Psychometric Analysis of Student Social Skill Instruments (S3I) with the Rasch Model

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ABSTRACT: Social skills are an important aspect in developing the character of 21st century students, especially in facing the challenges of communication, collaboration, and cross-cultural interaction. However, there is no measurement instrument specifically designed to assess students' social skills in the context of higher education in Indonesia. This study aims to develop and evaluate a valid, reliable, and gender and department-free Student Social Skills Instrument (S3I). The research sample consisted of 575 responses collected from various departments at IKIP Siliwangi, consisting of 113 male students (19.7%; SD = -0.79) and 462 female students (80.3%; SD = 0.69). The S3I instrument consists of 204 items arranged on a 5-point Likert scale. Data analysis was conducted using the Rasch model approach, including analysis of item validity, reliability, unidimensionality, and Differential Item Functioning (DIF) based on gender and department. The results showed that the S3I instrument had very high reliability (α = 0.98), met the criteria of unidimensionality (explained variance 29.8%), and most of the items showed conformity with the Rasch model.

INTRODUCTION

The development of social skills is a crucial aspect in the lives of adolescents and young adults, including university students. Social skills are defined as interpersonal abilities used to engage with society and serve as a fundamental foundation for individuals to achieve academic and social success (Sari et al., 2020). As agents of change, university students are expected to possess and actively develop social skills that enable them to interact effectively with their environment. In the learning process, students require social competence to communicate, interact, and collaborate in order to achieve learning objectives (Lestari & Kustiyani, 2022). Furthermore, globalization has influenced the characteristics of learners, including university students, in line with the rapid advancement of the digital era (Harefa, 2022). According to Goleman (1995), social skills are a component of emotional intelligence that involve the ability to manage relationships and build social networks. Individuals with strong social skills are capable of recognizing their own emotions and those of others, regulating emotions effectively, and fostering harmonious interpersonal relationships. Goleman argues that emotional intelligence contributes more significantly to a person's success than intellectual intelligence (IQ), particularly in social contexts.

The continuous advancement of the digital era has brought about dynamic changes in social interaction, particularly through digital platforms or what is commonly referred to as social media. Social media has the potential to replace face to face interactions, which in turn affects social skills among adolescents and university students by altering the way individuals engage with others,

leading to lower levels of social competence (Rakhmaniar, 2024). A study conducted by Desalegn et al (2019) in Ethiopia found that 31.2% of health science students experienced social skill impairments in the form of social anxiety, characterized by withdrawal behavior due to difficulties in communication. Similarly, research by Alnemr et al (2024) involving 455 international students in Türkiye, revealed that 60.8% of the respondents experienced social skill deficits with symptoms of social anxiety, indicating challenges in forming interpersonal relationships and ineffective communication. In Indonesia, university students' social skill levels have yet to show optimal results. A study by Mawarni et al (2024) at Universitas 17 Agustus 1945 Surabaya reported that 77% of students had moderate levels of social skills, which was attributed to excessive social media use and poor emotional regulation, resulting in lower social competence. Additionally, a study by Suryaningrum (2021) involving 364 students from two universities in Malang found that 76.9% of students experienced social anxiety characterized by fear of social interaction, difficulty speaking in public, and challenges in expressing opinions factors that contribute to low social skills among students.

Various studies have shown that students' social skills range from moderate to high levels, depending on age, educational level, and the learning approach used. A study by Dewi Kurniawati, 166 seventh-grade students found that 35% of students had very high social skills, 55% high, and 10% moderate, with no students categorized as low or very low. The five measured dimensions of social skills cooperation, assertiveness, empathy, self-control, and responsibility were analyzed using a scale with very high reliability ($\alpha = 0.945$), confirming that students generally demonstrated positive social behavior (Anastasia Febriana Swastono & A. Setyandari, 2024). The results showed students scored 75% in cooperation, 72% in assertiveness, and 78% in emotional control. All aspects of social skills were above the "good" category (≥ 75%), indicating that students' social development is on a positive track (Anastasia Febriana Swastono & A. Setyandari, 2024).

Low levels of social skills among university students can have significant impacts on both their daily social and academic life, including difficulties in interaction and communication (Margaret Aurelia et al., 2024), decreased academic performance (Izzati, 2014), difficulties in establishing social relationships (Lubis & Suci, 2019), maladaptive behavior and emotional disorders (Zaimatus Septiana et al., 2024) nd can cause anxiety and stress (Hariyani et al., 2025). Consequently, the implementation of measurement tools or instruments is imperative to assess social skills in a precise and context-aware manner, facilitating the identification of potential challenges related to social skills in a timely manner. This approach enables the provision of targeted interventions, particularly through guidance and counseling services in higher education for students.

However, until now the measurement tools or instruments for measuring social skills developed specifically for students in Indonesia are still very limited. Most of the instruments used are adaptations from western countries. This is because in Indonesia, the development of social skills measurement instruments specifically designed and contextualized for Indonesian students is still very limited. To date, there has been little research systematically developing and testing the validity and reliability of local instruments that are appropriate to the cultural context, social values, and characteristics of education in Indonesia. For example, the Social Skill Rating System (SSRS) developed by Gresham & Elliot (1990) published by the American Guidance Service, the instrument has been tested and has been widely used by elementary to secondary schools to measure social skills, problem behavior, and academic commemoration. Meanwhile, there is the Teenage Inventory of Social Skill (TISS) developed by Inderbitzen & Foster (1992) which has been used in the United States, the instrument is used to measure social skills, acceptance and social adjustment in adolescents. In addition, the Social Skills Scale (SSS) developed by Anme et al. (2013) has been used in Japan, the instrument is used to measure social skills, assertive behavior, self-control, and cooperation in preschool children. While in Indonesia, in Malang city, East Java there is a Social Skills

Assessment Instrument through Video Self-Assessment (VSA) developed by Gustavian (2023) this instrument measures social skills in junior high school students. Meanwhile, in Cimahi city, West Java there is an Early Childhood Social Skills Anget developed by Handayani et al. (2021) which measures social skills in early childhood. So the instruments used to measure student skills are still very limited.

