Psychometric validation of the adolescent sexting behavior screening scale for school-based physical education and health promotion programs

Validación psicométrica de la escala de detección de conductas de sexting en adolescentes para programas escolares de educación física y promoción de la salud

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Abstract

Introduction: Adolescent sexting is a sensitive digital sexual risk behavior that requires valid, non-stigmatizing screening tools for school-based health promotion.
Objective: This study evaluated the psychometric quality of the Adolescent Sexting Behavior Screening Scale and identified valid items for future research.
Methodology: A cross-sectional psychometric validation design was used with 682 Indonesian students. Content validity was assessed using the Content Validity Index, followed by Rasch analysis with the Partial Credit Model.
Results: All revised items showed excellent content validity. Rasch analysis indicated that the revised 12-item model was more defensible than the original 13-item version after removing one misfitting item. Item 3 required revision, and items 5 and 13 showed possible redundancy.
Discussion: The scale may support group-level mapping of preventive education needs related to body awareness, consent, peer pressure, and responsible digital interaction.
Conclusion: The revised scale is promising but requires further validation across broader adolescent samples.

Keywords

Adolescent sexting; Rasch analysis; digital sexual risk behavior; physical education; school health promotion.

Resumen

Introducción: El sexting adolescente es una conducta sensible de riesgo sexual digital que requiere herramientas de detección válidas y no estigmatizantes para la promoción de la salud escolar.
Objetivo: Este estudio evaluó la calidad psicométrica de la Adolescent Sexting Behavior Screening Scale e identificó ítems válidos para futuras investigaciones.
Metodología: Se utilizó un diseño transversal de validación psicométrica con 682 estudiantes indonesios. La validez de contenido se evaluó mediante el Índice de Validez de Contenido, seguida de un análisis Rasch con el Modelo de Crédito Parcial.
Resultados: Todos los ítems revisados mostraron excelente validez de contenido. El análisis Rasch indicó que el modelo revisado de 12 ítems fue más defendible que la versión original de 13 ítems tras eliminar un ítem con desajuste. El ítem 3 requirió revisión, y los ítems 5 y 13 mostraron posible redundancia.
Discusión: La escala puede apoyar la identificación grupal de necesidades de educación preventiva relacionadas con la conciencia corporal, el consentimiento, la presión de pares y la interacción digital responsable.
Conclusión: La escala revisada es prometedora, pero requiere mayor validación en muestras adolescentes más amplias.

Palabras clave

Sexting adolescente; análisis Rasch; conducta sexual digital de riesgo; educación física; promoción de la salud escolar.

Introduction

Physical education is increasingly understood not only as a curricular space for improving physical fitness, but also as a strategic school-based setting for health promotion, adolescent well-being, self-regulation, and prevention of risk behavior. Global evidence indicates that adolescents' health is shaped by physical activity, sedentary behavior, psychosocial adjustment, and the quality of health-related learning opportunities provided by schools (Bull et al., 2020; Guthold et al., 2020). Recent studies in Retos also show that physical education can be integrated with digital learning, ecological literacy, wellness models, and equitable student participation, suggesting that physical education is no longer limited to movement instruction but can contribute to broader health literacy and preventive education (Asih et al., 2026; Toding et al., 2026; Yafie et al., 2026). This expanded view is important because adolescents' health problems today are not only physical, but also relational, psychological, and digital.

The rapid growth of digital communication has transformed how adolescents interact, build intimacy, negotiate identity, and respond to peer influence. Digital media use is associated with both opportunities and risks, especially when adolescents lack self-regulation, critical health literacy, and safe decision-making skills (Amez & Baert, 2020; Odgers & Jensen, 2020). Online risk behavior may involve exposure to harmful content, risky social interaction, privacy violations, coercion, and technology-facilitated sexual violence (Sampedro-Ferreirós et al., 2026). For this reason, digital risk behavior should be treated as part of adolescent health promotion, not merely as a disciplinary or moral issue. In school contexts, physical education and health education programs can become preventive spaces where students learn about bodily autonomy, respect, peer pressure, consent, and responsible digital interaction.

One form of adolescent digital sexual risk behavior that requires careful assessment is sexting. Sexting generally refers to sending, receiving, or forwarding sexual messages, images, or videos through digital media, although its meaning differs across contexts, motives, consent, coercion, and relational dynamics (Del Rey et al., 2021; Molla Esparza et al., 2020). Previous studies have shown that adolescent sexting cannot be interpreted as a single homogeneous behavior because it may involve consensual communication, pressure from peers or partners, relational experimentation, or vulnerability to victimization (Foody et al., 2023; Pistoni et al., 2023). Longitudinal evidence further suggests that the relationship between sexting and mental health is complex, because sexting may be associated with depression or conduct problems at the between-person level, yet does not always predict later mental health deterioration (Frøyland et al., 2024). Therefore, a screening instrument for adolescent sexting should be non-stigmatizing, behaviorally specific, and sensitive to different patterns of digital sexual communication.

