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Intercultural competence measurement tools for Indonesian students: Adaptation, testing construct validity, and measurement invariance with the MIMIC model

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ABSTRACT

Background: Intercultural competence (IC) is a crucial ability, especially in the current context of increased social mobility and globalization. However, it's alarming that no IC instrument or measurement tool adaptation and psychometric property testing has been found in Indonesia, particularly among the student population. This absence highlights a significant gap in research that needs to be addressed.
Purpose: This study aims to adapt and test the psychometric properties of an intercultural competence instrument for Indonesian students.
Method: 589 students from public and private universities in Indonesia with various socio-demographic backgrounds participated by completing the Intercultural Competence Self-assessment (ICSa) and the Intercultural Effectiveness Scale (IES) that has been adopted into the Indonesian version. The data we obtained from all participants was analyzed using Confirmatory Factor Analysis (CFA) and the MIMIC models.
Findings: The analysis results showed that both instruments meet the model fit index, but the data produced by IES is more susceptible to measurement invariance than ICSa.
Implication: For future research, we suggest 1) exploring the dynamics of socio-demographic variables in the development of students' intercultural competence and 2) Survey studies using IC instruments that we have adapted to consider socio-demographic data as covariates when conducting statistical analysis.

KEYWORDS
intercultural competence self-assessment; intercultural effectiveness scale; MIMIC model

Introduction

Due to increasing social mobility and globalization, intercultural competence is considered a crucial ability for students and more relevant than ever (Dalib et al., 2018; Deardorff, 2011; Sample, 2013; Tsareva et al., 2020). Lack of intercultural competence is associated with negative intergroup contact, triggering prejudice and discrimination that occurs to this day (Hong, 2019; Meleady et al., 2021; Pedersen et al., 2015). For example, ethnic minority students, including multiracial students, are more likely to experience discrimination such as racial essentialization or being seen as members of an outgroup less worthy of affection and assistance, invalidation of racial identity through external imposition of a new identity, and marginalization (Museus et al., 2016; Stevens et al., 2018). A prolonged conflict involving groups of migrant students also occurred in Indonesia between students from Ambon, Maluku, and Sumba, which resulted in their forced return to their hometown (Pratama, 2017). Likewise, there is a tendency for Javanese students as local societies to discriminate based on their prejudice against students from East Nusa Tenggara (Adelina et al., 2017).

Not only relational impacts, but students can also experience stress and depression due to cultural problems because they are in an acculturation situation or are having intercultural

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meetings in the same environment (Brice, 2021; Gonzalez-Guarda et al., 2021; Kam & Lazarevic, 2014; Piña-Watson et al., 2015; Pratama & Arlianto, 2023). A person experiences stress or depression in an intercultural situation due to the lack of ability to undergo the adaptation process in a new cultural environment (Arbona et al., 2010). Difficulties in adapting to a new cultural environment that is often encountered include 1) following a system of values, norms, and rules and 2) behaving, speaking, and dressing like local people, both of which are entirely new or different from the previous environment (Brice, 2021). There are relational and personal impacts, so students need to develop competencies to create peace, and shared goals are also essential, especially in Asian countries (Browne et al., 2013; Bynner, 2016).

The intercultural competence (IC) concept was developed by Deardorff (2006, 2015) as an ability based on intercultural knowledge, skills, and attitudes to communicate effectively and appropriately in intercultural situations. Previous research also found several other conceptual terms relevant to IC, including cross-cultural effectiveness, cross-cultural adaptation, global competence, cultural competence, multicultural competence, intercultural agility, and intercultural effectiveness (Deardorff, 2015; Hammer, 2015; Lantz-Deaton & Golubeva, 2020; Portera, 2014). However, United Nations Educational, Scientific and Cultural Organization (The United Nations Educational Scientific And Cultural Organization [UNESCO], 2013) prefers to advocate for IC to be owned by people living in bicultural or multicultural environments because IC involves cultivating deep cultural awareness and understanding (i.e., how one's beliefs, values, perceptions, interpretations, judgments, and behaviors are influenced by one's cultural community or communities) and increased understanding of other cultures (i.e., understanding of the different ways people from other cultural groups understand and respond to cultural differences) (Hammer, 2015).

