all participants reported that the items were understandable and relevant to the construct. Thus, face validity was established.

3.2.2. Content validity

The scale's content validity was assessed using the Davis technique (Davis, 1992). The item-related content validity index (I-CVI) was calculated by utilizing a four-point scale ranging from 1 – "not relevant" to 4 – "highly relevant," in which experts are requested to assess the relevance

of each item to the intended construct. The expert panel consisted of three associate professors and seven doctors. For each item, the number of ratings of 3 and 4 was determined, and this count was divided by the total number of experts on the panel. Through this calculation, the I-CVI resulted in .917 in total, with each item ranging between .80 and 1.00. These values indicate a high level of content validity for the respective items, meeting the recommended criterion, which is .80 or higher, as Davis (1992) suggested.

Table 1. Characteristics of the participants (n = 376)

Variable	M	SD	Min	Max	f	%
Age	20.64	2.45	17.0	40.0		
Gender						
Female					83	22.1
Male					293	77.9
Study Year						
Freshman					126	33.5
Sophomore					89	23.7
Junior					83	22.1
Senior & Others					78	20.7
Internet Use Patterns						
Academic Internet Use	2.004	1.786	0.0	12.0		
Social Internet Use	3.212	2.221	0.0	18.0		
Recreational Internet Use	1.877	1.917	0.0	18.0		
Daily Internet Use	6.078	3.161	0.0	24.0		

Note. M: Mean; SD: Standard Deviation; Min: Minimum; Max: Maximum

3.2.3. Construct validity

3.2.3.1. Exploratory factor analysis (EFA)

The results of the EFA revealed a two-factor structure with 6 items based on Kaiser's eigenvalues greater than one rule, scree plot, and parallel analysis. Table 2 demonstrates that the eigenvalues for the first two factors exceeded those obtained from parallel analysis, providing evidence for a two-factor structure solution.

Table 2. Kaiser's eigenvalues, mean of eigenvalues, and PA eigenvalues

Factor	Kaiser's Eigenvalues	Mean of Eigenvalues	PA Eigenvalues
1*	2.74	1.24	1.33
2*	1.46	1.13	1.20
3	.63	1.04	1.08

Note. PA: Parallel analysis, * The number of factors

The factor structure of the Turkish version of the RSD scale was composed of six items with two factors, which did not align with the original scale, which consisted of a single factor with six items. The first factor, called "Usage Moderation (UM)," comprised the first four items, while the second factor, called "Availability Management (AM)," embraced the remaining two items (see Appendix A-Table A1 for the adapted version of the scale).

The UM factor explained 45.62% of the variance, while the AM factor accounted for 25.29%. These two factors explained 69.91% of the total variance, exceeding the 60% benchmark considered satisfactory (Hair et al., 2019). As depicted in Table 3, the factor loadings for the six items ranged between .59 and .83. This range signifies that each item significantly contributes to its respective factor (Tabachnick & Fidell, 2014). Furthermore, the communality values for each item were higher than .40, meeting the standard recommended by Costello and Osborne (2005).

Furthermore, the correlation analysis revealed a statistically significant negative relationship between the two factors, Usage Moderation and Availability Management ($r = -.30$). This suggests that participants who actively engage in regulating their smartphone usage tend to also manage their availability less, or vice versa.

Table 3. Factor loadings and communalities of the Turkish version of the RSD scale

Items	Factors		
	F1	F2	h^2
UM1	.83	-.01	.69
UM2	.76	.01	.58
UM3	.64	.01	.41
UM4	.59	-.01	.35
AM1	-.02	.84	.70
AM2	.02	.83	.70
% of Variance	45.62	24.29	
Cumulative %	45.62	69.91	
Factor Correlations			
F1: UM	–		
F2: AM	-.30	–	

Note. h^2 = Communality. Pattern coefficients higher than .40 were indicated in boldface.
UM: Usage moderation; AM: Availability Management

3.2.3.2. Confirmatory factor analysis (CFA)

CFA was performed with maximum likelihood estimation to confirm the two-factor structure solution obtained from EFA in the study. The fit indices showed a good fit to the data (χ^2/df = 2.30, CFI = .97, GFI = .97, TLI = .94, RMR = .04, SRMR = .04, RMSEA = .08) with no modifications made to the model. The CFI, GFI, and TLI indices should possess a value of at least .90, which is considered acceptable, and .95 and above is considered a perfect fit (Hu & Bentler, 1999). Furthermore, RMSEA, RMR, and SRMR values less than .05 indicate an excellent fit, while values ranging from .05 to .08 are good and acceptable (Cudeck & Browne, 1983). Values of χ^2/df less than 3 are typically seen as indicative of a good fit, while those less than 5 are deemed acceptable (Kline, 2011). The factor loadings of the items ranged between .57 and .89; greater than .40 is acceptable, as Stevens (2002) recommended.