School-based health promotion provides an appropriate framework for addressing sexting because schools have regular access to adolescents and can integrate prevention, education, referral, and psychosocial support. Systematic reviews and meta-analyses indicate that school-based sexuality education can improve students' knowledge, attitudes, and preventive behaviors, although program effectiveness depends on contextual relevance, pedagogical quality, and student participation (Abrams et al., 2023; Barriuso-Ortega et al., 2024; Kim & Chung, 2023). Adolescents' perspectives also show that sexuality education is more meaningful when it is safe, inclusive, practical, and connected to their lived digital experiences (Kabelka et al., 2025). Digital or media-based sexual health education may also support adolescents when it is developmentally appropriate and linked to decision-making skills (Guo et al., 2025). Within this framework, physical education can serve as a practical entry point for health promotion because it directly engages students with themes of body awareness, respect for self and others, self-control, peer interaction, and healthy lifestyle behavior.

Despite increasing attention to sexting, measurement remains a major challenge. Existing sexting instruments vary in their dimensions, including sending, receiving, forwarding, motives, victimization, and contextual factors (Del Rey et al., 2021; Molla Esparza et al., 2020). Some instruments emphasize sexual communication behavior, while others focus on motives, coercion, or technology-facilitated sexual harm (Sampedro-Ferreirós et al., 2026). This variation creates a methodological problem for researchers and practitioners because an instrument that is valid in one cultural context may not function in the same way among Indonesian adolescents. Therefore, before a sexting behavior screening scale is used in future research or school-based intervention programs, its item validity, reliability, and measurement functioning need to be examined empirically.

Psychometric validation is particularly important because screening tools used with adolescents must provide reliable and interpretable item-level evidence. Rasch analysis is useful for this purpose because it allows researchers to examine item fit, item difficulty, person reliability, dimensionality, and the extent to which response categories function as intended. Recent studies affiliated with Universitas Negeri Malang have demonstrated the usefulness of Rasch modeling for validating educational, counseling, and psychosocial instruments in Indonesian contexts (Andrianie et al., 2025; Ariyanto et al., 2025). Studies in Retos have also applied Rasch-based validation to examine constructs related to grit, leadership potential, altruism, self-control, resilience, and sport-related development (Andrianie et al., 2025; Ariyanto et al., 2025, 2026; Suhardita et al., 2026; Wahyudin, Ramli, Chusniyah, Eva, Oktasari, Mufaridah, Andriani, Stevani, Soejanto, Hikmy, et al., 2026). These studies strengthen the methodological rationale for using Rasch analysis to identify which items are valid, which items need revision, and which items should be removed before the instrument is used in further research.

The present study addresses an important gap in adolescent health measurement. Although sexting has been widely discussed as a form of digital sexual behavior, there is still limited psychometric evidence for a brief screening instrument that can be used in Indonesian school-based physical education and health promotion programs. This gap is relevant to Retos because the journal's scope includes physical education, health, sport, human movement, and school-based development, while contemporary physical education increasingly interacts with issues of well-being, inclusion, self-regulation, and adolescent risk prevention. Positioning the Adolescent Sexting Behavior Screening Scale within physical education and health promotion does not mean reducing physical education into sexuality education; rather, it expands physical education as a preventive educational space where students learn to understand their bodies, respect boundaries, manage peer pressure, and make healthier decisions in digital environments.

Therefore, this study aims to examine the psychometric properties of the Adolescent Sexting Behavior Screening Scale for use in school-based physical education and health promotion programs. Specifically, this study seeks to evaluate content validity, internal consistency, item validity, and item functioning using Rasch analysis. The expected output is a set of empirically valid items that can be used in subsequent research and as a preliminary screening tool for school-based adolescent health promotion. By validating this instrument, the study contributes to the development of culturally relevant measurement tools for Indonesian adolescents and provides practical evidence for integrating digital sexual risk prevention into broader physical education, health promotion, and student well-being initiatives.

Method

Study Design

This study employed a quantitative cross-sectional psychometric validation design based on the Rasch Measurement Model. The main objective was to evaluate the psychometric properties of the Adolescent Sexting Behavior Screening Scale and identify items suitable for use in school-based sexual and digital health programs. The validation process consisted of two stages: first, content validity was assessed by expert judgment using the Content Validity Index (CVI); second, empirical item validation was performed using the Rasch Measurement Model, examining item fit, difficulty, response category functioning, dimensionality, person-item targeting, reliability, separation, and differential item functioning. All Rasch model assumptions, including unidimensionality, local independence, and monotonicity of response categories, were checked prior to interpretation.

Participants and Sampling

The initial dataset included 683 Indonesian adolescent students. Participants were recruited using convenience sampling from multiple secondary schools, with voluntary participation considered. Potential sampling bias was noted due to overrepresentation of students with higher digital literacy and frequent gadget use. One respondent was excluded due to non-numeric responses, leaving 682 valid participants. The sample included students aged 14–22 years (M = 16.50, SD = 0.96) from grades 10–12, comprising 281 males (41.2%) and 401 females (58.8%). The sample size was deemed adequate for Rasch analysis, based on guidelines recommending at least 250–500 participants for stable calibration of polytomous items (Carpentier et al., 2024).

Instrument

The instrument, Adolescent Sexting Behavior Screening Scale, was developed to measure adolescents' involvement in digital sexual risk behaviors. The original scale included 13 items across three conceptual domains: (1) active sexting or sending behavior, (2) passive sexting and behavioral response, and (3) patterns and relational context. Responses were recorded on a five-point ordinal scale, with higher scores indicating greater involvement. After item-level analysis, one misfitting item was removed, resulting in a 12-item version.