Deardorff (2006, 2015) developed an IC theoretical model consisting of components of knowledge, attitudes, skills, and desired internal-external outcomes. Attitudes in intercultural competence include a sense of respect or appreciation for other people, curiosity to learn about different cultures, openness, which means refraining from judging or making assumptions about others, and tolerance. Attitudes are improved by how much knowledge they have about other cultures (values and norms), language (grammar and vocabulary), and context, including history, literature/cultural artifacts, political/economic/religious systems, and influences in other cultures. Finally, skill dimensions must be mastered in intercultural situations, such as listening and carefully observing the content of interactions, critical self-reflection, seeing from other people's perspectives, and communicating verbally and non-verbally.

Although the definition and components of IC that are needed in the development of measuring tools to assess IC students have been found, most of them are inconsistent because an integral component of IC is culture itself, which is often different in each study (Griffith et al., 2016; Sabet & Chapman, 2023). A literature study by Matsumoto and Hwang (2013) found ten instruments to measure cross-cultural or intercultural competence (see Table 1), with the finding that several tests were inadequate because they had limited cross-cultural sample coverage. Apart from these ten, many other instruments are reported to have met psychometric property standards, such as the Intercultural Effectiveness Scale (Bates & Rehal, 2017; Portella & Chen, 2010), the Global Perspective Inventory (Braskamp et al., 2014), and Test to Measure Intercultural Competence (Schnabel et al., 2015).

Based on previous psychometric studies of ten instruments, no psychometric property testing has been found on these instruments in Indonesia, especially among the student population. Moreover, the meaning of cultural background according to Indonesian society is different from that of international society, who tend to differentiate culture based on ethnicity as a social organization or group (Kistanto, 2017), not nationality or citizenship, as in previous research. We only found a few previous studies involving Indonesian participants to explore IC or other concepts relevant to teachers or lecturers (Abduh & Rosmaladewi, 2018; Idris, 2021; Melati

et al., 2021) Indonesian workers in international workgroups (Panggabean et al., 2013), and Indonesian students in the UK (Lugman, 2023).

This research aims to adapt and investigate the construct validity of two intercultural competency measurement instruments, the Intercultural Competence Self-assessment (ICSa) and Intercultural Effectiveness Scale (IES), which has been tested in previous research. We chose ICSa because it is the first model of IC from Deardorff (2006) and was also created based on the needs of higher education levels, so it is considered effective in measuring students' level of intercultural

Table 1
Existing Instruments of Cross-cultural or Intercultural Competence

Instrument	Number of Items	Sample Participants in Respective Studies
Cross-Cultural Adaptability Inventory (CCAI)	50	CCAI was administered to 45 students from five European universities located in Kosovo, Czech Republic, Poland, Belgium, and Malta (Sylwia et al., 2024); 16 students took psychology study abroad programs in Europe (Zayac et al., 2021); and 18 student teachers in the U.S (King et al., 2022).
Cross-Cultural Sensitivity Scale (CCSS)	24	Koc et al. (2021) administered the CCSS to 1195 students at a Turkish university.
Cultural Quotient Scale (CQS)	20	The construct validity of the CQS was tested involving 286 students from 30 countries (van Dyne et al., 2012).
Behavioral Assessment Scale for Intercultural Communication Effectiveness (BASIC)	9	Graf and Harland (2005) administered the BASIC to 188 MBA students at a Midwestern U.S. university.
Intercultural Adjustment Potential Scale (ICAPS)	55	Evidence for the construct validity of ICAPS involving 357 individuals from the U.S., the Republic of China, South Korea, and France (Matsumoto & Hwang, 2020).
Intercultural Communication Competence (ICC)	10	Gonçalves et al. (2020) demonstrated the construct validity of ICC in a study involving 588 participants of Portuguese nationality.
Intercultural Sensitivity Inventory (ICSI)	46	Gómez Yepes et al. (2023) validated the ICSI construct using a Spanish sample of 872 participants
Intercultural Development Inventory (IDI)	50	Hammer (2011) administered a 50-item IDI to 4,763 respondents from 11 cultural groups
Intercultural Sensitivity Scale (ISS)	24	Hajeer et al. (2023) tested the construct validity of the ISS on 361 Hungarian university students.
Multicultural Personality Questionnaire (MPQ)	78	Evidence for the construct validity of MPQ involving 842 participants from four different cultures: Hungarian, Czech Republic, Serbia, and Germany (Genkova et al., 2021).

competence (Lantz-Deaton & Golubeva, 2020). IES is the second instrument we chose because it was developed from an intercultural effectiveness model (Portella & Chen, 2010). Although the model is different, it is still relevant to IC and was proven to meet psychometric properties when tested on international students (Bates & Rehal, 2017; Hammer, 2015). The use of these two instruments refers to the recommendations of Lantz-Deaton and Golubeva (2020) to gain more general insight into IC and as a method to avoid measurement inconsistencies in different IC models (Griffith et al., 2016; Sabet & Chapman, 2023).

