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Validation of the Screen Dependency Scale in Indonesian Version to Measure Screen Addiction in Children

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Abstract

The rapid advancement of digital technology has profoundly impacted children's lives, increasing the risk of screen addiction, which poses threats to children's social, emotional, and physical well-being. To address this issue in Indonesia, a culturally adapted version of the Screen Dependency Scale (SDS) was developed and validated in this study. The SDS, originally designed in English, assesses screen dependency across four dimensions: Preoccupation, Behavior, Activity, and Tolerance. A sample of 261 parents of children aged 3-7 years in East Java participated by completing the Indonesian version of the SDS. Validity tests indicated that each item significantly correlated with the overall score, demonstrating strong item validity, with Pearson correlation coefficients ranging from 0.625 to 0.845. Reliability analysis revealed high internal consistency, with a Cronbach's alpha of 0.938, indicating excellent reliability. Confirmatory Factor Analysis (CFA) further validated the four-factor structure, with model fit indices such as CFI (0.922) and TLI (0.902) supporting the scale's robustness. Although the RMSEA value (0.099) was slightly above the ideal threshold, it remained within

an acceptable range for exploratory research. These results affirm the SDS as a reliable and valid instrument for measuring screen addiction among Indonesian children, offering a critical tool for educators, counselors, and researchers in combating this issue. Future studies should consider applying the SDS to broader age groups and longitudinal designs to track screen dependency trends over time and refine its cultural applicability in diverse Indonesian settings.

Keywords: *Children, Kindergarten, Screen Addiction, and Screen Dependency Scale*

1. Introduction

The rapid development of digital technology has brought significant changes to children's lives. Digital devices, such as smartphones, tablets, and computers, have become an essential part of their daily activities, both for learning and entertainment (BÖLÜKBAŞI MACİT & KAVAFOĞLU, 2019; Ramli et al., 2020; Syaputra et al., 2023; Tsai, 2015). The Central Statistics Agency conducted a survey in 2020 that showed an increase in internet usage in Indonesia, with mobile phone usage reaching 62.84%, internet usage reaching 78.18%, and computer ownership increasing by 18.83% from the previous year (Badan Pusat Statistik, 2020). While these technologies offer positive benefits, excessive use among children can lead to screen addiction, a growing concern for parents, educators, and child health experts worldwide, including in Indonesia (Geniş & Ayaz-Alkaya, 2023; Ngussa et al., 2021; Ramli et al., 2023; Ran et al., 2022; Tri Hariastuti et al., n.d.). This condition can have a range of negative effects on children's social, emotional, and physical development (Dennis et al., 2022; Lissak, 2018; Panjeti-Madan & Ranganathan, 2023; Tekeci et al., 2024).

Screen addiction in children is known to have several adverse impacts. Physically, it can lead to sleep disturbances, obesity, and eye strain due to prolonged screen exposure. Psychologically, children who are addicted to screens often experience decreased concentration, mood disorders such as anxiety and depression, and a diminished capacity for emotional regulation (Alshoaibi et al., 2023; Lissak, 2018; Rocka et al., 2022). Socially, screen addiction can hinder children's ability to interact with their surroundings and reduce their social sensitivity (Panjeti-Madan & Ranganathan, 2023). Children who spend excessive time on screens tend to withdraw from social activities and direct interaction, potentially leading to difficulties in establishing interpersonal relationships.

One challenge in addressing this issue is the need for a reliable instrument to measure children's level of dependence on digital devices (Abdul Hadi et al., 2022a; Bağatarhan & Siyez, 2023; Hawi et al., 2019; Kwon et al., 2013; Rajendhiran et al., 2021; SARITEPECİ, 2021). One of the scales proven to be useful in several countries, including Malaysia, is the *Screen Dependency Scale* (SDS) (Abdul Hadi et al., 2022b). This scale was developed to assess the degree of screen dependency in children across various aspects, such as usage duration, social impact, and psychological effects. While the SDS has been recognized as a valid and reliable assessment tool in English and has been implemented in Malaysia, a standardized Indonesian version of this instrument is still lacking.