Content Validity Procedure

Four experts in adolescent psychology, sexual health, and digital education with 5–15 years of experience evaluated content validity. Each expert rated the relevance of each item on a four-point scale (1 = not relevant, 4 = highly relevant). Items rated 3–4 were considered relevant. The I-CVI was calculated as the proportion of experts rating the item as relevant; S-CVI/Ave and S-CVI/UA were also computed using standard formulas. Initially, five items scored below the threshold (I-CVI = 0.75) and were revised. After revision, all items achieved I-CVI = 1.00, S-CVI/Ave = 1.00, and S-CVI/UA = 1.00, indicating excellent content validity.

Data Collection Procedure and Handling of Missing Data

Data were collected via anonymous self-report questionnaires. Participants were informed about study objectives, confidentiality, voluntary participation, and the sensitive nature of the questions. Missing or invalid responses were recoded when matching original categories; responses that could not be mapped were treated as missing. The proportion of missing responses per item was <0.5%. One participant was removed due to multiple invalid responses.

Data Screening and Preparation

Before Rasch analysis, the dataset was screened for missing values, non-numeric entries, out-of-range responses, and inconsistent demographic entries. The original dataset contained 683 respondents and 13 item responses. One respondent, R104, was excluded because responses to item 7 and item 12 contained non-numeric symbols that could not be interpreted. Textual responses that clearly matched the original response categories were recoded according to the instrument scoring scheme. Specifically, the textual response equivalent to "never" was recoded as 1, and the textual response equivalent to "rarely" was recoded as 2. Responses that could not be mapped to the original response categories were treated as invalid. Several demographic entries were standardized for descriptive reporting. Age entries with textual additions were recoded into numerical age values. Grade entries using Roman numerals were recoded into numerical grade levels. One unclear grade entry was treated as missing for demographic reporting. These demographic corrections did not affect the item-level Rasch scoring.

Rasch Analysis and Statistical Procedures

Empirical validation used the Partial Credit Model (PCM) within the Rasch framework, which is appropriate for five-point Likert-type data with variable category thresholds. Analyses were conducted using Winsteps v5.3.5. Item fit was evaluated using infit and outfit mean square statistics, with values between 0.50 and 1.50 considered acceptable. Point-measure correlations were examined to ensure they were positive and theoretically meaningful. Dimensionality was assessed through Principal Component Analysis of residuals, with the dominant construct confirmed by a first residual contrast below 2.0. Local independence was checked, flagging residual correlations above 0.30 as indicative of strong dependence. Differential Item Functioning (DIF) was examined across gender, grade, relationship status, prior education, and daily gadget use, ensuring each subgroup had a minimum of 30 participants. Response category functioning was also evaluated, including threshold ordering and monotonicity, with category collapsing considered for any disordered thresholds.

Item Reduction

Item 7 was removed due to severe misfit and inconsistent response distribution. Item 3 required revision for limited variability. Items 2, 5, 8, and 13 were retained with caution based on minor measurement issues but maintained for conceptual relevance. The decision to reduce from 13 to 12 items was based on Rasch fit statistics, point-measure correlations, and local dependence analysis.

Item Fit Criteria

Item fit was evaluated using infit mean square (infit MNSQ) and outfit mean square (outfit MNSQ) statistics. Items with infit and outfit MNSQ values between 0.50 and 1.50 were considered productive for measurement. Values above 1.50 indicated potential underfit, suggesting unpredictable or noisy responses, while values below 0.50 indicated potential overfit, suggesting overly predictable responses. This fit range is widely used in Rasch-based instrument validation and is also recommended in Winsteps fit interpretation guidelines. Standardized fit statistics were reviewed as supporting evidence, but they were not used as the primary criterion for item retention because standardized statistics can be overly sensitive in large samples. Therefore, item decisions were based primarily on MNSQ values, point-measure correlation, response category functioning, and conceptual relevance.

Point-Measure Correlation

Point-measure correlation was examined to determine whether each item aligned with the overall construct of adolescent sexting behavior. Items with positive point-measure correlations were interpreted as moving in the expected direction of the latent trait. Items with negative or very low point-measure correlations were flagged for further review because they may indicate inconsistency with the intended construct.

Response Category Functioning

Response category functioning was examined to determine whether the five response categories worked as intended. The analysis included category frequency, average measure, threshold ordering, and category fit statistics. Categories were considered functioning adequately when category frequencies were sufficient, average measures increased monotonically, thresholds were ordered, and category fit statistics were acceptable. Because sexting-related behavior may represent a low-frequency sensitive behavior, upper response categories were expected to be less frequently endorsed by participants. If disordered thresholds or underused categories were identified, category collapsing was considered as a sensitivity analysis. Rasch reporting guidelines recommend reporting rating scale functioning and any category modification procedures used to improve measurement quality.

Reliability and Separation

Person reliability and item reliability were examined to evaluate the consistency of measurement. Person reliability indicated the extent to which the instrument could distinguish respondents with different levels of involvement in adolescent sexting behavior. Item reliability indicated the extent to which the sample was sufficient to confirm the hierarchy of item difficulty. Person separation and item separation indices were also examined. Higher person separation indicates that the instrument can distinguish multiple levels of respondents on the latent trait. Higher item separation indicates that the sample is adequate for confirming meaningful differences in item difficulty.

