





Assessing Validity and Reliability of Muslim Student' Interpersonal Communication Scale: A Rasch Model Study

 Dian Ari Widyastuti*^{1,3},  Edi Purwanta¹,  Budi Astuti¹
 Rita Eka Izzaty¹,  Moh Farozin¹,  Affero Ismail²
 Rohmatus Naini³

¹Universitas Negeri Yogyakarta, Indonesia

²Universiti Tun Hussein Onn, Malaysia

³Universitas Ahmad Dahlan, Indonesia

 dianari.2022@student.uny.ac.id*

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Abstract

Developing a scale of interpersonal communication for Muslim students in Indonesia is very important because of the unique cultural and religious context that these students live in. Effective interpersonal communication is essential to fostering a supportive educational environment, improving peer relationships, and improving students' overall well-being. Currently there are no published research findings that specifically discuss measuring interpersonal communication among Muslim students in Indonesia. Therefore, this research aims to develop a valid and reliable Muslim Student Interpersonal Communication Scale (MSICS). MSICS was developed based on five aspects: openness, empathy, supportiveness, positivity, and equality. Content validity was assessed by two psychometric experts, and the results were analyzed using an inter-rater agreement model. Construct validity involved 432 Muslim junior high school students in Yogyakarta City, Indonesia, and the data was analyzed using the Rasch model. The results of the interrater agreement model analysis show that there is agreement between two psychometric experts regarding the acceptability of the statement items in the MSICS. Furthermore, the Rasch model analysis shows that the MSICS appears as a valid and reliable instrument for assessing the level of interpersonal communication among Muslim students in junior high schools in Indonesia with a variance explained by measures value of 26,7% (>20%), which means good enough to describe the measured data, and the reliability value is 0,91, which means very good. The results of this study can be used by school counselors to measure Muslim students' interpersonal communication.

INTRODUCTION

Interpersonal communication among Muslim students in educational settings is critical to their academic success, social interactions, and overall well-being. Adolescence, as a developmental phase, marks a critical period marked by significant physical, emotional and social changes (Santrock, 2017; Skinner & Zimmer-Gembeck, 2007). During this developmental period, individuals experience transitions that shape their self-identity and social interactions, so effective communication skills are important to have (Charmaraman et al.,

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2020; Pachucki et al., 2015). For Muslim students in Indonesia, whose experiences are shaped by unique cultural and religious contexts, interpersonal communication serves not only as a means of social interaction but also as an important aspect in the development of their personality and character.

Interpersonal communication can be defined as a contact by two or more people exchanging meaningful messages in one or many contexts of a given relationship (DeVito, 2017). Consistent with this definition, interpersonal communication involves the process of exchanging information between individuals, influencing each other, and understanding each other through verbal and non-verbal symbols (Johnson, 1972). Based on this definition, it can be concluded that interpersonal communication plays an important role in building and strengthening meaningful personal relationships.

Interpersonal communication is crucial in the development of personal and social identity, helping individuals understand, and respond to each other's emotions, including among Muslim students (Gamble & Gamble, 2020). Effective interpersonal communication increases satisfaction and success in various contexts (Rachmi et al., 2024). It is essential for Muslim students in facilitating meaningful and productive relationships with others.

Interpersonal communication for Muslim students plays an important role because it reflects the noble values upheld in religious teachings (Ebrahimi & Yusoff, 2017; Komariah & Nihayah, 2023). The Qur'an emphasizes that good interpersonal communication is characterized by a mutual understanding and respect between people, which is crucial in interpersonal relationships (Khalil, 2016; Sulaiman, 2021). Surah Al-Hujurat (49:11) emphasizes the importance of avoiding envy and ridicule, and recommends speaking well and with dignity. The Prophet Muhammad (saw) also emphasized that honest, polite, and compassionate communication is a fundamental aspect of Islamic teachings that must be practiced by everyone (Solihin et al., 2020; Tobroni & Purwojuwono, 2016). In everyday life, effective interpersonal communication in Islam helps build harmonious relationships, increases mutual understanding between individuals, and strengthens the principles of justice and equality (Afifi & Setiawan, 2021; Jamilin et al., 2017).