Based on this, this study aims to develop and analyze the validity and reliability of student social skills instruments. To produce an objective and accurate instrument, modern psychometrics are needed, so this research uses the Rasch Model approach, which is able to analyze the characteristics of each item, evaluate unindemensionality, and detect possible bias. And named Student Social Skill Instrument (S3I). This instrument was developed contextually according to the needs of Indonesian students, and analyzed using the Rasch Model approach to produce an instrument that meets international psychometric standards and can be widely used for educational assessment and counseling services in higher education.

METHODS

Procedures and Participants

After obtaining ethical clearance from the Educational Assessment Association, Serang, Indonesia (Ethical Approval No.129/EC/AAP/III/2025), the research procedures and instruments were deemed appropriate for data collection. Subsequently, an online survey was developed using Google Forms, a widely used, free online survey platform that ensures easy distribution and accessibility. The survey link was disseminated via email to all active students across various departments at IKIP Siliwangi. In the accompanying message, participants were informed about the purpose of the study, assured of the confidentiality of their responses, and reminded that participation was entirely voluntary and could be withdrawn at any time without consequence. A total of 575 responses were collected, consisting of 113 male students (19.7%; SD = −0.79) and 462 female students (80.3%; SD = 0.69). The demographic characteristics of the participants, including age, gender, and department affiliation, are summarized in Table 1.

Table 1. Frequency Distribution of Demographic Variables (N = 575)

Demographic Variables (code)	Frequency (f)	Percent %
Gender		
Male (M)	113	19.7
Female (F)	462	80.3
Department		
Guidance and counseling (B)	306	53.2
Primary School Teacher Education (D)	142	24.7
Indonesian Language and Literature Education (I)	87	15.1
Community Education (S)	14	2.4
Early Childhood Teacher Education (U)	10	1.7
Mathematics Education (M)	16	2.8

Scale Development

The development of Student Social Skill Instruments (S3I) was guided by a theoretical framework Gresham's (1998). An extensive literature review was conducted to assess various aspects of S3I. A total of 220 related items were identified in six aspects, namely: communication, interpersonal relationships, self-management, social problem solving, emotional aspects, and social facilitation. After removing items with similar content or expression, 215 items were retained for

further evaluation. Experts including, couselor, psycholog, psychiatrists, and general practitioners validated the 215 items, thereby eliminating 8 items based on their recommendations. Furthermore, 207 revised items were submitted to experts such as measurement and evaluation experts, as well as experienced lecturers. A five-point Likert scale was used to assess whether students understood the item descriptions, the answers of S3I were very appropriate, appropriate, somewhat appropriate, inappropriate, and very inappropriate. In addition, a telephone-based cognitive interview was conducted with the same respondents to explore their thoughts on each scale item and responses. The results showed that no further changes were needed. Based on these several stages, 204 items were used to conduct the pilot test.

Data and Statistical Analysis

The analysis technique used in this research is the Rasch model. George Rasch, a Danish mathematician, introduced this method also known as Rasch Model or Measurement in 1960 (Bond et al., 2020). The analysis was rooted in the Item Response Theory (IRT), which examined the relationship between item attributes and the abilities of respondents (Waugh, 2012). Rasch analysis also provides more in-depth diagnostic information for scale expansion (Boone, 2016), which adds value to obtaining accurate psychometric estimates in the context of S3I. The computer program Winsteps (version 5.5.0) and its user guide (Linacre, 2021) were used to evaluate the fit of observed data with Rasch expectations (Boone et al., 2014; Sumintono, B., & Widhiarso, 2015). S3I was analyzed to determine its overall fit; diagnostic rating scale; targeting; unidimensionality and local independence assumptions; as well as item measures, fit indices, and measurement precision.

The analysis technique employed in this study was the Rasch Model, a statistical approach developed by Danish mathematician George Rasch in 1960. The Rasch Model is part of the broader framework of Item Response Theory (IRT), which examines the relationship between item characteristics and latent respondent abilities (Waugh, 2012). Unlike classical test theory, the Rasch Model enables more objective measurement and offers the advantage of simultaneously evaluating both item quality and respondent performance (Bond et al., 2020).

In the context of developing the Student Social Skill Instruments (S3I), Rasch analysis was selected for its ability to provide in-depth diagnostic information at both the item and person levels. It allows researchers to assess the degree to which observed data conform to the model's expectations, which is crucial for ensuring the validity and reliability of the instrument. This includes evaluating item quality, item difficulty, person reliability, and the alignment between item difficulty and respondent ability. Furthermore, Rasch analysis helps identify misfitting items that may not accurately reflect the underlying construct, thus enhancing the psychometric robustness of the instrument (Boone, 2016; Ifdil et al., 2022, 2024).

The analysis was conducted using Winsteps software (version 5.5.0), a widely recognized tool for Rasch measurement. The procedures followed the user manual developed by (Linacre, 2021), with additional guidance from (Boone et al., 2014; Sumintono, B., & Widhiarso, 2015) for interpreting outputs in the context of educational and psychological measurement. Several key aspects were analyzed, including overall model fit, diagnostic evaluation of the rating scale, targeting (i.e., the match between item difficulty and respondent ability), and the examination of critical assumptions such as unidimensionality and local independence. In addition, detailed analyses were conducted on item measures, fit statistics (infit and outfit), and measurement precision through reliability indices and standard errors. By applying the Rasch Model, this study ensured that the S3I instrument was not only psychometrically sound but also fair, interpretable, and suitable for use in various educational settings.