3.2.3.3. Convergent and discriminant validity

This study assessed construct validity in two ways. Convergent validity ensures that different indicators of the same construct are closely related, sharing a high proportion of variance (Hair et al., 2019). Conversely, discriminant validity confirms that a construct is distinct from others, highlighting its uniqueness (Hair et al., 2019). To ascertain adequate convergent validity, it is crucial for both the standardized factor loadings and the Average Variance Extracted (AVE) to exceed the .50 threshold (Fornell & Larcker, 1981). The findings from this study affirm the convergent validity of the Availability Management factor and all standardized factor loadings. As shown in Table 4, the Usage Moderation factor's AVE was .43, slightly below the .50 threshold. However, as Fornell and Larcker (1981) stated, AVE values below .50 can still be considered acceptable if the composite reliability (CR) exceeds .70. In this study, the CR for Usage Moderation was .75, satisfying this condition. Table 4 also depicts that the composite reliability values for both factors surpass their corresponding AVE values, further reinforcing the evidence of robust convergent validity in the study.

Table 4. Measurement model

Construct	L Interval	AVE	CR	α	Discriminant Validity	
					UM	AM
User moderation (UM)	.57 – .72	.43	.75	.70	(.66)	–
Availability management (AM)	.79 – .89	.71	.83	.81	.25	(.84)

Note. L: Factor Loadings; AVE: Average Variance Extracted; CR: Composite Reliability; Cronbach's alpha;
*The values in parentheses are the square roots of AVE

Table 4 also presents evidence for discriminant validity, as recommended by Fornell and Larcker (1981). According to this criterion, the square root of each construct's AVE should exceed

its correlation with other constructs and also surpass the .50 benchmark. In Table 4, the square roots of AVE are reported in parentheses along the diagonal: .66 for Usage Moderation and .84 for Availability Management. Both values are greater than the inter-construct correlation of .25 and the minimum threshold of .50, thus confirming the discriminant validity of the study (also see Figure 1).

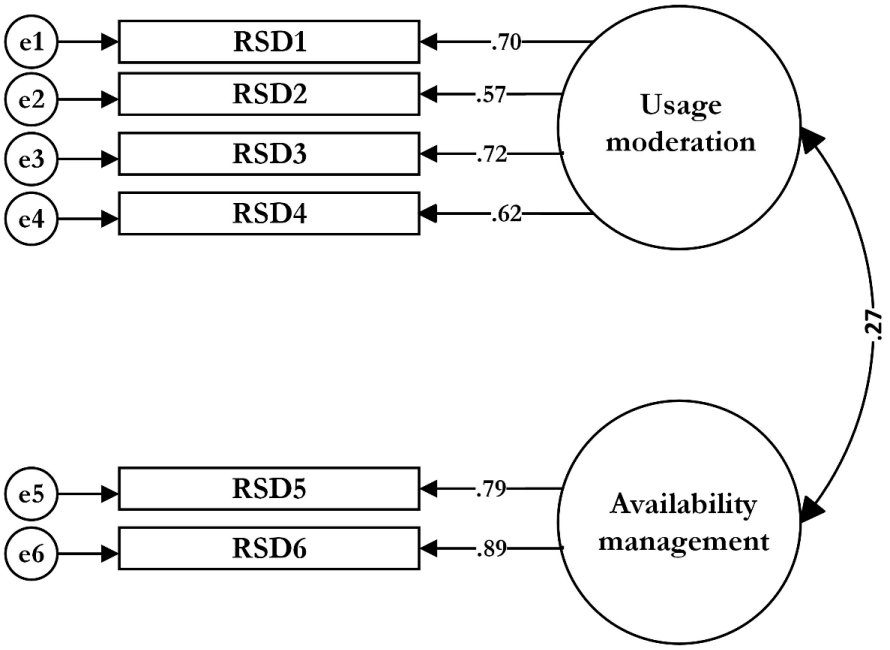

Figure 1. The measurement model of the translated version of the RSD-scale

3.2.4. Criterion validity

In this study, concurrent validity—a subtype of criterion validity—was examined by correlating the new scale with an established measure. According to established psychometric standards, concurrent validity is supported when scores on a new instrument are significantly correlated with scores on a validated measure assessing a related construct (Kline, 2011). Reflective Smartphone Disengagement (RSD) was negatively correlated with nomophobia (r = -.17, p < .01), supporting its concurrent validity.