Although interpersonal communication is recognized as important, validated measurement tools specifically adapted to the cultural and religious context of Muslim students in Indonesia remains limited. Existing instruments for measuring interpersonal communication may not fully capture the experience or dynamics of communication among Muslim students in Indonesia, who have distinct cultural and religious characteristics. When the obtained research outcomes are transplanted in a different cultural setting, what has been realized might be different or even insignificantly related (Smith & Bond, 2019). In other words, culture or cultural settings influence the way a phenomenon or theory will function or will be interpreted (Kivunja & Kuyini, 2017). Therefore, it is necessary to develop instruments that are more appropriate to the social, cultural and religious conditions specific to them.

The current assessment instruments are not very specific and sensitive to some of the interpersonal communication characteristics owing to being a Muslim (Neuliep, 2016). These instruments consist the interpersonal communication scale by Campbell & Ataş Akdemir (2016), Dewi & Astuti (2022), Huang & Lin (2016), and Wilkins et al. (2015). This gap confirms the importance of the proper and culturally and religiously appropriate approach to the creation of assessment tools that can correctly reflect the complexity of the interpersonal communication of Muslim students.

Recent advances in psychometric methods, particularly Rasch models, providing promising solutions address this gap. The Rasch model provides a powerful framework for developing, refining, and validating measurement scales in educational and psychological research (Peeters & Augustine, 2023; Van Zile-Tamsen, 2017). By analyzing the probabilistic relationship between individual responses and item characteristics, the Rasch model ensures

that measurement scales are not only valid and reliable but also culturally appropriate for diverse populations (Sarwari & Wahab, 2017).

Nevertheless, whereas the Rasch model was employed to analyze and construct educational measurements, the analysis of the praise and blame, or unfamiliarity through the specific context of the interpersonal communication of Muslim students in Indonesia is rarely addressed in the current literature. Therefore, this gap provides an opportunity for extending theoretical knowledge and improving the theory-based practice of learning and counseling activities.

The main objectives of this study are twofold: first, to develop the Muslim Student Interpersonal Communication Scale (MSICS), a valid measurement instrument that captures Muslim characteristics for the appraisal of interpersonal communication among the students in Indonesia; and second, validate the MSICS using rigorous Rasch model analysis. The MSICS was systematically developed through constructing items and perfecting the scale such that key dimensions include openness, empathy, supportiveness, positive attitudes, and equality that is essential in prompting interpersonal communication (Azizi et al., 2023).

As part of the validation process, scale will be used on a sample of Muslim junior high school students in Indonesia and Rasch model analysis will be conducted. More specifically, the Rasch model will assess the item ordering, the response patterns, and the reliability of the MSICS to ensure the model provides a valid and interpretable index of interpersonal communication skills among its target population.

Objectives

By achieving these goals, this study aims to make a significant contribution to psychological assessment, especially measuring interpersonal communication. Validated and culturally sensitive measurement tools, such as the MSICS, can enhance the ability of school counselors to effectively assess and support interpersonal communication skills among Muslim students. This study is not only academically significant but also has practical implications, serving as the foundations for guidance and counseling services and ultimately creating a supportive environment that fosters academic achievement and socioemotional well-being among Muslim students in Indonesia.

METHODS

Population and the methods of sampling

The population for this study comprised Muslim junior high school students in Yogyakarta, Indonesia. To ensure a representative sample, a stratified random sampling method was employed. This method enabled the selection of participants from various Muhammadiyah schools as one type of Islamic school across the city, ensuring diversity in terms of age, gender, socioeconomic background, academic achievement, and religious involvement. The schools involved in this study are Muhammadiyah schools because they are one of the largest and most representative Islamic education networks in Yogyakarta. This was due to accessibility the homogenization of Islamic values, and the kinds of research that can be done. The results presented the assessment of Islamic education among Muslim students with other Muslim students because indeed Islamic values are in concord with religious educations for Muslim students in Indonesia. A total of 432 students were recruited, which met the sample size for performing the Rasch model, essential to obtain credible and accurate results (Chen et al., 2019). Sample criteria of this study involves Muslim students, both male and female in Muhammadiyah Junior High School, Yogyakarta City. The last measure was the students are of age range 12-15 years old. The sample criteria in this study are shown in Table 1.