Adapting the SDS into Indonesian is essential to make this tool accessible to users in Indonesia, particularly researchers, counsellors, and educational practitioners who deal with screen addiction issues among children. This adaptation involves not only language translation but also validation and testing of the instrument to ensure it aligns with the cultural and social context of Indonesia. This is crucial to obtain accurate and relevant data on screen dependency among Indonesian children, which can be used in effective prevention and intervention efforts.

Against this background, this study aims to validate an Indonesian version of the *Screen Dependency Scale* to measure screen addiction in Indonesian children. This research is expected to make a significant contribution by providing a culturally appropriate instrument to support efforts to mitigate the rising incidence of screen addiction among children.

2. Materials and methods

2.1Participants

The study involved 261 parents of children aged 3-7 years old, residing in East Java, Indonesia. Participants were selected through convenience sampling to represent a diverse demographic of Indonesian families. Each parent was asked to complete the Indonesian version of the Screen Dependency Scale (SDS) to evaluate their child's screen usage habits.

2.2Instruments

The Screen Dependency Scale (SDS) was adapted into Indonesian for this study. The SDS consists of items that assess screen dependency across several domains, originally designed in the English version to measure factors related to excessive screen use among children. The scale covers four sub-dimensions:

(1) Preoccupation: Assesses the extent to which children are preoccupied with screen usage, including persistent thoughts about screen time and the desire to use screens frequently.

(2) Behavior: Measures observable signs of screen dependency, including actions such as prolonged screen time and difficulty reducing screen usage.

(3) Activity: Focuses on the child's engagement in screen-related activities, particularly activities that interfere with daily routines and social interactions.

(4) Tolerance: Evaluates the need for increased screen time to achieve satisfaction, indicating an escalation in screen use to maintain the same level of enjoyment.

Each item is rated on a Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), and sample items include statements such as:

"*My child uses the phone longer than I permit.*"

"*My child often stays up late using the phone.*"

"*My child will ask for the phone immediately upon waking.*"

"*My child finds it hard to stop using the phone.*"

2.3Data Collection

A pilot study with 30 parents was conducted to check the clarity of the items and identify any potential issues. Based on feedback, minor adjustments were made to ensure the items were understandable and culturally appropriate.

Data were collected by distributing an online questionnaire to parents in East Java. Parents were instructed to respond based on their observations of their child's behavior and screen use. The online format allowed for broader distribution and convenience for participants, enhancing the study's accessibility.

2.4Data analysis

To validate the Indonesian SDS, several analyses were conducted. Reliability Testing: The internal consistency of the SDS was assessed using Cronbach's alpha for each subscale (P, B, E, T) and for the overall scale. A Cronbach's alpha of 0.7 or higher was considered acceptable for reliability. Item Validity: Item-total correlations were calculated to assess the validity of each item within its subscale. Items with low correlations (<0.3) were considered for revision or removal. Confirmatory Factor Analysis (CFA): CFA was conducted to verify the four-factor structure of the SDS in the Indonesian context. Model fit indices, such as the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA), were used to assess fit. A CFI and TLI value of ≥0.90 and an RMSEA value of ≤0.08 indicated an acceptable model fit.

3. Results and discussion

3.1Item Validity

The item validity test, measured through bivariate correlation, shows that each item on the Indonesian version of the Screen Dependency Scale (SDS) correlates significantly with the overall score, indicating strong item validity. The Pearson correlation coefficients for individual items range from 0.625 to 0.845, all of which are highly significant ($p < 0.001$). This suggests that each item is a valid measure of screen dependency as it contributes meaningfully to the overall scale.