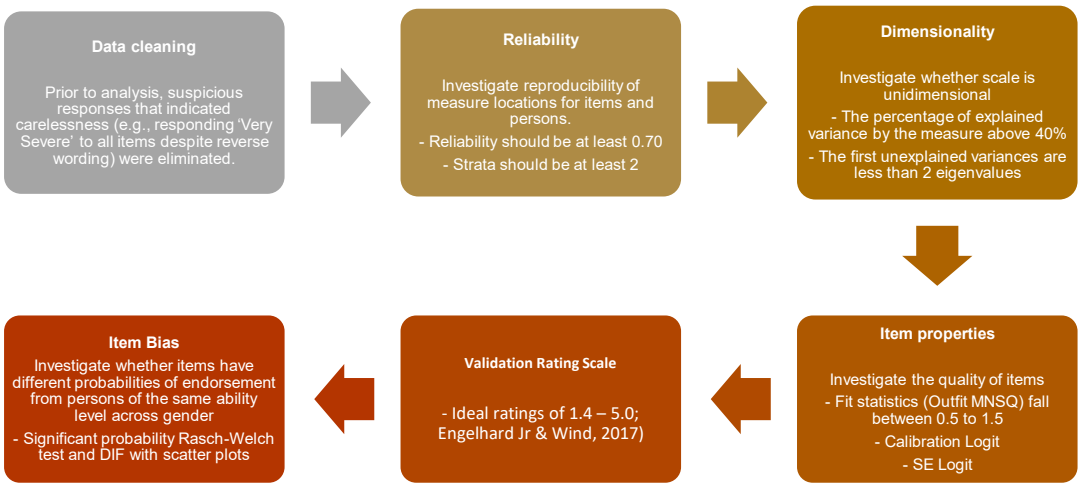

Figure 1. Data analyses flow

RESULTS AND DISCUSSION

Results

Rasch measurement model Results

The evaluation of the psychometric properties of the Student Social Skill Instruments (S3I) was carried out using Rasch analysis, which generated summary statistics for both item parameters (I = 204) and respondent data (N = 575). Key outputs included reliability coefficients, separation indices, mean measures expressed in logits, and fit statistics (Infit and Outfit MNSQ/ZSTD), which collectively indicate how well the data align with Rasch model expectations (Syahputra et al., 2019). Additionally, Cronbach's alpha was calculated as an index of internal consistency, while the proportion of raw variance explained by the measure was determined through Principal Component Analysis (PCA) to assess unidimensionality (Linacre, 2021). The complete summary of these results is shown in the table below.

Table 1. Summary statistics of person and item (I = 204, N = 575)

	Reliability	Separation index	Mean measure*)	Infit MNSQ/ZSTD	Outfit MNSQ/ZSTD	Cronbach's alpha	Raw variance explained by measure**)
Person	0.98	7.99	0.68	1.03/-0.89	1.02/-0.92	0.98	29.8%
Item	0.99	9.20	0.00	1.00/-0.04	1.02/0.23		

*) Measure in Logit.

**) Computed through Principal Component Analysis (PCA).

The findings of the Rasch analysis for the Student Social Skill Instruments (S3I) are presented in Table 1. The person reliability index was 0.98, indicating an excellent level of consistency in respondents' answers across the instrument. The item reliability index was also high at 0.99, demonstrating the stability of item calibrations and the precision with which the items differentiate social skill levels. Cronbach's alpha coefficient was 0.98, reflecting a very high level of internal consistency and suggesting that the items in S3I are highly interrelated and measure a cohesive construct.

The person separation index was 7.99, and the item separation index was 9.20, both of which far exceed the acceptable threshold of 2.0. These results indicate that the instrument can distinguish between several strata of individual social skill abilities and provides strong evidence of its discriminative power across different item difficulties. The mean person measure was 0.68 logits,

suggesting that on average, respondents demonstrated a relatively high level of social skill as measured by the instrument. In terms of model fit, the Infit and Outfit Mean Square (MNSQ) values for both persons (1.03 and 1.02) and items (1.00 and 1.02) were close to the expected value of 1.0, with ZSTD values within the acceptable range, indicating overall good model-data fit. Additionally, the raw variance explained by the measure was 29.8%, which meets the Rasch analysis criterion for unidimensionality. These results collectively support the conclusion that the S3I is a valid, reliable, and psychometrically sound tool for assessing student social skills across a broad range of abilities.

Unidimensional and Local Independence

The Rasch Principal Component Analysis (PCA) of residuals provided robust evidence supporting the unidimensionality and structural integrity of the Student Social Skill Instruments (S3I). According to the analysis, the S3I explained a significant proportion of the total variance—29.8%—with an eigenvalue of 86.73. This value far exceeds the commonly accepted benchmark of 20% variance explained for Rasch-derived measures (Linacre, 2021), indicating that a substantial portion of the data variation is captured by the primary latent construct the instrument was designed to assess, namely student social skills.

In addition to the variance explained, the PCA revealed minimal unexplained variance in the first four residual contrasts, which serves as a critical test of the assumption of unidimensionality (Linacre, 2017). The first contrast accounted for only 10.8% of unexplained variance with an eigenvalue of 31.45, remaining well below the 15% threshold that might signal the presence of a secondary dimension. The subsequent contrasts exhibited even smaller contributions to residual variance: 4.1% (eigenvalue = 11.99) in the second contrast, 1.8% (eigenvalue = 5.11) in the third, 1.4% (eigenvalue = 4.13) in the fourth, and 1.2% (eigenvalue = 3.35) in the fifth. These findings collectively strengthen the case for unidimensionality, confirming that the S3I is measuring a single underlying trait as intended.

Moreover, the residual correlation matrix showed no standardized residual correlations above 0.7 between items, further affirming the assumption of local item independence. This indicates that responses to individual items were not excessively correlated beyond what would be expected based on the underlying trait, suggesting that each item contributes uniquely to measuring social skills without redundancy or shared noise. These psychometric indicators high explained variance, low residual contrast variance, and low inter-item residual correlation reinforce that the S3I is both unidimensional and internally coherent. Combined with the satisfactory item and person fit indices, this analysis confirms that the instrument effectively captures the construct it was designed to measure, offering a sound foundation for its continued use in educational and psychological assessments of student social skills.