Table 1. Participants of This Study

Aspect	Criteria	Number of Participants
Age	12 years old	72
	13 years old	141
	14 years old	122
	15 years old	97
Gender	Male	151
	Female	281
Socio-economic Status	Middle to upper	129
	Middle	229
	Lower middle	74

Instrumentation

The Muslim Student' Interpersonal Communication Scale (MSICS) was meticulously developed to measure five core aspects of interpersonal communication: openness, empathy, supportiveness, positive attitude, and equality, adherence to the principle of interpersonal communication (DeVito, 2017). The scoring was done by adding the scores of each aspect to provide a subscale score finally, the scores of all aspects were summed to come up with the overall score of interpersonal communication competency. Self-Reported Personality: It is responses to these indices that are scored and the higher score mean betterful interpersonal communication skills. For the purposes of maintaining overall validity of the MSICS, both content and construct validity were adequately considered. Content validity was assessed independently by two psychometric testing experts while assessing the items relevance and clarity. Their evaluation was further supported by another high interrater agreement model (Gregory, 2015; Peeters & Augustine, 2023).

Procedures and If Relevant, the Time Frame

The study was carried out from December 2023 to June 2024. In the preliminary phase of this research, a literature review was made in arriving at the concept of the scale identified as the Muslim Students' Interpersonal Communication Scale (MSICS). In consequence of this, there was expert validation whereby two psychometric experts assessed content validity based on Interrater Agreement Model (Gregory, 2015; Peeters & Augustine, 2023). Subsequently, the MSICS was completed by the identified sample of students. Completed MSICS were also administered while in-class group discussions were conducted by trained researchers to get better interpretations. The collected data were then analysed using Rasch model to establish the construct validity and reliability of the scale (Van Zile-Tamsen, 2017).

Analysis Plan

Construct validity and reliability of the measure were further tested with Rasch model, a statistical method commonly used in educational and psychological research studies (Pohl et al., 2016). These were fit statistics, person reliability, and item reliability. The analysis revealed that all the MSICS items were within the Rasch model of Infit Mean Square and Outfit Mean Square from 0,7 to 1,3. This indicates that all MSICS items effectively measure the same construct/variable and conform to the Rasch Model (Boone, 2016). The person and item reliability coefficients were above 0,80, indicating strong internal consistency and reliability of the scale (Bond et al., 2020). These psychometric properties have supported the study's conclusion that the MSICS has given a clear and reliable assessment of interpersonal communication skills of junior high school students in Indonesia from Muslim background. These findings should not be generalized to all Muslim junior high school learners across Indonesia because the sample holds demographic characteristics of specific features of Islamic education in the area.

Scope and Limitations of the Methodology

This study is limited to Muslim junior high school students in Yogyakarta, which may affect the generalizability of the findings to other regions or age groups. Although this research focuses on Muslim junior high school students in Yogyakarta, its findings may be applicable to Muslim students across Indonesia because Yogyakarta is known as an educational center with a socio-culturally diverse Muslim population. Moreover, the Islamic values taught in schools in Yogyakarta align with educational approaches in many other regions of Indonesia. However, further studies in various regions in Indonesia can strengthen external validity. Additionally, the reliance on self-reported data may introduce bias, although efforts were made to mitigate this through the use of trained facilitators and clear instructions. Another limitation is the cross-sectional design, which captures data at a single point in time and does not account for changes over time or the potential influence of longitudinal factors on interpersonal communication skills (Neuliep, 2016). Nevertheless, this study is valuable as it aims to develop a valid and reliable measurement index for interpersonal communication among Muslim students within their cultural context.

RESULTS AND DISCUSSION

Results

The initial analysis revealed that two out of five psychometrics experts agreed on the acceptability of statement items in the MSICS. This process, known as Content Validity Analysis, is conducted to assess the suitability and relevance of an instrument, including its aspects and indicators. This result was derived from an examination of the interrater agreement model parameters. The results of this study incorporate the interrater agreement model and are depicted descriptively in Figure 1.