Matsumoto and Hwang (2013) found some IC tests were inadequate because they did not use criteria or other variables (e.g., demographic or ecological variables) to test psychometric properties. Therefore, we tested measurement invariance in the data obtained from the two instruments using the Multiple Indicators Multiple Cause (MIMIC) model, which is an extension of the structural equation model (Wang & Wang, 2020) after testing construct validity with confirmatory factor analysis (CFA). Invariance testing with the MIMIC model will help check whether an instrument produces biased data due to population heterogeneity as a covariate (Widhiarso, 2012). Ultimately, this study will provide information about IC measurement tools that are more adequate or can produce reliable, valid data and are not affected by measurement invariance.

Method

Stage 1 of the Study: Lingua-Cultural Adaptation of ICSa and IES

Instrument 1: Intercultural Competence Self-assessment (ICSa). This self-assessment instrument is recommended by Lantz-Deaton and Golubeva (2020) because it was created based on the needs of higher education levels, so it is considered effective in measuring students' intercultural competence. Lantz-Deaton and Golubeva (2020) designed the Intercultural Competence Self-assessment (ICSa) by adapting the unidimensional model of intercultural competence from Deardorff (2006) where this model moves from individual-level attitudes (respect, openness, curiosity, and discovery), as well as personal attributes (knowledge and understanding of culture) to the interactive level of culture to internal outcomes (empathy, adaptability, flexibility) and external outcomes (cultural humility, challenging discrimination, promoting inclusion). This instrument consists of 14 questions and has a range of answer choices from not sure (scored 0) to very high (scored 5) in each question. Some examples of item contents that are still original or have not been modified include: (a) "To what extent do you understand the meaning behind the word culture?"; (b) "To what extent do you believe that those who hold cultural values other than yours should be respected?"; and (c) "To what extent are you comfortable changing your behavior or communicating to make an intercultural interaction more positive, effective, and appropriate?".

Instrument 2: Intercultural Effectiveness Scale (IES). This scale was developed by Portella and Chen (2010) and retested by Bates and Rehal (2017) on a sample of international students. The Intercultural Effectiveness Scale (IES) has five dimensions, including behavioral flexibility (BFL), interaction relaxation (IRX), interactant respect (IRS), message skills (MSS), identity maintenance (IMT), and interaction management (IMM) (Portella & Chen, 2010). The five dimensions of the IES have different numbers of items: BFL has four items, IRX five items, three items each in IRS, MSS, IMT, and only IMM has two items. Overall, the IES has 20 items in Likert form with five response options (1 = strongly disagree; 5 = strongly agree) for each item. Examples of original item contents include: (a) "I find it is easy to talk with people from different cultures"; (b) "I often miss parts of what is going on when interacting with people from different cultures."; and (c) "I find it is easy to identify with my culturally different counterparts during our interaction."

Procedure. ICSa and IES were adapted to the Indonesian version by referring to the procedures from Beaton et al. (2000), including forward translation, synthesis, back translation,

expert committee review, and pre-testing. The translation stage of the original ICSa and IES items was carried out by two translators who have good skills and master's qualifications in English. The translated words are then synthesized or adapted to potential participants' research objectives and characteristics. At the synthesis stage, five raters or experts were asked to measure the content, concepts, and language suitability between the original ICSa and IES items and the translation results. The experts consisted of two translators with a master's degree in English education and five psychologists (one doctoral and four master's degrees) with measurement and social psychology competencies. Items deemed appropriate by the experts are then translated from Indonesian to English by professional translators with master's qualifications in English.

The results of content validity analysis using the Aiken V formula show a good level of content-validity coefficient from the experts involved in assessing the suitability of content, concepts, and language between the original and translated versions of the two instruments. On the 14 items of ICSa, the V score obtained by each item was between 0.813 – 0.841, while the 20 items of IES obtained a V score between 0.804 – 0.833. The content validity results ensure that the translated ICSa and IES items have the potential to measure students' intercultural competence because they are relevant to the constructs or behavioral indicators underlying the two instruments.