Dimensionality

Unidimensionality was examined using Rasch-based principal component analysis of residuals. The purpose was to determine whether the 13 items measured a dominant underlying construct of adolescent sexting behavior. A sufficiently dominant Rasch dimension supported the interpretation of the scale as a general screening measure. If residual contrasts suggested the presence of secondary dimensions, the conceptual domains of the instrument were reviewed to determine whether separate domain-level interpretation was warranted.

Person-Item Map

A person-item map was used to examine the alignment between respondent ability estimates and item difficulty estimates. The map helped determine whether the items adequately covered low, moderate, and high levels of adolescent sexting behavior involvement. It also helped identify item clustering, gaps in measurement coverage, and items that were too easy or too difficult for the sample.

Differential Item Functioning

Differential Item Functioning (DIF) analysis was conducted only for demographic variables with adequate subgroup sizes. The planned DIF variables were gender, grade level, relationship status, prior

education on the topic, daily gadget use duration, and living arrangement. Gadget ownership was not included in DIF analysis because the subgroup distribution was highly imbalanced. DIF analysis was used to examine whether items functioned differently across respondent groups after controlling for the overall level of the latent trait.

Criteria for Final Item Decision

The final item decision was based on combined evidence from content validity and Rasch measurement results. Items were classified as retained, retained with caution, revised, or removed.

Table 1. Criteria for Final Item Decision

Evidence	Criterion for Retention
Content validity	I-CVI ≥ 0.78
Item fit	Infit and outfit MNSQ between 0.50 and 1.50
Point-measure correlation	Positive and theoretically meaningful
Response category functioning	Ordered and interpretable categories
Reliability contribution	Item supports person and item reliability
Dimensionality	Item supports the dominant measured construct
DIF	No substantial item bias across key demographic groups
Conceptual relevance	Item remains relevant to adolescent sexting behavior

Table 2. Interpretation of Item Decision

Final Decision	Interpretation
Retained	The item met content validity and Rasch measurement criteria.
Retained with caution	The item was conceptually important but showed minor measurement limitations.
Revised	The item was relevant but showed problematic Rasch evidence.
Removed	The item showed poor fit, weak measurement contribution, substantial bias, or inconsistency with the construct.

The final output of the analysis was a set of empirically valid items of the Adolescent Sexting Behavior Screening Scale recommended for subsequent research and school-based physical education and health promotion programs.

Ethical Considerations

Ethical approval was obtained from Health Research Ethics Committee under approval number IRB NO. E.4.d/032/KEPK/FIKES-UMM/V/2025. For participants under the age of 18, parental or guardian consent and student assent were obtained before data collection.

Results

Data Screening and Participant Characteristics

The initial dataset consisted of 683 respondents. During data screening, one respondent was excluded because two item responses contained non-numeric symbols that could not be interpreted. Textual responses that clearly matched the original response categories were recoded according to the instrument scoring system. Specifically, responses equivalent to “never” were recoded as 1, and responses equivalent to “rarely” were recoded as 2. After data screening and recoding, the final dataset used for Rasch analysis consisted of 682 valid respondents.

Participants were Indonesian students aged 14 to 22 years (M = 16.50, SD = 0.96). The sample consisted of 281 male students (41.2%) and 401 female students (58.8%). Most participants were in grade 11, followed by grade 12 and grade 10. Almost all participants reported owning a personal gadget, and most used gadgets for six to seven hours per day. Because the instrument was developed for school-based health promotion, participant characteristics were reported to clarify the educational and digital context in which the scale was validated. Detailed participant characteristics are presented in Table 1.

Table 3. Participant Characteristics

Characteristic	Category	n	%
Gender	Male	281	41.2
	Female	401	58.8
Grade level	Grade 10	185	27.1
	Grade 11	262	38.4
	Grade 12	234	34.3
Gadget ownership	Yes	680	99.7
	No	2	0.3
Daily gadget use	≤3 hours	116	17.0
	6–7 hours	415	60.9
	≥8 hours	151	22.1
Relationship status	In a relationship	432	63.3
	Not in a relationship	250	36.7
Previous education on the topic	Yes	95	13.9
	No	587	86.1
Living arrangement	With parents/guardians	605	88.7
	Dormitory/boarding house	77	11.3

Content Validity Evidence

The initial content validity assessment indicated that five items required revision. Items 5, 7, 8, 11, and 13 obtained I-CVI values of 0.75, which were below the criterion used in this study. The initial S-CVI/Ave was 0.90, while the initial S-CVI/UA was 0.62. After expert-based revision, all 13 items obtained I-CVI = 1.00, with S-CVI/Ave = 1.00 and S-CVI/UA = 1.00, indicating excellent expert agreement regarding the relevance of all revised items to the construct of adolescent sexting behavior. Content validity was interpreted as preliminary evidence of item relevance.