		Expert 1	
		L.R. (1-2)	H.T. (3-4)
Expert 2	L.R. (1-2)	0	0
	H.T. (3-4)	14	57

Figure 1. Interrater Agreement Model

Description

Figure 1. Interrater Agreement Model

L.R. : Low relevance

H.T. : High relevance

After obtaining quantification, the next step was to determine the expert assessment index using the formula:

$$\text{Expert Assessment Index} = \frac{D}{A+B+C+D} = \frac{57}{0+0+14+57} = 0,802$$

The expert assessment index is 0.802, falling within the range of 0.76-1.00. This indicates that the agreement between the two experts confirms that the MSICS meets the acceptability and suitable for measuring interpersonal communication among junior high school students in Indonesia (Gregory, 2015).

In addition to content validity, this study also examined the construct validity using Rasch Model analysis. The construct validity test using the Rasch Model involved 71 statement items derived from five aspects, as shown in Table 2.

Table 2. Distribution of Items before Conducting Rasch Model Analysis

Variable	Aspect	Number of Item
Interpersonal Communication	Openness	15
	Empathy	11
	Supportiveness	16
	Positiveness	12
	Equality	17
Total		71

The first Rasch Model analysis produced statistical summaries as shown in Table 3. Table 3 provides insights into the respondents' quality, the instrument quality, and the interaction between persons and items. The Person Measure values in Table 3 represent the average respondent scores for the instrument used. As shown in Table 3, the logit value of the Person Measure was 0,61. According to Rasch Model criteria, if the Person Measure value exceeds a logit of 0,0, respondents in this study tended to agree more frequently with statements across various items (Sumintono & Widhiarso, 2013). Cronbach's Alpha measures reliability, specifically the overall interaction between persons and items. As shown in Table 3, the Cronbach's Alpha value was 0,91. According to Rasch Model criteria, this value falls into the 'excellent' category, i.e., >0,8 (Sumintono & Widhiarso, 2013). Person Reliability reflects the consistency of respondents' answers. As shown in Table 3, the Person Reliability value was 0,90. According to the Rasch Model criteria, this value falls into the 'good' category, ranging between 0,81 and 0,90 (Sumintono & Widhiarso, 2013). Item Reliability reflects the quality of items used in the instrument. As shown in Table 3, the Item Reliability value was 0,99. According to Rasch Model criteria, this score falls into the 'outstanding' category (i.e., >0,94).

The subsequent analysis in Table 4 presents the Item Measure results, focusing on items that are the most difficult and the easiest for respondents to agree with. Based on the Item Measure analysis in Table 4, the measure column shows that item number 15 (+1,50 logit) was the most difficult item for respondents to agree with, while item number 5 (-1,31 logit) is the easiest item to be agreed upon by respondents.

Table 3. Summary Statistics

No	Information	Results
1	The person measure	0,61
2	Cronbach's Alpha	0,91
3	Person reliability	0,90
4	Item reliability	0,99

Table 4. Item Measure

Item number	Coefisien Measure	Description
15	1,50	the most difficult item to be agreed
5	-1,31	the easiest item to be agreed

The Rasch model in this study was also used to analyze Item Fit Order to determine item fit and misfit. The results of the Item Fit Order are presented in Table 5. The process of determining item fit and misfit involves summing the MEAN and S.D. values, and comparing them with the INFIT MNSQ values. Logit values greater than the sum of MEAN and S.D. indicate misfitting items (invalid). As shown in Table 5, the ideal logit value was $1,00 + 0,15 = 1,15$. Thus, 10 items fell into the misfit category with higher INFIT MNSQ values. These items include item number 4, 10, 15, 19, 20, 38, 53, 55, 62, and 68. According to the analysis in Table 5, 61 items were found to be fit. The distribution of these items is presented in Table 6.

Table 5. Item Fit Order

Mean=1,00; SD=0,15; Ideal Value Logit=1,00+0,15=1,15

Item number	Coefesien Measure	Description
4	1,20 (>1,15)	Misfit
10	1,17 (>1,15)	Misfit
15	1,20 (>1,15)	Misfit
19	1,50 (>1,15)	Misfit
20	1,19 (>1,15)	Misfit
38	1,19 (>1,15)	Misfit
53	1,18 (>1,15)	Misfit
55	1,16 (>1,15)	Misfit
62	1,28 (>1,15)	Misfit
68	1,19 (>1,15)	Misfit

Table 6. Distribution of Items after Conducting Rasch Model Analysis

Variable	Aspect	Number of Item
Interpersonal Communication	Opennes	12
	Empathy	9
	Supportivenes	15
	Positivenes	11
	Equality	14
Total		61

The results of the Rasch model analysis in this study also indicate unidimensionality. Unidimensionality is used to determine whether the instrument can measure what is intended to measure. The results of unidimensionality analysis are presented in Figure 2.