Model Data Fit

The items measure the useful analysis can reveal the fit statistic. The parameters used to demonstrate the suitability is infit and outfit of the mean squared value by the middle square value 1.0 or with the ideal range of 0.5> MNSQ <1.5 and Z-standardized values by the middle square value 0.0 or with the ideal range -2.0> ZSTD <+2.0 (Boone et al., 2014; JM, 2015; Sumintono, 2015; Trevor G Bond & Christine Fox, 2015). These robust findings strongly indicate that the application of the Rasch model effectively captures the underlying structure of the data, substantiating its appropriateness for further examination and interpretation. These findings suggest that the Rasch model is a good fit for the data.

Table 2. The summary of item measure (I = 15, N = 1035).

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	JMLE MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEASUR-AL CORR.	PTMEASUR-AL EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item
115	1843	575	.56	.05	1.55	8.47	1.58	8.67	A .17	.49	40.7	43.4	I0115
49	2039	575	.08	.05	1.54	7.80	1.57	8.16	B .25	.46	35.5	46.7	I0049
1	2531	575	-1.55	.07	1.36	5.23	1.56	7.25	C .16	.35	47.0	56.2	I0001
13	1991	575	.20	.05	1.48	7.09	1.51	7.54	D .21	.47	34.8	45.9	I0013
62	1691	575	.89	.05	1.37	6.24	1.44	7.22	E .29	.51	33.9	40.9	I0062
9	2380	575	-.94	.06	1.28	4.20	1.43	6.18	F .23	.39	49.2	52.4	I0009
6	2181	575	-.30	.05	1.38	5.58	1.41	5.93	G .41	.44	50.3	48.4	I0006
35	2215	575	-.40	.05	1.35	5.11	1.41	5.91	H .29	.43	42.4	48.7	I0035
26	1551	575	1.19	.05	1.32	5.65	1.40	6.75	I .23	.52	34.1	39.6	I0026
28	1655	575	.97	.05	1.28	4.88	1.36	6.09	J .26	.51	36.3	40.6	I0028
11	2299	575	-.67	.06	1.21	3.23	1.35	5.08	K .14	.41	50.3	51.0	I0011
204	2052	575	.05	.05	1.25	3.88	1.35	5.26	L .49	.46	47.7	46.8	I0204
198	1830	575	.59	.05	1.02	.30	1.33	5.26	M .37	.49	46.3	43.0	I0198
7	2247	575	-.50	.06	1.22	3.39	1.32	4.77	N .19	.42	45.2	49.2	I0007
10	2062	575	.02	.05	1.11	1.81	1.32	4.82	O .46	.46	49.4	46.9	I0010
8	2045	575	.07	.05	1.31	4.77	1.28	4.35	P .43	.46	41.9	46.7	I0008
34	1696	575	.88	.05	1.26	4.47	1.30	5.10	Q .33	.51	39.1	40.9	I0034
68	1618	575	1.05	.05	1.21	3.74	1.29	5.00	R .29	.52	38.4	40.4	I0068
16	2009	575	.16	.05	1.22	3.52	1.28	4.35	S .46	.46	45.9	46.2	I0016
110	2080	575	-.02	.05	1.28	4.22	1.27	4.17	T .56	.45	48.5	47.1	I0110
171	2118	575	-.13	.05	1.26	3.93	1.28	4.21	U .34	.45	42.4	47.8	I0171
2	1606	575	1.07	.05	1.21	3.72	1.26	4.57	V .33	.52	36.3	40.4	I0002
22	1866	575	.50	.05	1.16	2.66	1.25	4.11	W .39	.49	40.0	43.9	I0022
188	2204	575	-.37	.05	1.25	3.82	1.23	3.46	X .58	.43	50.4	48.6	I0188
192	1700	575	.87	.05	1.20	3.48	1.25	4.23	Y .33	.51	41.7	40.9	I0192
158	2129	575	-.16	.05	1.24	3.60	1.19	3.04	Z .59	.44	48.7	47.9	I0158
15	2484	575	-1.34	.06	1.23	3.46	1.17	2.48	.40	.36	50.4	54.3	I0015
156	1612	575	1.06	.05	1.17	3.09	1.23	4.12	.32	.52	38.4	40.4	I0156
168	2145	575	-.20	.05	1.23	3.50	1.21	3.20	.59	.44	49.2	48.0	I0168
72	2115	575	-.12	.05	1.22	3.38	1.17	2.72	.58	.45	48.9	47.7	I0072
191	1942	575	.32	.05	1.20	3.22	1.21	3.40	.23	.47	43.7	45.2	I0191
4	1927	575	.36	.05	1.18	2.93	1.20	3.27	.42	.48	40.5	45.0	I0004
30	1900	575	.42	.05	1.16	2.64	1.19	3.20	.47	.48	39.5	44.6	I0030
88	2177	575	-.29	.05	1.19	2.94	1.17	2.67	.64	.44	53.0	48.4	I0088
14	1726	575	.82	.05	1.15	2.67	1.18	3.18	.35	.50	42.8	41.1	I0014
24	1987	575	.21	.05	1.18	2.92	1.18	2.86	.51	.47	40.7	45.9	I0024
73	2025	575	.12	.05	1.15	2.36	1.18	2.88	.32	.46	48.0	46.5	I0073
137	2023	575	.12	.05	1.09	1.44	1.18	2.83	.28	.46	43.0	46.4	I0137
3	2150	575	-.22	.05	1.15	2.41	1.17	2.69	.18	.44	39.1	48.0	I0003
12	2221	575	-.42	.05	1.17	2.68	1.09	1.47	.48	.43	55.3	48.7	I0012
116	1790	575	.68	.05	1.10	1.76	1.17	2.95	.42	.50	45.9	42.0	I0116
89	1997	575	.19	.05	1.14	2.30	1.16	2.56	.27	.47	45.4	46.0	I0089
172	1978	575	.24	.05	1.11	1.85	1.16	2.66	.51	.47	49.9	45.7	I0172
67	2087	575	-.04	.05	1.07	1.22	1.15	2.32	.35	.45	47.1	47.2	I0067
149	2209	575	-.39	.05	1.11	1.76	1.15	2.34	.46	.43	48.5	48.6	I0149
20	1702	575	.87	.05	1.09	1.57	1.14	2.49	.39	.51	40.2	40.9	I0020
113	2000	575	.18	.05	1.10	1.67	1.14	2.20	.26	.47	45.0	46.0	I0113
136	1866	575	.50	.05	1.10	1.81	1.14	2.36	.49	.49	40.7	43.9	I0136
5	2260	575	-.54	.06	1.11	1.70	1.13	2.10	.31	.42	47.1	49.5	I0005
60	2151	575	-.22	.05	1.13	2.07	1.07	1.18	.61	.44	54.6	48.0	I0060
70	1842	575	.56	.05	1.04	.64	1.13	2.27	.40	.49	44.0	43.4	I0070
64	1793	575	.67	.05	1.08	1.38	1.12	2.17	.44	.50	41.9	42.0	I0064
BETTER FITTING NOT SHOWN													
152	1733	575	.80	.05	.89	-2.11	.94	-1.18	.40	.50	48.3	41.2	I0152
104	1829	575	.59	.05	.88	-2.25	.91	-1.65	.51	.49	50.6	43.0	I0104
80	1890	575	.45	.05	.88	-2.20	.90	-1.78	.53	.48	49.2	44.4	I0080
36	1850	575	.54	.05	.87	-2.47	.89	-1.96	.52	.49	46.3	43.6	I0036
41	2223	575	-.43	.05	.88	-2.07	.89	-1.76	.45	.43	51.1	48.7	I0041
54	1895	575	.44	.05	.89	-2.00	.88	-2.08	.57	.48	48.2	44.4	I0054
107	2062	575	.02	.05	.88	-2.01	.89	-1.91	.37	.46	52.0	46.9	I0107
121	2153	575	-.22	.05	.87	-2.22	.89	-1.91	.43	.44	52.2	48.0	I0121
145	2174	575	-.28	.05	.86	-2.36	.89	-1.93	.48	.44	50.6	48.3	I0145
42	1867	575	.50	.05	.87	-2.29	.88	-2.13	.46	.49	47.0	43.9	I0042
46	1768	575	.72	.05	.87	-2.47	.88	-2.29	.49	.50	45.2	41.6	I0046
125	2235	575	-.46	.06	.88	-1.99	.87	-2.22	.52	.43	47.5	48.9	I0125
153	2070	575	.00	.05	.87	-2.19	.88	-1.98	.40	.45	53.4	47.0	I0153
157	2160	575	-.24	.05	.86	-2.32	.88	-2.04	.46	.44	52.0	48.1	I0157
79	2230	575	-.45	.06	.87	-2.13	.86	-2.32	.47	.43	48.0	48.8	I0079
185	2063	575	.02	.05	.85	-2.57	.87	-2.32	.40	.46	49.7	46.9	I0185
50	1765	575	.73	.05	.85	-2.87	.86	-2.57	.49	.50	47.1	41.6	I0050
95	2238	575	-.47	.06	.86	-2.37	.85	-2.53	.49	.42	53.9	49.0	I0095
102	2036	575	.09	.05	.86	-2.47	.85	-2.59	.59	.46	56.7	46.6	I0102
189	2179	575	-.30	.05	.86	-2.40	.85	-2.49	.52	.44	52.0	48.4	I0189