Rasch Analysis and Item Reduction

The initial Rasch calibration was conducted using all 13 items. Most items showed acceptable infit and outfit mean square values; however, item 7 showed substantial outfit misfit (outfit MNSQ = 3.49) and an inconsistent response distribution, indicating unstable measurement contribution. Item 10 also showed outfit MNSQ above the preferred range in the initial model (1.72). Based on these empirical criteria (misfit, point-measure correlation, local dependence), item 7 was removed, reducing the scale to 12 items.

Item 3 was classified as requiring revision due to limited response variability and the lowest point-measure correlation, while items 2, 5, 8, and 13 were retained with caution because they remained conceptually important but showed minor measurement limitations. This step is justified psychometrically: the removal of item 7 improved the dimensionality (first residual contrast decreased from 4.11 to 1.95), slightly reduced person reliability (from 0.68 to 0.59), and enhanced the stability of response category functioning.

Table 4. Summary of Content Validity Evidence

Validation stage	Items requiring revision	I-CVI range	S-CVI/Ave	S-CVI/UA	Interpretation
Initial assessment	I5, I7, I8, I11, I13	0.75–1.00	0.90	0.62	Good overall content validity; five items required revision
After revision	None	1.00	1.00	1.00	Excellent content validity

Response Distribution and Category Use

The five-point response scale was dominated by the lowest category across most items, indicating that sexting-related behaviors were low-frequency and sensitive. After removing item 7, category functioning improved, although the highest category remained rarely endorsed, reinforcing the need for careful interpretation and possible future simplification of response categories.

Dimensionality, Local Dependence, and DIF

The recalibrated 12-item model showed improved unidimensionality. Residual correlation analysis identified strong local dependence between items 5 and 13 (r = 0.93), suggesting potential redundancy, although both items were retained due to conceptual importance. DIF analyses were conducted across

gender, grade level, relationship status, prior education, and daily gadget use. No substantial DIF was observed that would threaten the validity of the scale.

Final Item Classification and Justification

The final 12-item version of the Adolescent Sexting Behavior Screening Scale included items classified as retained (I1, I4, I6, I9, I10, I11, I12), retained with caution (I2, I5, I8, I13), revised (I3), and removed (I7). The psychometric justification for reducing the scale from 13 to 12 items is supported by multiple indicators, including item fit statistics, improved dimensionality, stability of reliability estimates, and response category functioning. These analyses demonstrate that the revised 12-item scale is methodologically defensible and appropriate for use as a preliminary screening instrument in school-based sexual and digital health programs, providing a reliable and valid foundation for assessing adolescent digital sexual risk behaviors.

Initial and Recalibrated Rasch Model

The initial Rasch calibration was conducted using all 13 items. Most items showed acceptable infit and outfit mean square values. However, item 7 showed substantial outfit misfit, with outfit MNSQ = 3.49, indicating highly unpredictable responses. Item 10 also showed outfit MNSQ above the preferred range in the initial model, with outfit MNSQ = 1.72. Although item 7 had a positive point-measure correlation, it was removed because its outfit MNSQ was substantially above the acceptable range and its response distribution was inconsistent with the rest of the scale. After item 7 was removed, the Rasch model was recalibrated using the remaining 12 items. In the recalibrated model, item 10 improved and fell within the acceptable fit range. The 12-item model also showed improved residual dimensionality, as the first residual contrast decreased from 4.11 in the 13-item model to 1.95 in the 12-item model.

Table 5. Summary of Initial and Recalibrated Rasch Models

Indicator	13-item model	12-item model after removing I7	Interpretation
Misfitting item	I7	None with severe underfit	Removal of I7 improved model stability
Person reliability	0.68	0.59	Limited-to-moderate respondent separation
Person separation	1.47	1.19	The scale distinguishes respondents modestly
First residual contrast	4.11	1.95	Dimensionality improved after removing I7
Main concern	I7 severe outfit misfit	Category functioning and local dependence	12-item model is more defensible
Recommended model	No	Yes	12-item model is retained for interpretation

The decrease in person reliability after removing item 7 should be interpreted alongside the improvement in fit and dimensionality. Item 7 contributed response variability but did not contribute stable measurement because of severe outfit misfit.

Item Fit and Final Item-Level Decision

Table 6 presents the recalibrated Rasch item fit statistics, concise item wording, and final item decision. To keep the main manuscript concise, item wording is presented in shortened form; the complete Indonesian and English item wording can be provided as supplementary material.

Table 6. Recalibrated Rasch Item Fit and Final Item Decision

Item	Short item wording	Measure	Infit MNSQ	Outfit MNSQ	Point-measure correlation	Final decision
I1	Sending intimate messages through mobile phone or social media	0.69	1.07	0.93	0.39	Retained
I2	Sending private images through digital media	1.77	1.03	0.43	0.22	Retained with caution
I3	Sending intimate messages to the same person more than once	3.51	1.08	0.63	0.16	Revised
I4	Sending private messages or images on one's own initiative	-1.56	0.79	0.63	0.71	Retained
I5	Receiving intimate private messages through digital media	-1.23	0.68	0.52	0.77	Retained with caution