Table of STANDARDIZED RESIDUAL variance (in Eigenvalue units)

	Empirical	Modeled
Total raw variance in observations =	96.8 100.0%	100.0%
Raw variance explained by measures =	25.8 26.7%	27.5%
Raw variance explained by persons =	5.7 5.9%	6.1%
Raw Variance explained by items =	20.1 20.7%	21.4%
Raw unexplained variance (total) =	71.0 73.3%	72.5%
Unexplned variance in 1st contrast =	9.6 9.9%	13.5%
Unexplned variance in 2nd contrast =	5.7 5.9%	8.0%
Unexplned variance in 3rd contrast =	2.5 2.5%	3.5%
Unexplned variance in 4th contrast =	2.1 2.1%	2.9%
Unexplned variance in 5th contrast =	1.9 2.0%	2.7%

Figure 2. Dimensionality

Based on Figure 2, the raw variance explained by measures obtained by the instrument in this study is 26.7%. This indicates that the instrument meets the unidimensionality requirement, which has a minimum threshold of 20%. Additionally, the unexplained variance ranges from 2.0% to 9.9%, which meets the requirement that it should not exceed 15%. In conclusion, the instrument can measure what is intended to measure.

Discussion

The Rasch model analysis results indicate that the MSICS is capable of accurately measuring Muslim students’ interpersonal skills. Accuracy in psychological measurement is a prerequisite for capturing and describing conditions in individuals, encompassing both attitudes and behaviors (Clark & Watson, 2019; Echevarría-Guanilo et al., 2019). When a psychological measurement tool cannot assess a psychological variable in real-life conditions, it may lead to a disadvantage.

This study contributes to understanding the measurement of interpersonal communication through the development and validation of the Muslim Students' Interpersonal Communication Scale (MSICS). This study presents substantial construct validity and reliability evidence for the MSICS by using the Rasch model in the analysis of the data. These results support the previous research that has identified the value of the Rasch model, especially for developing the culturally and psychometrically appropriate MSICS. This study thus establishes significant psychometric properties to support the validity and reliability of the instrument by applying the Rasch model in the analysis of the MSICS. These findings are consistent with the prior studies that highlight the benefit of the Rasch model, particularly in establishing the culturally and psychometrically valid measures (Pohl et al., 2016). The high person-item reliability index revealed by the MSICS shows that the instrument will thus be able to identify the differences in the level of students' interpersonal communication skills, this makes the MSICS a useful and manageable psychological assessment tool for teachers as well as counsellors.

These findings support the premise that interpersonal communication skills are crucial during adolescent's development. These interpersonal communication skills are crucial for Muslims and other ethnic groups, not only to succeed academically but to foster intercultural and interreligious understanding (Avraamidou, 2019; Ezzani & Brooks, 2019). When validated, MSICS includes dimensions that may be important in fostering mutual, structured, and meaningful altruistic patient-practitioner interactions, including; openness, empathy, maintaining positive attitude and perceived equality (Chen et al., 2019; R'Boul, 2021). Previous literature also highlighted this dimension, stating that it fosters friendly interaction among students and enhances their well-being (Gamble & Gamble, 2020; Rachmi et al., 2024).

The positive aspects of Interpersonal communication among Muslim students shares a spirituality with Islamic teachings that emphasize honesty, respect and kindness. As important as the concept of communication may be, it must be anchored in the principles of respect, as emphasized in the Holy Qur'an and hadith. For example, Surah Al-Hujurat (49:11) encourages Muslims to avoid ridicule people and harsh criticism, and to speak gently. This kind of communication helps build trust, supports social relationships, and fosters a warm educational environment. Further still, the Prophet Muhammad (pbuh) prohibited lying and abusive language, both of which are equally important in fostering a caring and supportive foundation of interpersonal communication (Nasrullah et al., 2017; Wati, 2023).