195	2168	575	-.27	.05	.86	-2.45	.84	-2.67	.46	.44	53.6	48.2	I0195
93	2142	575	-.19	.05	.85	-2.49	.85	-2.63	.44	.44	53.9	48.0	I0093
159	2137	575	-.18	.05	.85	-2.52	.84	-2.80	z .46	.44	49.6	48.0	I0159
173	2207	575	-.38	.05	.84	-2.65	.85	-2.49	y .52	.43	52.7	48.6	I0173
151	2136	575	-.18	.05	.84	-2.83	.83	-2.95	x .43	.44	55.1	48.0	I0151
202	1826	575	.60	.05	.80	-3.91	.83	-3.13	w .52	.49	52.7	42.9	I0202
97	2175	575	-.29	.05	.80	-3.52	.82	-3.13	v .44	.44	53.2	48.3	I0097
142	1844	575	.55	.05	.81	-3.66	.82	-3.37	u .49	.49	51.8	43.6	I0142
146	1998	575	.19	.05	.82	-3.19	.80	-3.60	t .60	.47	54.6	46.0	I0146
150	1777	575	.70	.05	.79	-4.08	.82	-3.50	s .50	.50	50.1	41.8	I0150
163	2210	575	-.39	.05	.82	-3.06	.80	-3.46	r .50	.43	53.2	48.6	I0163
59	2110	575	-.10	.05	.81	-3.24	.81	-3.38	q .42	.45	55.7	47.6	I0059
87	2246	575	-.50	.06	.81	-3.27	.80	-3.41	p .53	.42	50.3	49.2	I0087
103	2203	575	-.37	.05	.81	-3.24	.81	-3.35	o .49	.43	52.7	48.5	I0103
199	2155	575	-.23	.05	.81	-3.29	.79	-3.70	n .51	.44	53.4	48.1	I0199
29	2355	575	-.86	.06	.80	-3.39	.79	-3.64	m .50	.40	56.9	52.1	I0029
57	2163	575	-.25	.05	.79	-3.64	.80	-3.46	l .40	.44	52.3	48.2	I0057
101	2217	575	-.41	.05	.80	-3.46	.78	-3.90	k .49	.43	53.0	48.7	I0101
131	2176	575	-.29	.05	.80	-3.39	.79	-3.76	j .51	.44	53.6	48.3	I0131
122	1964	575	.27	.05	.79	-3.77	.78	-4.08	i .58	.47	51.3	45.5	I0122
135	2203	575	-.37	.05	.78	-3.85	.76	-4.35	h .54	.43	52.3	48.5	I0135
167	2112	575	-.11	.05	.78	-3.80	.77	-4.14	g .47	.45	54.4	47.7	I0167
65	2180	575	-.30	.05	.77	-4.00	.76	-4.34	f .45	.44	54.6	48.4	I0065
92	1833	575	.58	.05	.75	-4.86	.77	-4.44	e .49	.49	48.0	43.2	I0092
43	2268	575	-.57	.06	.76	-4.21	.75	-4.45	d .49	.42	56.0	49.6	I0043
147	2198	575	-.35	.05	.75	-4.32	.74	-4.76	c .51	.43	55.0	48.4	I0147
194	1910	575	.40	.05	.72	-5.41	.73	-5.16	b .57	.48	52.0	44.7	I0194
144	1983	575	.22	.05	.70	-5.61	.69	-5.95	a .60	.47	58.6	45.8	I0144
MEAN	2058.5	575.0	.00	.05	1.00	-.04	1.02	.23			49.0	46.8	
P.SD	181.7	.0	.48	.00	.15	2.55	.17	2.81			5.1	2.9	