Table 1. The Pearson's Correlations Result

Pearson's Correlations		
Variable	**Skor Total**	
	Pearson's r	p-value
Item1	0.694 ***	3.562×10-53
Item2	0.686 ***	2.016×10-51
Item3	0.689 ***	3.348×10-52
Item4	0.704 ***	2.314×10-55
Item5	0.771 ***	2.176×10-72
Item6	0.748 ***	6.553×10-66
Item7	0.783 ***	3.930×10-76
Item8	0.755 ***	1.092×10-67
Item9	0.625 ***	1.880×10-40

Item10	0.646 ***	5.183×10-44
Item11	0.737 ***	4.949×10-63
Item12	0.662 ***	8.354×10-47
Item13	0.822 ***	5.967×10-90
Item14	0.831 ***	1.246×10-93
Item15	0.845 ***	1.504×10-99

3.2Reliability Test

The Indonesian version of the SDS demonstrated high internal consistency, as indicated by a Cronbach's alpha of 0.938. This falls within the 95% confidence interval of 0.928 to 0.947, underscoring the reliability of the instrument. A Cronbach's alpha above 0.9 indicates excellent reliability, suggesting that the scale consistently measures screen dependency in children across different respondents.

Table 2. The Reliability Test

Frequentist Scale Reliability Statistics	
Estimate	**Cronbach's α**
Point estimate	0.938
95% CI lower bound	0.928
95% CI upper bound	0.947

3.3 Confirmatory Factor Analysis

The confirmatory factor analysis (CFA) supports the four-factor structure of the SDS, with items loading onto their respective factors: Psychological Dependency (P), Behavioral Dependency (B), Emotional Dependency (E), and Tolerance/Escalation (T). The Model fit indicated by the p-values as below 0.05 (Table X), and support by the additional fit measures (Table X). the additional fit measures indicate a good fit with the data, as Comparative Fit Index (CFI) at 0.922, Tucker-Lewis Index (TLI) at 0.902, Bentler-Bonett Non-normed Fit Index (NNFI) at 0.902, Bentler-Bonett Normed Fit Index (NFI) at 0.902. All of these values that above the 0.9 was make the CFA has a good fit to go.

Table 3. Model Fit

Chi-square test			
Model	**X^2**	**df**	**p**
Baseline model	3897.869	105	
Factor model	380.627	84	0.000

Table 4. Additional Fit Measures

Fit indices	
Index	**Value**
Comparative Fit Index (CFI)	0.922
Tucker-Lewis Index (TLI)	0.902
Bentler-Bonett Non-normed Fit Index (NNFI)	0.902
Bentler-Bonett Normed Fit Index (NFI)	0.902
Parsimony Normed Fit Index (PNFI)	0.722
Bollen's Relative Fit Index (RFI)	0.878
Bollen's Incremental Fit Index (IFI)	0.922
Relative Noncentrality Index (RNI)	0.922

Table 5. Other Fit Measures

Metric	Value
Root mean square error of approximation (RMSEA)	0.099
RMSEA 90% CI lower bound	0.089
RMSEA 90% CI upper bound	0.109
RMSEA p-value	5.329×10^{-15}
Standardized root mean square residual (SRMR)	0.047
Hoelter's critical N (α = .05)	101.909
Hoelter's critical N (α = .01)	112.021
Goodness of fit index (GFI)	0.96
McDonald fit index (MFI)	0.663
Expected cross validation index (ECVI)	1.337

Additionally, the Root Mean Square Error of Approximation (RMSEA) is 0.099, with a 90% confidence interval between 0.089 and 0.109. Although slightly above the conventional threshold of 0.08, this value is still within an acceptable range, particularly for exploratory or initial validation studies. The Standardized Root Mean Square Residual (SRMR) of 0.047 further supports a good fit, as it is well below the threshold of 0.08.

Each item demonstrated significant loadings on its respective factor, with z-values ranging from 11.964 to 22.425, all significant at $p < 0.001$. Factor loadings range from 0.43 to 0.6, indicating that each item has a substantial contribution to its designated factor. The highest loadings were observed for items on Factor 4 (Tolerance/Escalation), with items ranging between 0.585 and 0.6, suggesting that tolerance and escalation are particularly robust indicators of screen dependency in this context.