The final stage is the pre-test stage, which aims to verify the accuracy of the items that have passed the previous stages related to the clarity of the test instructions and understanding of the items. Before starting the trial, we created a draft ICSa and IES in an online version using the Microsoft Forms platform. The choice of using an online format is because this method can help to improve the research process by expanding the range of participants (Creswell & Creswell, 2018). Next, fifteen students from the psychology undergraduate program were asked to read the draft ICSa and IES and provide feedback. After reading the draft, the fifteen students reported that they did not experience any problems accessing it and could understand the instructions and content of each item. The advice given to us was to increase the size of the words and correct any typos they found. After revising the draft as suggested, the Indonesian version of the ICSa and IES was complete and ready for use. Therefore, the stage of lingua-cultural adaptation to the Indonesian version was completed, and a psychometric property test was carried out.

Stage 2 of the Study: Psychometric Properties of ICSa and IES Indonesian Version

Participants. Participants in this stage were obtained using convenience sampling techniques or selecting participants based on their willingness and availability or ease of access to participate in the research, but they had to pass general criteria (Morling, 2020). All participants have passed the general criteria that we have set, including Indonesian citizens aged between 18 – 30 years, and have active status as students in undergraduate programs (S1) at universities in Indonesia. We got 589 participants, consisting of 428 women and 161 men, with an average age of 20.7 (*SD* = 1.67). Of these, 342 were students at state universities, and 247 were private universities. Most participants are currently in their second or third year of study (*n* = 461 students), others are in their fourth year or above (*n* = 128 students). We also obtained information about ethnicity (*n* = 232 Javanese students, 357 non-Javanese students), religion (*n* = 448 Muslim students, 141 non-Muslim students), and current domicile status (*n* = 286 local students, 303 migrant students).

Data Analyses. The data that has been collected will be tested for internal consistency reliability using the Cronbach Alpha formula with JAMOVI version 2. Apart from the reliability coefficient, this formula will also help researchers get the item-rest correlation score. Kotian et al. (2022) recommend a minimum reliability coefficient index of .700, and the item-rest correlation exceeds .300.

Data on items that have gone through reliability analysis will then be used to test the validity of the construct using the confirmatory factor analysis (CFA) method. An item score can explain the latent variable if it has a loading factor of at least 0.300 (Brown, 2015; Ondé & Alvarado, 2020).

Finally, we applied Multiple Indicator Multiple Cause (MIMIC) analysis, which is an extension of CFA by involving covariates in the model to see measurement invariance in the data (Wang & Wang, 2020). The MIMIC model tries to facilitate population heterogeneity involving a set of predictors or covariates in the model (Muthén, 1989) so that it can be applied to smaller sample sizes (Widhiarso, 2012). The MIMIC model is also needed because if the scale is susceptible to population heterogeneity (demographic background, socio-economic status, and environment) as a covariate variable, it will tend to produce biased information (De Los Reyes et al., 2022). We used the MPlus version 7 for the CFA and MIMIC models.

Mplus provides numbers of model fit indices for analysis methods and estimations. This study excludes the Chi-square statistic because it is sensitive to sample size and non-normality distribution (Bergh, 2015; Brace & Savalei, 2017). Wang and Wang (2020) suggest the Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR) as model fit indices. The model had CFI and TLI values in the range of 0.90 and 0.95, the RMSEA below 0.06, and the SRMR below 0.08, which could be identified as a fit model (Kline, 2016).

Even though TLI, CFI, and RMSEA are commonly reported in research, it is still expected to find that among the three indices, one may be appropriate to the data, and others are not (Wang & Wang, 2020). Previous studies found that CFI scores were inconsistent with RMSEA or SRMR, so it cannot be automatically decided that a model is unfit (Lai & Green, 2016; Shi et al., 2020). Therefore, we also refer to the results of testing previous model fit indices where RMSEA and SRMR are more considered in assessing model fit (Montoya & Edwards, 2021; Mutiah et al., 2023; Shi et al., 2020) with a standard cut-point as in general.