This condition explains that there are four items that are included in the misfit category, namely not meeting the statistical criteria for fit items in the Rasch model. The four items are items 1, 13, 49, and 115, which are marked in red in the analysis results. This discrepancy can be seen from the MNSQ infit and outfit values which are outside the ideal range (0.5–1.5) and the ZSTD value which exceeds the ±2.0 limit. These values indicate that the participants' responses to these four items are inconsistent with the expectations of the Rasch model, thus indicating that these items contain disturbances to the unidimensionality of the construct or may cause ambiguity in interpretation by respondents. Therefore, these items require further evaluation, either through content analysis or additional validity tests, to determine whether they need to be revised, replaced, or removed from the final instrument.

Rating Scale Validation

The rating scale provided on the S3I scale must be well understood by respondents to ensure the accuracy and validity of their responses. The clarity of the scale directly affects how well respondents can interpret and respond to each item, which in turn influences the overall quality of the data collected. The S3I instrument employs a 5-point Likert scale, ranging from strongly agree to strongly disagree, to capture varying degrees of agreement with each statement. This range allows for more nuanced responses and supports better differentiation in respondent perceptions. This indicates that each response option is functioning well, clearly distinguishable, and contributes meaningfully to the measurement of the intended construct.

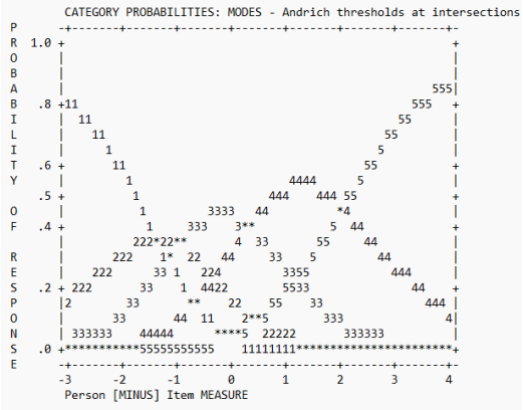

Figure 2. Probability of Response

Based on the analysis of the category probability curve in Figure 2, it can be concluded that response category 2 ("Not Appropriate") is not functioning optimally, as it does not show a peak probability at any point along the respondent ability continuum. This means that respondents rarely select this option as their most likely response, indicating that the category may be confusing or too similar to adjacent categories. Therefore, category 2 should be removed from the scale. The S3I instrument should be revised to use a 4-point Likert scale only, which is expected to improve the clarity of the response options and enhance the overall quality and validity of the data collected.

Differential Item Functioning (DIF) Analysis

DIF analysis obtained significant results especially in the respondent subgroups. In this instrument development research, DIF analysis was conducted on the aspects of gender and major. In the gender group, there were seven items that indicated bias, namely: 0026, 0002, 0068, 0156, 0001, 0021, and 0023.