I6	Receiving private images through mobile phone or social media	-1.77	0.98	0.77	0.64	Retained
I7	Replying to intimate messages after receiving them	-3.72	0.98	3.49	0.56	Removed
I8	Continuing communication after receiving private messages or images	2.84	0.90	0.36	0.46	Retained with caution
I9	Sending replies after first receiving private messages or images	-1.26	1.40	0.82	0.38	Retained
I10	Engaging in digital intimate communication more than once	-0.85	1.23	0.97	0.30	Retained
I11	Engaging in digital intimate communication with more than one person	1.70	1.08	0.93	0.49	Retained
I12	Engaging in digital intimate communication with a close or special person	-2.61	1.43	1.33	0.49	Retained
I13	Engaging in digital intimate communication with someone never met in person	-1.21	0.69	0.52	0.76	Retained with caution

Most items in the recalibrated model demonstrated acceptable fit and positive point-measure correlations. Item 7 was removed because of severe outfit misfit. Item 3 was classified as requiring revision because it had limited response variability and the lowest point-measure correlation. Items 2, 5, 8, and 13 were retained with caution. These items were not removed because they remained conceptually important and did not show severe underfit; however, they require further testing because of overfit, low endorsement, or local dependence.

Response Category Functioning

The five-point response scale did not function optimally in the initial 13-item model. The average measure increased from category 1 to category 4 but decreased in category 5, indicating that the highest category did not consistently represent a higher level of the latent trait. After item 7 was removed, category functioning improved, but category 5 remained rarely endorsed and did not show a fully optimal monotonic pattern.

Table 7. Response Category Functioning

Model	Category	Frequency	%	Average measure
13-item model	1	6,577	74.18	-0.18
	2	1,039	11.72	0.40
	3	584	6.59	0.79
	4	210	2.37	0.87
	5	456	5.14	0.27
12-item model	1	6,442	78.71	-0.20
	2	1,023	12.50	0.50
	3	552	6.74	0.94
	4	112	1.37	1.54
	5	55	0.67	0.90

The disordered category pattern suggests that adolescents did not consistently distinguish between the upper response categories. This may reflect the sensitive and low-frequency nature of sexting-related behavior. Therefore, future validation should test whether a simplified response format, such as a three-category or dichotomous screening format, provides better category functioning.

Local Dependence and Item Redundancy

Residual correlation analysis indicated strong local dependence between item 5 and item 13, with a residual correlation of 0.93. This value suggests that the two items may share overlapping response patterns or may function redundantly within the scale. However, both items were retained with caution in the present version because they represented different relational contexts: item 5 assessed receiving intimate messages from others through digital media, whereas item 13 assessed digital intimate communication with someone the respondent had never met in person. Because the residual correlation between item 5 and item 13 was very high, both items should be re-evaluated in subsequent validation studies. If the goal is to produce a shorter and cleaner version of the scale, one of these items may be removed based on theoretical relevance and empirical performance in a new sample.

Final Item Classification

The final classification was based on combined evidence from content validity and Rasch measurement results. All items demonstrated excellent content validity after revision, but the Rasch analysis showed that not all items functioned equally well empirically.

Table 8. Response Category Functioning

Classification	Items	Interpretation
Retained	I1, I4, I6, I9, I10, I11, I12	Items demonstrated acceptable Rasch fit and positive measurement contribution.
Retained with caution	I2, I5, I8, I13	Items remained conceptually relevant but showed minor measurement limitations, including overfit, low endorsement, or local dependence.
Revised	I3	Item showed limited variability and weak point-measure correlation.
Removed	I7	Item showed severe outfit misfit and was excluded from the recommended version.

Based on these findings, the strongest empirical version of the Adolescent Sexting Behavior Screening Scale consists of 12 items, with item 7 removed. Item 3 should be revised before future use, while items 2, 5, 8, and 13 should be retained with caution and re-evaluated in subsequent validation studies.

Summary of Findings

The Adolescent Sexting Behavior Screening Scale demonstrated excellent content validity and generally acceptable Rasch-based item functioning after the removal of the misfitting item. The initial 13-item model identified item 7 as problematic because of severe outfit misfit and an inconsistent response distribution. After removing item 7, the 12-item model showed improved dimensionality and acceptable item fit for most items.

However, response category functioning was not fully optimal because upper categories were rarely endorsed, and strong local dependence was identified between item 5 and item 13. These findings indicate that the instrument is promising but still requires refinement, especially regarding response category structure and possible item redundancy.

Overall, the findings support the use of the revised 12-item Adolescent Sexting Behavior Screening Scale as a preliminary screening tool for identifying digital sexual risk behavior in school-based health promotion contexts. Within physical education and health promotion programs, the scale may help educators, counselors, and school health professionals identify areas for preventive education related to body awareness, peer pressure, consent, responsible digital interaction, and adolescent well-being. However, further validation is required before the scale is used for individual-level decision-making.

Discussion

This study evaluated the psychometric quality of the Adolescent Sexting Behavior Screening Scale using content validity evidence and the Rasch Measurement Model. The findings showed that the instrument achieved excellent content validity after expert-based revision, but Rasch analysis revealed that not all items functioned equally well in the adolescent sample. This contrast highlights an important psychometric point: expert agreement is necessary for establishing item relevance, but it is not sufficient for determining whether an item functions properly in empirical measurement. After item 7 was removed, the 12-item model showed improved dimensionality and more defensible item functioning. These findings are consistent with recent Rasch reporting standards, which emphasize the need to examine item fit, rating scale functioning, dimensionality, reliability, and person-item targeting when validating measurement instruments (Thakur, 2025; Yamashita, 2022).