Table 6. Factor Loadings

						95% Confidence Interval	
Factor	**Indicator**	**Estimate**	**Std. Error**	**z-value**	**p**	**Lower**	**Upper**
Factor 1	Item1	0.498	0.03	16.708	0	0.44	0.557
	Item2	0.458	0.028	16.644	0	0.404	0.512
	Item3	0.476	0.027	17.831	0	0.424	0.528
	Item4	0.535	0.033	16.217	0	0.47	0.599
Factor 2	Item5	0.575	0.033	17.489	0	0.511	0.64
	Item6	0.566	0.034	16.546	0	0.499	0.633
	Item7	0.6	0.033	18.127	0	0.535	0.665
	Item8	0.519	0.031	16.679	0	0.458	0.58
	Item9	0.43	0.036	11.964	0	0.359	0.5
Factor 3	Item10	0.493	0.027	18.128	0	0.44	0.546
	Item11	0.481	0.023	20.945	0	0.436	0.526
	Item12	0.479	0.033	14.565	0	0.415	0.544
Factor 4	Item13	0.599	0.031	19.408	0	0.539	0.66
	Item14	0.6	0.028	21.697	0	0.545	0.654
	Item15	0.585	0.026	22.425	0	0.534	0.636

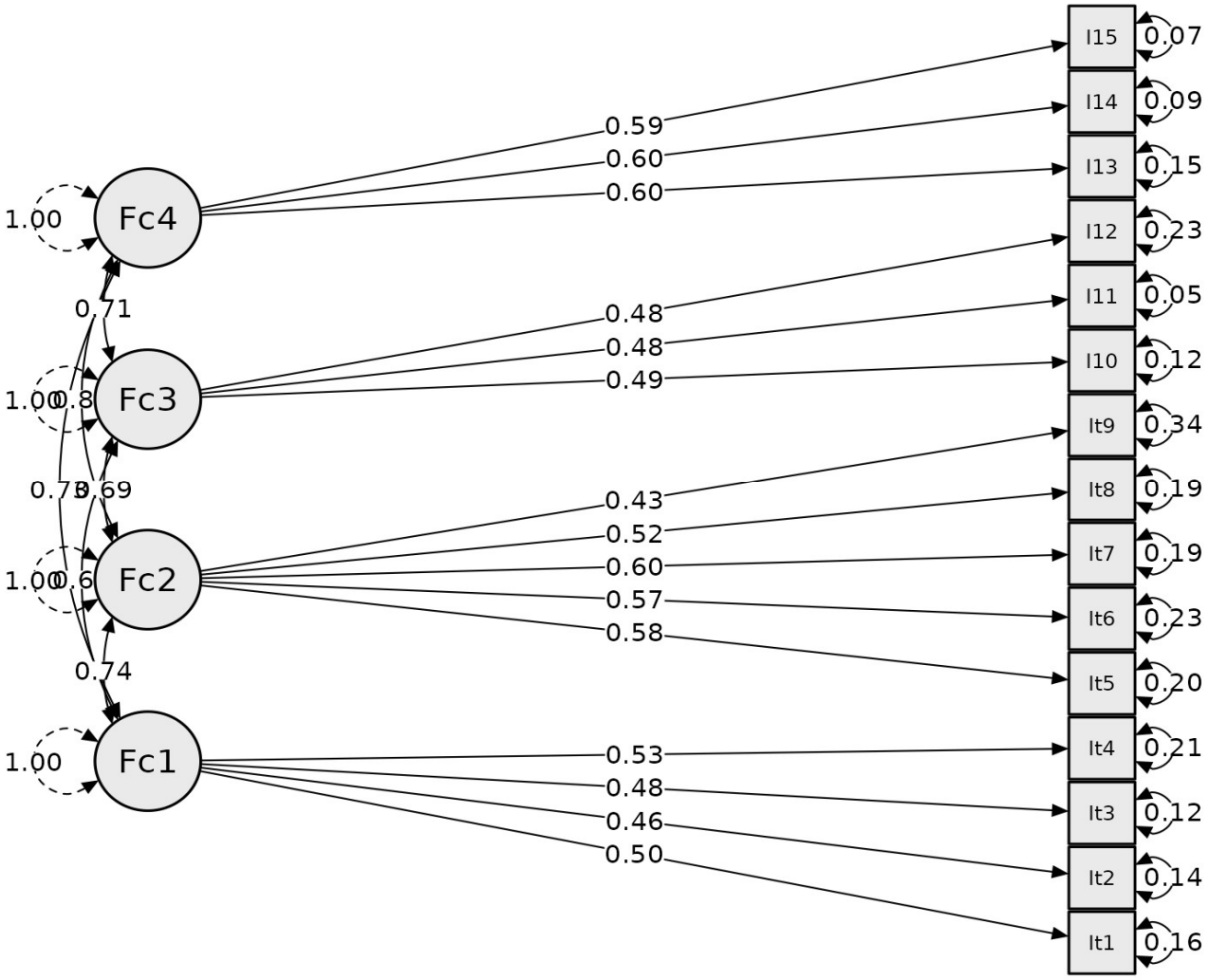

Figure 1. The Factor Loading distributionf of SDS

These results validate the Indonesian version of the Screen Dependency Scale (SDS) as a reliable and valid instrument for measuring screen addiction in children. The high item validity and reliability, combined with a solid factor structure confirmed by CFA, suggest that the instrument accurately reflects the constructs of screen dependency within the Indonesian cultural context. Minor adjustments may be considered in future studies to further refine the model fit, particularly for the RMSEA index.

4. Discussion

This study demonstrates the successful adaptation of the Screen Dependency Scale (SDS) into an Indonesian version, with the validation results aligning with previous research on similar scales across various cultural contexts. The item validity and reliability in this study are notable, with a high Cronbach's alpha of 0.938, closely matching findings from previous studies in Malaysia and other regions where the SDS was applied (Abdul Hadi et al., 2022b). This high internal consistency is indicative of a robust scale that accurately measures screen dependency in children, suggesting that the SDS's construct remains stable across diverse settings.

When comparing the Confirmatory Factor Analysis (CFA) results, the Indonesian version's four-factor structure achieved acceptable fit indices (CFI = 0.922, TLI = 0.902), which closely parallels findings from similar SDS studies conducted in multilingual settings. For instance, studies in Malaysia and Turkey also reported strong model fits for these indices, indicating the universality of the four-dimensional structure of the SDS (Bağatarhan & Siyez, 2023; SARITEPECİ, 2021). The RMSEA value (0.099) is slightly above the conventional threshold of 0.08, similar to early exploratory studies, where higher RMSEA values are common due to the initial adaptation of the scale to new cultural contexts.