3.2.5. Reliability

Cronbach's alpha (α) coefficients for the usage moderation and availability management factors were calculated as .70 and .81, respectively, exceeding the acceptable threshold of .70 (Fornell & Larcker, 1981), indicating good internal consistency reliability (see Table 4).

3.3. Undergraduate nursing students' reflective smartphone disengagement levels

Descriptive analyses revealed that the mean of the undergraduate nursing students' RSD scores was 3.61 ± .64 on a scale ranging from 1 to 5. The mean scores of sub-factors, highest to lowest, were as follows: AM (M = 3.78 ± .83) and UM (M = 3.52 ± .79).

4. Discussion

This study aimed to adapt the Reflective Smartphone Disengagement (RSD) Scale to the Turkish language for nursing students and evaluate its validity and reliability. Excessive smartphone use among nursing students can adversely affect their physical and mental well-being, as well as their learning efficiency in both academic and clinical settings. Recent literature indicates that nursing students may be particularly vulnerable to smartphone overuse due to the dual demands of coursework and clinical practicums, which can compromise attention, communication, and patient care quality (Ramjan et al., 2021; Semerci & Akgün Kostak, 2019; Kırca & Kutlutürkan, 2019). Consequently, it is essential to identify and enhance the skills of nursing students in reflective disengagement from smartphone use. To date, no specialized

instrument has been validated for measuring reflective smartphone disengagement in Turkish nursing students. The present study demonstrates that the Turkish version of the RSD Scale is a valid and reliable tool for assessing nursing students' deliberate efforts to regulate and moderate their smartphone use, and the results are broadly applicable to this population.

4.1. Validity analysis

The original version of the RSD Scale featured a single-factor structure with six items. However, the adapted Turkish version revealed a two-factor structure, still encompassing six items. This difference may reflect cultural and contextual factors influencing nursing students' smartphone use behaviors, highlighting the importance of cross-cultural adaptation. Validity refers to the extent to which a measurement tool accurately assesses the intended attributes without being influenced by extraneous factors (Thorkildsen, 2010). In our study, face, content, construct, and criterion validity were employed to evaluate the scale's validity. Although some indicators were borderline—such as AVE slightly below .50, RMSEA = .08, and the concurrent validity correlation r = −.17—these values remain within acceptable ranges according to psychometric literature, supporting the scale's validity. The adapted RSD Scale is therefore deemed a valid tool for Turkish nursing students.

4.1.1. Face validity

For the assessment of face validity, an expert in psychiatric nursing and five undergraduate nursing students conducted an evaluative interview of the scale. This process aimed to identify potential response errors and ensure comprehensibility of the items (Allen et al., 2023; Willis, 2004). Based on the feedback obtained during the face validity assessment, minor but meaningful amendments were made to several items to enhance clarity, linguistic simplicity, and cultural relevance for Turkish nursing students. Specifically, certain items were rephrased to reduce syntactic complexity, eliminate potentially ambiguous expressions, and align the wording more closely with terminology commonly used in Turkish academic and clinical nursing contexts. Such refinements are particularly important in scale adaptation studies, as subtle linguistic nuances may influence respondents' interpretation of items and subsequently affect response accuracy (Beaton et al., 2000). Prior research has emphasized that culturally inappropriate or overly complex item phrasing can introduce measurement error, especially among student populations with varying levels of academic and clinical experience (Boateng et al., 2018). The revisions implemented in this study aimed to ensure semantic equivalence with the original scale while improving comprehensibility for the target population, thereby supporting content representativeness and response validity. Overall, these modifications contributed to strengthening the face validity of the Turkish version of the RSD Scale by ensuring that items were easily understood, contextually appropriate, and interpreted consistently by nursing students.