The strong content validity evidence indicates that the revised items were considered relevant to the construct of adolescent sexting behavior. This is important because sexting is a complex form of digital sexual communication that may involve sending, receiving, responding, repetition, relational context, consent, and coercion. Previous psychometric studies have emphasized that sexting measures should use behaviorally specific items rather than broad or ambiguous indicators (Del Rey et al., 2021; Molla Esparza et al., 2020). The present findings extend this literature by showing that even when item content is judged as relevant by experts, empirical testing remains necessary to determine whether each item

works as intended in a specific cultural and school-based context. This supports the need for local validation before an instrument is used with Indonesian adolescents, especially because sexting behavior and its meanings may vary across cultural settings (Ojeda et al., 2025).

The response distribution showed that sexting-related behavior was generally low-endorsed in this sample. Most respondents selected the lowest response category, suggesting that the measured behaviors were either uncommon, underreported, or socially sensitive. This pattern should not be interpreted simply as evidence that sexting is irrelevant among adolescents; rather, it suggests that sexting is a low-frequency and sensitive behavior that requires careful, non-stigmatizing measurement. Previous reviews have shown that adolescent sexting may be associated with diverse outcomes, ranging from relational experimentation to stigma, victimization, and psychosocial harm (Doyle et al., 2021). Qualitative evidence also indicates that adolescents' sexting experiences are shaped by peer expectations, relational pressures, privacy concerns, and the social risks attached to digital intimacy (Dully et al., 2023).

Item 7 was the only item removed from the recommended version of the scale. Although the item showed a positive point-measure correlation, its outfit MNSQ was substantially above the acceptable range, and its response distribution was inconsistent with the rest of the instrument. This may indicate that the item was not sufficiently specific to sexting-related behavior and may have been interpreted more broadly by respondents. In other words, replying to an intimate message may not always reflect the same behavioral meaning as initiating, sending, receiving, or repeatedly engaging in sexting-related communication. This interpretation is consistent with recent findings showing that adolescent sexting may involve different behavioral profiles, including consensual, pressured, and coerced forms, which should not be treated as identical indicators of risk (Dolev-Cohen & Shaul, 2025; Sampedro-Ferreirós et al., 2026).

The recalibrated 12-item model was more defensible than the original 13-item model. The decrease in the first residual contrast after removing item 7 indicated improved dimensionality, even though person reliability also decreased. This decrease in reliability should be interpreted cautiously: item 7 contributed response variability, but that variability was not psychometrically stable because the item showed severe outfit misfit. In Rasch-based validation, retaining a misfitting item merely to maintain reliability may weaken score interpretation. Recent Rasch-based studies in educational and sport-related contexts have similarly shown that item refinement should be based on fit, dimensionality, and measurement quality rather than reliability alone (Andrianie et al., 2025; Ariyanto et al., 2026; Suhardita et al., 2026).

Item 3 was classified as requiring revision because it showed limited response variability and the weakest point-measure correlation. Conceptually, the item addressed repeated sending of intimate messages to the same person. The item remains theoretically relevant, but its wording may not sufficiently distinguish ordinary repeated communication from repeated sexting behavior. Future revision should clarify the intimate or sexual nature of the message, the repeated pattern, and the digital context. Items 2, 5, 8, and 13 were retained with caution because they remained conceptually important but showed minor measurement limitations, including overfit, low endorsement, or local dependence. This cautious interpretation is consistent with psychometric validation principles that require item decisions to balance conceptual relevance and empirical functioning (Thakur, 2025; Yamashita, 2022).

A particularly important finding was the strong local dependence between item 5 and item 13. Item 5 assessed receiving intimate private messages through digital media, whereas item 13 assessed digital intimate communication with someone the respondent had never met in person. Although these items represent different conceptual aspects of sexting, their very high residual correlation suggests that they may function redundantly in the empirical response structure. Future validation should compare two alternative models: one retaining both items and another removing one of the locally dependent items. This would help determine whether both items are needed in the final scale or whether a shorter version would provide cleaner measurement. A valid screening instrument should be conceptually comprehensive while remaining empirically efficient (Thakur, 2025; Yamashita, 2022).

The response category analysis showed that the five-point response format did not function optimally. The highest category was rarely endorsed and did not consistently represent a higher level of the latent trait. This suggests that adolescents did not clearly distinguish between the upper response categories when responding to sensitive sexting-related items. This finding contributes to the measurement of sen-

sitive adolescent behaviors by showing that more response categories do not necessarily improve measurement precision when the behavior is rarely endorsed. Future studies should test whether a three-category format or a dichotomous screening format provides better category functioning. This recommendation is particularly relevant for school-based screening, where the purpose is not to measure high-frequency involvement in detail, but to identify patterns of risk that may inform preventive education and support (Thakur, 2025; Yamashita, 2022).

The findings contribute to the growing literature on adolescent sexting measurement by providing Rasch-based evidence from an Indonesian school-based sample. Previous studies have shown that sexting is associated with peer relationships, social competence, positive youth development, and mental health, but the meaning and consequences of sexting vary depending on context, consent, coercion, and relational dynamics (Foody et al., 2023; Pistoni et al., 2023). The present study adds to this literature by showing that item-level validation is essential before sexting-related measures are used in adolescent health research. Rather than assuming that all theoretically relevant items function equally well, the Rasch results allowed the study to identify one item for removal, one item for revision, and several items requiring cautious interpretation.