Another notable comparison lies in the factor loadings, with particularly high loadings observed on the Tolerance/Escalation factor in this study (items loading between 0.585 and 0.6), similar to prior studies where tolerance was a key indicator of screen dependency. For example, other study reported similar findings, where tolerance and escalation emerged as critical factors in identifying screen addiction (Rocka et al., 2022). These comparisons underscore the effectiveness of the SDS in capturing the multidimensional nature of screen dependency, validating its cross-cultural application and suggesting that tolerance is a universal feature in screen dependency.

In conclusion, this study contributes an Indonesian version of the SDS that performs comparably to versions in other languages. It supports the SDS as a culturally adaptable and reliable instrument, adding to the global discourse on screen dependency measurement and highlighting its applicability in Indonesian contexts.

5. Conclusion

This study validates the Indonesian adaptation of the Screen Dependency Scale (SDS) as a reliable and culturally appropriate tool for measuring screen dependency in children. The results demonstrate strong item validity and internal consistency, with high factor loadings confirming the robustness of the four-factor structure, similar to findings from studies in other cultural settings. This version of the SDS provides a valuable resource for Indonesian educators, counselors, and researchers, enabling more accurate identification and assessment of screen addiction in young children and supporting targeted intervention and prevention efforts.

Given the positive outcomes of this validation, future studies could expand on this work by exploring the SDS's applicability across other age groups and regions in Indonesia to examine screen dependency trends on a broader scale. Additionally, longitudinal studies would be beneficial to assess the instrument's sensitivity over time,

especially as children's screen use patterns and the digital landscape continue to evolve. Lastly, research integrating qualitative methods, such as interviews with parents and educators, could provide a more nuanced understanding of cultural factors that influence screen dependency, allowing for further refinement of the scale and its contextual relevance.

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Conflict of interest

There is no conflict of interest in this research data collection and publication.

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