Rasch model analysis also enriched the knowledge of the researchers, and it was revealed that the items of the MSICS fit the respondents' abilities which confirms the statement that this scale can be used to measure the level of interpersonal communication. This is in agreement with the earlier studies of (Van Zile-Tamsen, 2017), who pointed out that in any populations, well-developed Rasch model scales adequately assess the real essence of the complexities of interpersonal skills. Furthermore, psychometric properties, specifically high reliability and validity coefficients, point to this scale as relevant for practical use and for the subsequent exploration of the potential for improving communication between Muslim students.

Muslim students with high levels of interpersonal communication are likely to experience increased self-efficacy and academic achievement at school (Archiopoli et al., 2016; Tsai & Liu, 2015). Research shows that high interpersonal communication may significantly enhance students' social development (Duz & Aslan, 2020). Moreover, high interpersonal communication skills among Muslim students also boosts self-esteem while reducing conflict with their parents (Mazaheri & Rezakhani, 2017). Interpersonal communication skills of the students can impact different sectors of life, in a positive or negative way. Thus, school counselors should address the issue of interpersonal communication of learners more cautiously.

The findings of this study have important implications for Muslim students' interpersonal communication in both educational and policy contexts. First, this study highlights the need for

a culturally appropriate and valid measurement tool - the Muslim Students' Interpersonal Communication Scale (MSICS), to help educators and counselors assess and support Muslim students' interpersonal communication experiences. This tool can identify specific gaps in student behavior that require guidance and help refine supportive interpersonal strategies to foster a culture of understanding and acceptance in the learning environment (Hattie, 2015; Sellnow, 2021).

Previous studies indicate the need for culturally appropriate instruments in educational research. Nonetheless, the MSICS helps account for ethnic and religious differences among the Muslim students in classroom to ensure unbiased assessment that provides accurate and meaningful results. In addition to the validity of the assessments, this approach promotes fairness in educational practices. The findings can significantly benefit educational centers: curricula and programs need to reflect students' cultural backgrounds to improve educational outcomes (Banks, 2019; Gay, 2018).

Lastly, the application of new psychometric methods, including the Rasch model, in developing educational assessments has been demonstrated as feasible. Thus, strong fit of the Rasch model to MSICS ensures that the instrument aligns with its intended scope while establishing reliability and validity benchmarks for future studies in educational measurement. Such methodological rigor can influence future research using similar methods, hence contributing to the continuous improvement of the assessment tools. Furthermore, using the Rasch model in culturally diverse environments can facilitate the integration of global perspectives into broader and more inclusive educational research (Boone, 2016; Engelhard et al., 2018).

However, some limitations of this study should be acknowledged. This study focused only on junior high school students in Yogyakarta. Therefore, its results cannot be generalized to students from other regions or age groups. Future studies should aim to include samples from different population in order to improve the reliability of the MSICS. However, further qualitative analysis could provide valuable insights into the organizational context within which the scale can be applied and help interpret findings on interpersonal communication among Muslim students. Analyzing human interactions in schools, more specifically in instructional environments, requires more intricate approach incorporating mixed method research designs in education (Creswell & Plano Clark, 2023). Additionally, this study offers several recommendations for future research, including: 1) using a larger sample of Muslim students from both public and private schools in Yogyakarta, 2) involving Muslim students from other regions in Indonesia, and 3) involving Muslim students in other countries.

CONCLUSIONS

Based on the findings of the data analysis using the Rasch Model, it can be concluded that the Muslim Students' Interpersonal Communication Scale (MSICS) meet the aspect of acceptability and accuracy for measuring interpersonal communication among junior high school students in Indonesia. The development of MSICS was guided by five aspects: openness, empathy, supportiveness, positive attitude, and equality. School counselors can use MSICS to assess students' interpersonal communication skills, enabling them to design guidance and counseling programs aimed at improving students' interpersonal communication.

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AUTHOR CONTRIBUTION STATEMENT

The authors in this study have roles and contributions according to their respective expertise. The first author explains the main idea, urgency, instrument design, and data analysis. The second, third, fourth, fifth, and sixth authors checked the conformity of the statements in the instrument with theory and checked the methodology. The seventh author contributed to checking the grammar, methodology, and structure of the manuscript.

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