4.1.2. Content validity

Content validity refers to the extent to which the total scale and each scale item accurately represent the targeted concept (Cohen & Swerdlik, 2018). The measurement tool must encompass all aspects of the concept to ensure content validity (Ratter et al., 2022). The present study utilized the Davis technique (1992) to evaluate the content validity of the RSD scale. Ten academicians, selected based on their expertise in psychiatric nursing, psychometrics, and prior experience with smartphone-related research, rated the relevance of each item to the targeted construct. The high item-content validity results obtained in this study provide strong evidence that the Turkish version of the RSD Scale adequately represents the intended construct. An overall I-CVI value of .917, with individual item scores ranging from .80 to 1.00, exceeds the minimum threshold recommended for content validity and indicates substantial expert agreement (Davis, 1992). The inclusion of academicians with complementary expertise in psychiatric nursing, psychometrics, and smartphone-related research strengthens the rigor of the evaluation process and aligns with best practices in scale adaptation studies (Polit & Beck, 2006; Boateng et al., 2018). High content validity is particularly important in cross-cultural adaptation studies, as it ensures that translated items not only preserve semantic equivalence but also reflect contextual and professional relevance within the target population (Beaton et al., 2000). For nursing students, whose academic and clinical environments involve distinct expectations regarding technology use, expert validation helps ensure that items accurately capture reflective disengagement behaviors

in both educational and clinical contexts. The present findings suggest that the adapted items comprehensively cover the domain of reflective smartphone disengagement and provide a sound foundation for subsequent construct validity and reliability analyses.

4.1.3. Construct validity

Construct validity refers to the extent to which a scale accurately measures the theoretical construct or concept intended to be measured. The present study employed exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and convergent and discriminant validity to assess the construct validity of the RSD scale.

The EFA results revealed a two-factor structure with six items differing from the original single-factor structure. Parallel analysis also supported a two-factor solution. The first four items of the scale were grouped under the factor named "Usage Moderation (UM)," while the remaining two items were included in the factor named "Availability Management" in the scale. The UM factor accounted for 45.62% of the variance, and the Availability Management (AM) factor contributed 25.29%. Together, explaining 69.91% of the total variance, surpassing the 60% threshold deemed satisfactory for scale validity (Hair et al., 2019). Factor loadings for all items exceeded .32 (Tabachnick & Fidell, 2014), and no items were removed. The shift from a single-factor to a two-factor structure may reflect cultural and contextual differences in how Turkish nursing students conceptualize reflective smartphone disengagement, influenced by academic pressures, clinical practicum expectations, and cultural norms around smartphone use. From a theoretical standpoint, the emergence of this two-factor model can be interpreted through the lens of Self-Regulation Theory, developed by Bandura (1986, 1991) and later expanded by Baumeister and Vohs (2004), and Sociocultural Theory, originally proposed by Vygotsky (1978). The Usage Moderation factor aligns with behavioral self-regulation (Baumeister & Vohs, 2004), reflecting intentional control over when, where, and how the phone is used, particularly in social or personal contexts. In contrast, the Availability Management factor appears to represent the regulation of external boundaries, such as limiting reachability or disconnecting from communication demands. This distinction is especially relevant in collectivist cultural contexts like Türkiye, where being reachable is often socially expected and valued. Thus, the two-factor structure suggests that Turkish nursing students may differentiate between moderating personal use and actively managing their availability to others, a nuance not captured in the original unidimensional structure.

CFA is conducted to validate the factors identified in measurement tools that were adapted from another language (Gomez et al., 2022). The present study employed the CFA to confirm whether the scale's structure aligns with the structure obtained in the EFA. The results of the CFA demonstrated an acceptable model fit with the following fit indices: χ^2/df = 2.30; CFI = .97; GFI = .97; TLI = .94; RMR = .04; SRMR = .04; RMSEA = .08). The factor loadings for the items varied from .57 to .89, all exceeding the acceptable threshold of .40, as recommended by Stevens (2002).

Convergent and discriminant validity were evaluated to further support the construct validity of the Turkish version of the RSD Scale (Fink, 2010). Convergent validity was primarily evidenced by statistically significant and adequate standardized factor loadings, as well as acceptable AVE values. Although the AVE for the UM factor was slightly below the recommended threshold (.43), this value is considered acceptable because the composite reliability exceeded .70, indicating sufficient internal consistency. Contemporary methodological literature emphasizes that AVE values below .50 do not necessarily undermine convergent validity when composite reliability and factor loadings are satisfactory (Hair et al., 2019; Fornell & Larcker, 1981). Similar approaches have been adopted in recent psychometric validation studies, particularly in social and behavioral sciences, where constructs are complex and multidimensional. Discriminant validity was established using the Fornell–Larcker criterion, as the square root of the AVE for each construct exceeded both the inter-construct correlation coefficients and the .50 benchmark, demonstrating adequate distinction between the factors. Taken together, these findings provide robust evidence for the construct validity of the Turkish RSD Scale and support the interpretability of its two-factor structure within a sound methodological framework.