Contemporary school-based sexual and digital health programs can contribute to adolescent health when it is connected to body literacy, self-regulation, social responsibility, peer interaction, and healthy decision-making. The WHO guidelines emphasize the importance of physical activity and reduced sedentary behavior for adolescent health, while school health promotion increasingly requires attention to digital behavior and psychosocial well-being as part of students' overall development (Bull et al., 2020). Recent studies have also positioned school-based sexual and digital health programs and school-based programs as spaces for digital-supported learning, wellness promotion, equality of participation, self-control, resilience, and student development (Asih et al., 2026; Toding et al., 2026; Wahyudin et al., 2026). In this context, the scale complements school-based health promotion by providing evidence for preventive education related to body awareness, consent, peer pressure, responsible digital interaction, and adolescent well-being.

The practical implication of this study is that the revised 12-item scale may be considered as a preliminary research-based screening instrument for school-based sexual and digital health programs in the future. It may help schools map educational needs related to digital sexual risk behavior, especially when combined with counseling support, health education, and preventive programs. The scale should be used for group-level research and program planning, not for individual diagnosis, punishment, or moral labeling. This distinction is important because school-based sexuality and health education is more effective when it is safe, inclusive, practical, and connected to adolescents' lived experiences (Barriuso-Ortega et al., 2024; Kabelka et al., 2025). Digital or web-based sexual health education may also support adolescents when it is developmentally appropriate and linked to decision-making skills (Guo et al., 2025).

The findings also need to be interpreted in relation to adolescents' broader digital lives. Smartphone use, social media exposure, and online interaction have become part of students' everyday social environment, shaping how they communicate, build relationships, and manage privacy (Amez & Baert, 2020; Odgers & Jensen, 2020). For this reason, sexting-related prevention should not be framed only as risk avoidance, but also as digital health literacy, relational responsibility, and respectful decision-making. In this sense, the scale can help educators and school health professionals identify topics that require preventive education, such as boundaries, consent, privacy, peer pressure, and responsible online communication (Guo et al., 2025; Sampedro-Ferreirós et al., 2026).

Several limitations should be acknowledged. First, the sample consisted of Indonesian students, so the findings may not be generalizable to adolescents in other cultural or educational contexts. Second, the topic was sensitive, so underreporting and socially desirable responses may have occurred. Third, the five-point response format did not function optimally, indicating that future studies should test simplified response categories. Fourth, local dependence between item 5 and item 13 suggests possible redundancy that should be examined in another sample. Fifth, the upper age range reached 22 years, which may exceed the typical age range of secondary-school adolescents. Future studies should apply stricter age criteria or conduct sensitivity analyses excluding older respondents. These limitations indicate that the current findings should be interpreted as initial validation evidence rather than definitive evidence of measurement invariance or broad generalizability. Differential item functioning should also

be tested in future validation studies across gender, grade level, relationship status, and prior exposure to sexual health education (Carpentier et al., 2024; Ojeda et al., 2025).

Future research should validate the revised 12-item scale in larger and more diverse adolescent samples, including students from different regions, school types, and age groups. Future studies should also compare alternative response formats, examine differential item functioning across key demographic groups, and test convergent validity with related constructs such as digital literacy, self-control, peer pressure, sexual health knowledge, and adolescent well-being. Further intervention studies are also needed to examine whether the scale is sensitive to changes after school-based school-based sexual and digital health programs and health promotion programs. Such evidence would strengthen the practical utility of the instrument and clarify its role in preventive school health education (Andrianie et al., 2025; Ariyanto et al., 2026; Wahyudin et al., 2026).

In conclusion, the revised 12-item Adolescent Sexting Behavior Screening Scale provides initial Rasch-based evidence as a preliminary research and program-planning instrument for school-based health promotion. The scale may support preventive education related to body awareness, consent, peer pressure, responsible digital interaction, and adolescent well-being. However, the instrument should not be used for diagnosis, punishment, or individual labeling until further validation is conducted across broader samples and demographic groups. Within school-based health promotion, the scale offers a practical contribution by supporting evidence-informed prevention related to adolescents' digital sexual risk behavior (Barriuso-Ortega et al., 2024; Wahyudin et al.,, 2026).

Conclusion

This study provides initial Rasch-based psychometric evidence for the Adolescent Sexting Behavior Screening Scale as a preliminary research and program-planning instrument for school-based physical education and health promotion programs. The scale demonstrated excellent content validity after expert-based revision, while Rasch analysis showed that the revised 12-item version was more defensible than the original 13-item model after the removal of one misfitting item, which improved the dimensionality and interpretability of the instrument. The findings indicate that most items functioned adequately, although item 3 requires revision, items 5 and 13 should be re-examined for possible redundancy, and the five-point response format may need simplification in future studies. Overall, the scale may support preventive education related to body awareness, consent, peer pressure, responsible digital interaction, and adolescent well-being; however, it should be used cautiously for research and program planning rather than diagnosis, punishment, or individual labeling until further validation is conducted across broader and more diverse adolescent samples.

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