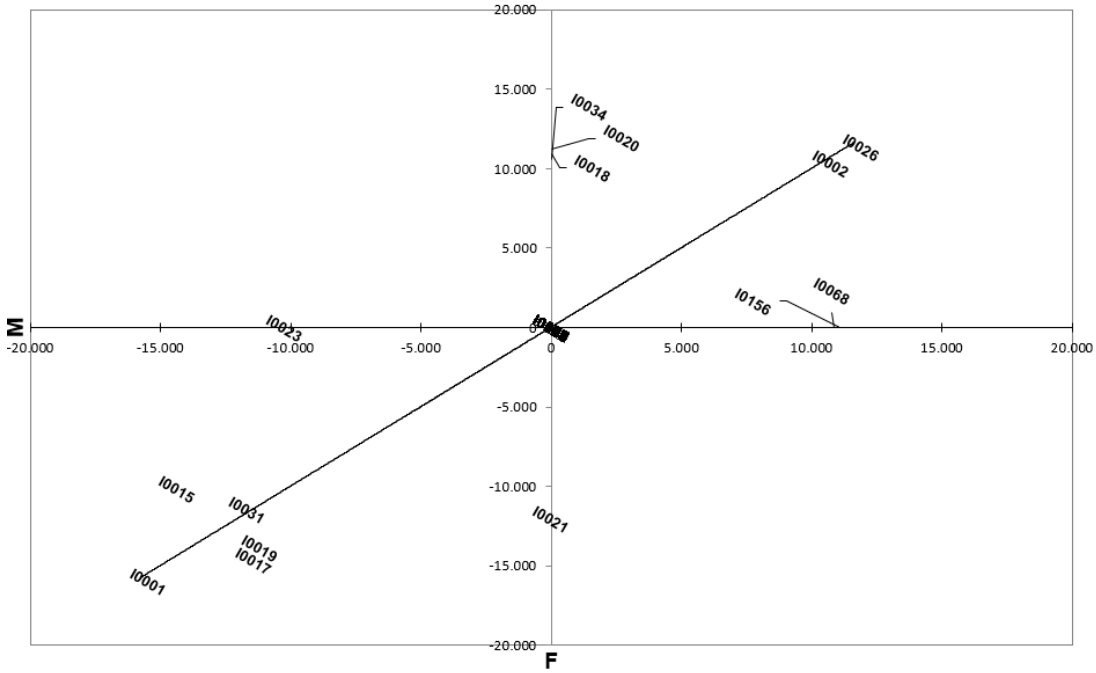

Figure 3. Results of DIF Analysis on Gender
M = Male; F = Female

Figure 3 shows a tendency for a number of students' social skills items to be closer to a certain gender group, indicating the potential for instrument bias or DIF. For example, items 0026, 0002,

0068, and 0156 appear closer to the female group (F), while items 0001, 0021, and 0023 tend to be closer to the male group (M). This condition suggests that these items provide a higher chance of answering to one group even though their social skills abilities are equal, thus causing gender bias in the measurement.

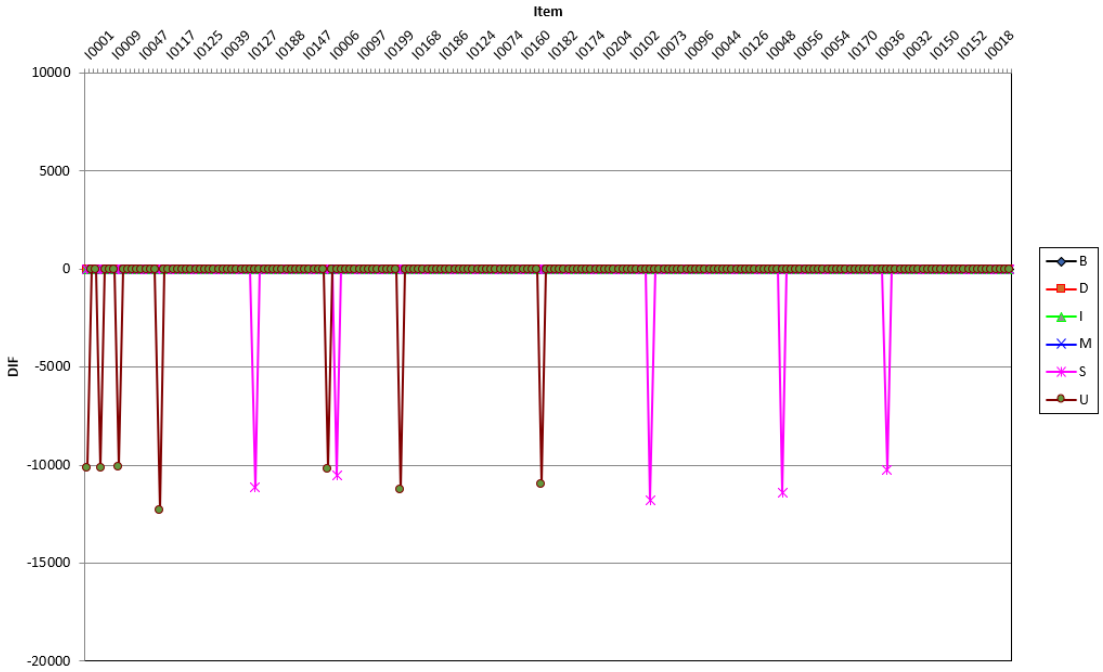

Figure 3. Results of DIF Analysis on Department

B = Guidance and counseling; D = Primary School Teacher Education; I = Indonesian Language and Literature Education; S = Community Education; U = Early Childhood Teacher Education; M = Mathematics Education (M)

Based on Figure 3, it can be seen that several items in the S3I instrument show significant negative DIF values when completed by students from the Community Education (S) and Elementary School Teacher Education (U) departments. This indicates that these items tend to benefit other major groups and give a higher burden to students majoring in S and U, even though their social skill levels may be equivalent. This difference reflects instrument bias or DIF based on academic background, which indicates that these items do not work fairly across majors. Thus, it is necessary to review and revise items that are indicated as biased to ensure that the instrument truly measures social skills objectively and is not distorted by the context of the major or study program.

Discussion

This study used advanced psychometric testing methods to understand the psychometric characteristics of the Student Social Skill Instrument (S3I) in the Indonesian population. The results of the Rasch analysis of the Student Social Skill Instruments (S3I) instrument show that overall, this instrument has very good psychometric quality. The very high person (0.98) and item (0.99) reliability values indicate that both participants and test items have consistency and stability in measurement. In addition, the high separation index indicates the instrument's ability to distinguish between different levels of social skills among respondents. The Cronbach's alpha value of 0.98 strengthens these findings, indicating that all items are correlated and together measure a coherent construct.