4.1.4. Criterion validity

Criterion validity refers to the degree to which a new measurement correlates with an established, validated instrument (Fink, 2010). In this study, the Nomophobia Questionnaire

(NMP-Q) (Yildirim & Correira, 2015) was selected as the criterion measure, as it assesses levels of nomophobia—the fear or anxiety experienced when one cannot access or use a mobile phone. The NMP-Q has been widely validated in multiple cultural contexts (Al-Balhan et al., 2018; Gao et al., 2020; Gutiérrez-Puertas et al., 2016; Ma & Liu, 2021; Yasan-Ak & Yildirim, 2018), making it an appropriate criterion for comparison with the RSD Scale. Correlation analysis revealed a negative association between nomophobia levels and the RSD scores ($r = -.17$, $p < .01$), indicating that higher reflective smartphone disengagement is modestly related to lower nomophobia levels. Although the correlation is relatively weak, it aligns with previous findings (Matthes et al., 2022) and is considered sufficient to support concurrent validity given that RSD and nomophobia assess related but conceptually distinct constructs. Other criterion measures were considered, but the NMP-Q was chosen due to its direct theoretical relevance and robust validation in prior studies. This supports the criterion validity of the Turkish RSD Scale among nursing students.

4.2. Reliability analysis

Reliability refers to the extent to which a measurement tool consistently measures the intended construct and the degree to which the results are free from error. Internal consistency reliability assesses whether the scale items measure the same underlying construct (Bruton et al., 2000). In this study, the Cronbach's alpha (α) coefficients for the two factors—Usage Moderation (UM) and Availability Management (AM) were .70 and .81, respectively, indicating acceptable internal consistency (Vaske et al., 2017). Although the Cronbach's alpha value of .70 obtained for the UM factor meets the commonly accepted minimum threshold for internal consistency, it should be interpreted in light of the scale's structure. Lower alpha coefficients are frequently observed in subscales with a small number of items, as alpha is sensitive to item count and assumes tau-equivalence (Cortina, 1993; Peterson, 1994). Recent methodological literature has further emphasized that reliance on Cronbach's alpha alone may underestimate reliability, particularly for brief scales or multidimensional constructs (McNeish, 2018; Hayes & Coutts, 2020). To address this limitation, McDonald's omega coefficients were also calculated, yielding values of .71 for UM and .82 for AM, which indicate satisfactory reliability and provide a more robust estimate of internal consistency. Omega has been increasingly recommended as a complementary reliability index because it does not require the restrictive assumptions underlying alpha and offers greater accuracy in applied research (Dunn et al., 2014; McNeish, 2018). Together, these reliability indicators support the internal consistency of the Turkish RSD Scale despite the relatively small number of items in the UM factor. In addition, consistent use of the factor labels "Usage Moderation" and "Availability Management" throughout the manuscript ensures conceptual clarity and strengthens the interpretability of the findings.

5. Implication and limitation

Due to a shift in research priorities that now emphasizes the reflective and restrictive aspects of smartphone use rather than focusing solely on compulsive patterns (Meier & Reinecke, 2021; Radtke et al., 2022), there is growing interest in changing smartphone-related behaviors. This issue is particularly relevant in nursing education, where smartphone addiction has been shown to impair students' attention during clinical practicums, with negative effects on their learning outcomes (Cho & Lee, 2015; 2016). It is therefore essential to evaluate and foster nursing students' ability to deliberately and consciously manage their smartphone use in ways that align with their academic and professional responsibilities. Despite this need, empirical research remains limited with respect to instruments that measure nursing students' self-regulation in smartphone use. This study addressed this gap by adapting and validating a reflective smartphone disengagement scale specifically for use in nursing education, and by exploring its implications for students' academic performance, clinical competence, and targeted intervention strategies.