The mentioned socio-demographic variables about intercultural competence were used as a covariate in the MIMIC model (see Table 2). We created some dummy socio-demographic variables as covariates and selected a referred group to be compared with other groups. The dummy socio-demographic variables consisted of gender (females as a referred group), religion (Islam as a referred group), ethnicity (Java as a referred group), domicile status (local student as a referred group), university status (state universities as a referred group), and current year of study (2nd & 3rd years as a referred group). To accommodate all participants, we included several non-Muslim religions in a single group and several non-Java ethnicities because each group of covariates contains at least 100 samples (Woods & Edwards, 2007).

Table 2
Characteristics of The Study Sample

Covariates		*n*	%
Gender	Female	428	72.7
	Male	161	27.3
Religion	Islam	448	76.1
	Non-Muslim	141	23.9
	Catholic	74	
	Protestant	60	
	Hindu	3	
	Budha	4	
Ethnic	Java	232	39.4
	Non-Java	357	60.6
	Ambon	10	
	Arab	2	
	Bali	4	
	Banjar	3	
	Batak	7	

Table 2. (*continued*)

	Betawi	39	
	Bugis	10	
	Dani	2	
	Dayak	2	
	Gayo	1	
	Gorontalo	2	
	Madura	8	
	Manggarai	8	
	Melayu	31	
	Minang	17	
	Samin	2	
	Sasak	34	
	Sumba	79	
	Sumbawa	12	
	Sunda	60	
	Tanimbar	3	
	Tidore	1	
	Timor	13	
	Tionghoa	6	
	Toraja	1	
Domicile status	Local students	286	48.6
	Migrant students	303	51.4
University status	State Universities	342	58.1
	Private Universities	247	41.9
Current year of study	2nd & 3rd years	461	78.3
	4th year and above	128	21.7

Result and Discussion

Results of the Study Stage 1

The first stage of the study focused on lingua-culturally translating the Intercultural Competence Self-assessment (ICSa) and the Intercultural Effectiveness Scale (IES) from English to Indonesian. Translation encompassed forward translation, synthesis, back translation, expert reviews, and pilot studies (Beaton et al., 2000). After going through all the phases, we obtained the result of the adaptation process for the Indonesian language and culture of ICSa (see Table 3) and IES (see Table 4) in the Indonesian Version.

Table 3

The Results of Lingua-Cultural Translation of ICSa

No	Label	Questions
1	ICSa_1	*Sejauh mana Anda memahami makna di balik kata 'budaya'?* (To what extent do you understand the meaning behind the word culture?)
2	ICSa_2	*Sejauh mana Anda percaya bahwa mereka yang memiliki nilai budaya berbeda dengan Anda harus dihormati?* (To what extent do you believe that those who hold cultural values other than your own should be respected?)
3	ICSa_3	*Sejauh mana Anda terbuka untuk belajar dari orang-orang yang berasal dari latar belakang budaya berbeda?* (To what extent are you open to learning from people who are from culturally different backgrounds?)

Table 3. (*continued*)