Rasch Model analysis showed that the Indonesian version of the S3I has adequate psychometric characteristics without any symptoms of DIF by gender. DIF analysis showed that there were a number of items that showed bias towards certain gender groups or majors/study

programs. Seven items were identified as showing gender bias, with some items favoring men and others favoring women, even though the level of social skills should be equal. The results of this study indicate that female students tend to have social skills. This study is in line with research conducted by Claudel & Gracia (2024) at the University of Seville, which shows that there are significant differences between male and female students in social skills, especially in assertive and empathetic aspects. Women tend to show higher empathy scores which include social skills than men. According to Machado et al. (2020) 49,52% 49.52% of female students have better and satisfying social skills than men, indicated by the behavior of women adapting faster than men. However, men who have social skills are shown to be able to accept criticism while women are better at tolerating individual differences (Rashid & Shehzadi, 2020). Even in early education, women are considered more competent in social skills than men by showing good adaptation (Hajovsky et al., 2021)

In addition, women have more social skills shown by aspects of cooperation, responding, empathy, responsibility, and self-control than men (Sitorus, 2023). According to N. P. Handayani et al (2021) the main supporting factors for women to have good social skills are emotional maturity and better communication skills in women than men. In addition, women have superior social skills than men, because women tend to be more obedient to rules, better understand the feelings of others, and are better able to build close relationships with peers (Aprianti, 2019).

Factors that make women superior include women having superior emotional intelligence to support communication skills, relationship maintenance, and conflict management (Munajim et al., 2022). In addition, women tend to have social attitudes that are gentle, not aggressive, and obey social rules, which support better social skills than men (Multazamsyah & Rahman, 2023). But parenting and social environment factors affect the development of social skills, women tend to be directed to be cooperative and obey social norms while men are given freedom of action (Istiana, 2018).

Furthermore, this finding is also consistent with the social-emotional development model, which states that social skills develop through environmental interactions and consistent learning experiences. Therefore, the S3I instrument is considered capable of sensitively capturing differences in social skill levels, without showing measurement bias between groups. However, this study has limitations in terms of population coverage, as it was only conducted on students from a specific region and did not cover a wider range of socio-economic backgrounds. In addition, although Rasch analysis was used to validate the unidimensional structure and item fit, further studies are needed to explore external factors that affect students' social skills in more depth, such as family factors, classroom dynamics and exposure to social media.

As in the study by Luo (2023) early social behavioral intervention that emphasizes social skill training is critical to addressing emotional and behavioral problems in early childhood. In this meta-analysis review, we examined all the social skills intervention studies for preschoolers with, or at risk of, emotional and behavioral problems using group designs. This review included 25 studies that met the inclusion criteria. The robust variance estimation method was used to calculate the overall effect size of all the included studies, as this method can count for the pre-existing difference between the experiment and control groups. The included studies yielded an overall effect of 0.54 from the 151 effect sizes that were obtained for the 3484 preschool participants. Curriculum, integration, and treatment fidelity were identified as significant moderators of effects (Dong et al., 2023).

As in the study social skills interventions are critical for promoting social, emotional, and behavioral competence for students with or at risk of emotional and behavioral disorders (EBD) and autism spectrum disorders (ASD). This single-case meta-analysis examined the effects of social skills interventions (SSIs) for students with EBD and ASD. Effect sizes were calculated for 78 cases across

25 included studies using a nonparametric effect size, Baseline Corrected Tau. The overall weighted mean effect size of 0.54 suggested a moderate effect across the 25 studies. The overall weighted mean effects for studies reporting maintenance and generalization data were 0.68 and 0.37, respectively. Potential moderators examined (disability, intervention design, intervention delivery, methodological quality) were not significant. As such, they did not moderate the outcomes for participants (Hutchins et al., 2020).

As in the study of systematic review and meta-analysis were carried out to identify relevant studies published between 2000-2023. The study was conducted in accordance with the PRISMA guidelines. Studies were included if they met the following criteria: randomized controlled trials (RCTs) or quasi-RCTs, participants were children with ASD aged 3-18 years, SST interventions were delivered individually or in groups, and social skills were assessed using standardized measures. Effect sizes were calculated using Cohen's d, and meta-analyses were carried out using a random-effects model. A total of 17 studies were included in the meta-analysis. The overall effect size for SST interventions was 0.28 - 0.60 (95% confidence interval: [0.23-0.41]), indicating a small to moderate effect. Social skills training interventions were effective in improving a range of social skills, including social communication, reciprocity, and joint attention (Alahmari et al., 2025).

Social skills have also become a key focus in various psychosocial interventions, particularly for children and adolescents who experience difficulties in social interaction. Social skills training programs have been proven effective in improving social competence across various groups, including children with special needs, those with behavioral disorders, and adolescents with mental health problems (Spence, 2003). Although numerous studies have been conducted in Western countries, research on social skills in Indonesia remains relatively limited especially within the context of a collectivist culture that emphasizes group harmony and social norms that differ from the individualistic values of Western societies. Therefore, it is important to expand research within the local context to understand how social skills are shaped and developed in Indonesian cultural settings.

Implications

The implications of the findings in this study indicate that the Student Social Skill Instruments (S3I) instrument has great potential to be used as a broad measurement tool for students' social skills, both in educational and psychological contexts, because it has been proven to be valid and reliable psychometrically. However, the presence of several items that do not fit the model (misfit) and indications of bias based on gender and study program underscore the importance of further evaluation and revision so that this instrument can truly be used fairly and objectively across groups. In addition, revising the scale to a 4-point format can improve the effectiveness of response interpretation and strengthen data quality. Therefore, the development and use of the S3I in educational assessment practices must be accompanied by a continuous improvement process in order to support the identification of students' social skills more accurately and free from bias.

CONCLUSION

The results of this study indicate that the Student Social Skill Instruments (S3I), consisting of 204 items, has excellent psychometric characteristics and can be used as a valid, reliable, and consistent measuring instrument to assess the level of students' social skills. This instrument is proven to be unidimensional, with a strong internal structure, and shows resistance to bias based on gender and major, making it suitable for use in various higher education contexts. Further research could develop a shorter version of this instrument for administrative efficiency or test the adaptation of the S3I in different cultural and institutional contexts. In addition, it is recommended to explore the relationship between social skills and other psychological or academic variables to

enrich the understanding of the contribution of social skills to the success of students' studies and social lives.

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