The Turkish version of the RSD Scale offers several potential applications within nursing education. First, it enables the assessment of students' reflective smartphone disengagement levels, allowing educators to identify individuals who may require additional support in managing their smartphone use and in developing healthier digital habits. The scale also allows researchers to investigate factors that influence disengagement, such as academic workload, clinical practicum demands, cultural expectations, or personal self-regulation strategies, which can guide the design of more targeted and contextually relevant interventions. In addition, the RSD Scale provides a reliable tool for evaluating the effectiveness of programs aimed at improving digital

well-being, including educational initiatives, structured self-regulation training, or technology-supported approaches such as app-based tracking or usage restriction features. Through these applications, the scale can contribute to both research and practice by supporting nursing students' academic focus, clinical performance, and overall digital health.

While the Turkish version of the RSD demonstrated strong validity and reliability, this study has several limitations. First, it employed convenience sampling and collected data from a single institution, which considerably limits the generalizability of the findings. Second, the sample consisted predominantly of female students. Although this reflects the gender distribution commonly seen in nursing education, it restricts the applicability of the findings to male students or more gender-diverse populations. Third, the Turkish adaptation resulted in a two-factor structure (Usage Moderation: four items; Availability Management: two items), whereas the original scale had a single-factor structure. This difference may reflect cultural and contextual variations in how smartphone disengagement is conceptualized among Turkish nursing students. Future studies should replicate this study across multiple institutions and include more diverse student populations to evaluate the scale's psychometric robustness and generalizability. Additionally, future adaptations may consider incorporating items related to screen-time limitation, academic prioritization, and smartphone disengagement during clinical activities to enhance both reliability and conceptual coverage.

6. Conclusion

This study adapted and validated the Reflective Smartphone Disengagement Scale for Turkish nursing students and demonstrated that the scale has satisfactory psychometric properties, including acceptable validity and reliability. The findings indicate that the Turkish version of the RSD Scale can be used to assess nursing students' deliberate efforts to regulate smartphone use in academic and clinical contexts. From a practical perspective, the scale may support nursing educators and researchers in identifying students who experience difficulties in digital self-regulation and in evaluating interventions aimed at promoting mindful and balanced smartphone use, which has been increasingly emphasized in recent literature (Meier & Reinecke, 2021; Matthes et al., 2022). Future research should replicate these findings in multi-center samples, examine longitudinal associations with academic and clinical outcomes, and further explore individual and contextual factors influencing reflective smartphone disengagement.

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Author contribution

NYA contributed to the study's conceptualization and design, data collection, drafting, editing, and proofreading of the manuscript. KB contributed to drafting, editing, and proofreading of the manuscript. Both NYA and KB contributed to the critical review of the manuscript.

Conflict of interest

Authors declare none.

Declaration of the use of Artificial Intelligence (AI)

The authors declare that generative AI and AI-assisted technologies were used to support language editing and grammatical refinement of the manuscript.

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Appendix A

Table A1. The RSD scale items

Original Items (Single factor)	Turkish version of Items (2-factor structure) (Akıllı Telefonlara Mesafe Koyma Ölçeği)	
1.There are certain periods during the day (e.g., while eating) when I do not want to use my mobile phone.	1.Gün içerisinde cep telefonumu kullanmak istemediğim belirli zamanlar (örneğin yemek yerken) vardır.	**Usage Moderation (Ölçülü Kullanım)**
2.There are certain places (e.g., in the bedroom, in the bathroom) where I do not want to use the mobile phone.	2.Cep telefonumu kullanmak istemediğim bazı yerler vardır (örneğin yatak odası, tuvalet-banyo).	
3.There are certain situations (e.g., on holiday, in presence of friends) in which I do not want to use the mobile phone.	3.Cep telefonumu kullanmak istemediğim bazı durumlar vardır (örneğin tatildeyken, arkadaşlarımlayken).	
4.I keep an eye out that my cell phone does not play too big a role in my life.	4.Cep telefonumun hayatımda çok büyük bir rol oynamamasına dikkat ederim.	
5.It is important to me that I decide when I can be reached and not that my mobile phone determines it.	5.Bana ne zaman ulaşılacağına cep telefonumun değil, benim karar vermem benim için önemlidir.	**Availability Management (Erişebilirlik Yönetimi)**
6. There are situations in which I do not want to be reachable, which is why I switch off the mobile phone, intentionally put it away, or don't look at it.	6.Ulaşılabilir olmak istemediğim durumlar vardır, bu yüzden cep telefonumu kapatırım, bilerek bir kenara koyarım veya telefonuma bakmam.	

Note. Scoring: 1-Strongly Disagree, 2- Disagree, 3- Neither Agree nor Disagree, 4- Agree, 5-. Strongly Agree