4	ICSa_4	*Sejauh mana Anda merasa ingin tahu tentang orang-orang yang melakukan hal-hal berbeda dan Anda ingin mempelajarinya lebih lanjut?* (To what extent do you find yourself feeling curious about people who do things differently from you and want to explore this further?)
5	ICSa_5	*Sejauh mana Anda mampu menempatkan diri pada posisi orang lain untuk membayangkan, 'bagaimana melihat dunia bila menjadi mereka'?* (To what extent are you able to put yourself in another person's shoes to imagine how you might see the world if you were them?)
6	ICSa_6	*Seberapa baik Anda mengatasi kondisi ketika tidak memahami aksen/logat atau perilaku orang lain, sehingga Anda tidak yakin bagaimana seharusnya berperilaku?* (How well do you cope when you do not understand someone else's accent or behavior or are unsure how to behave yourself?)
7	ICSa_7	*Sejauh mana Anda nyaman mengubah perilaku Anda atau cara berkomunikasi untuk membuat sebuah interaksi antarbudaya menjadi lebih positif, efektif, dan sesuai?* (To what extent are you comfortable changing your behavior or communicating to make an intercultural interaction more positive, effective, and appropriate?)
8	ICSa_8	*Sejauh mana Anda berusaha untuk mengenal orang lain yang berbeda dengan Anda atau belajar tentang budaya lain secara umum?* (To what extent do you try to get to know others who are different from you or to learn about other cultures more generally?)
9	ICSa_9	*Bila seseorang berperilaku dengan cara yang Anda anggap tidak menyenangkan atau aneh, sejauh mana Anda bersedia menahan diri untuk tidak menghakimi dan menyebut orang tersebut aneh?* (If someone behaves in a way you find unpleasant or strange, to what extent are you willing to suspend judgment and not pronounce the person as strange or weird?)
10	ICSa_10	*Seberapa baik Anda mengetahui latar belakang budaya sendiri, dan memahami bagian-bagian paling penting dari identitas Anda, serta sejauh mana menyadari bias yang Anda miliki terhadap orang lain?* (How well do you know your own cultural background and understand the most salient parts of your identity, and to what extent are you aware of the biases that you hold towards others?)
11	ICSa_11	*Sejauh mana Anda merasa sadar akan pikiran dan perasaan Anda maupun orang lain, serta memiliki kendali atas tindakan diri sendiri?* (To what extent do you feel aware of your thoughts and feelings, in control of your actions, and mindful of the thoughts and feelings of others?)
12	ICSa_12	*Sejauh mana Anda merasa sadar akan pikiran dan perasaan Anda maupun orang lain, serta memiliki kendali atas tindakan diri sendiri?* (To what extent are you able to look at intercultural situations in a dispassionate, fair, and objective way? Do you look for multiple explanations for situations and weigh alternatives before drawing conclusions?)
13	ICSa_13	*Menurut Anda, seberapa rendah hati Anda?* *Dengan kata lain, Anda cenderung memandang budaya sendiri lebih unggul dibandingkan budaya lain atau lebih percaya bahwa budaya Anda juga memiliki kelemahan.*

Table 3. (*continued*)

		(How humble do you believe that you are? In other words, do you view your culture as superior to others or do you believe your own culture also has its flaws?)
14	ICSa_14	*Sejauh mana Anda bersedia untuk menantang atau melawan sikap, perilaku, dan gambaran orang lain yang merendahkan martabat serta kehormatan mereka sendiri?* (To what extent are you willing to challenge attitudes, behaviors, and representations of others which undermine their dignity and respect?)

Table 4

The Results of Lingua-Cultural Translation of IES

No	Label	Statements
1	IRX_1	*Saya merasa mudah berbicara dengan orang dari budaya yang berbeda.* (I find it easy to talk with people from different cultures)
2	BFL_1	*Saya takut mengekspresikan diri saat berinteraksi dengan orang dari budaya yang berbeda.* (I am afraid to express myself when interacting with people from different cultures)
3	IRX_2	*Saya merasa mudah bergaul dengan orang dari budaya yang berbeda.* (I find it easy to get along with people from different cultures)
4	BFL_2	*Saya terlihat berbeda atau tidak selalu menjadi pribadi yang sama ketika berinteraksi dengan orang dari budaya berbeda.* (I am not always the person I appear to be when interacting with people from different cultures)
5	IMM_1	*Saya mampu mengekspresikan ide-ide saya dengan jelas ketika berinteraksi dengan orang dari budaya yang berbeda.* (I am able to express my ideas clearly when interacting with people from different cultures)
6	MSS_1	*Saya memiliki masalah dengan tata bahasa ketika berinteraksi dengan orang dari budaya yang berbeda.* (I have problems with grammar when interacting with people from different cultures)
7	IMM_2	*Saya mampu untuk menjawab pertanyaan dengan efektif ketika berinteraksi dengan orang dari budaya yang berbeda.* (I am able to answer questions effectively when interacting with people from different cultures)
8	IMT_1	*Saya merasa sulit untuk merasakan bahwa rekan yang berasal dari budaya lain mirip dengan saya.* (I find it difficult to feel my culturally different counterparts are similar to me)
9	IRS_1	*Saya menggunakan kontak mata yang sesuai atau tepat ketika berinteraksi dengan orang dari budaya yang berbeda.* (I use appropriate eye contact when interacting with people from different cultures)
10	MSS_2	*Saya memiliki masalah membedakan antara pesan informatif atau persuasif ketika berinteraksi dengan orang dari budaya yang berbeda.* (I have problems distinguishing between informative and persuasive messages when interacting with people from different cultures)
11	IRX_3	*Saya selalu tahu bagaimana untuk memulai percakapan ketika berinteraksi dengan orang dari budaya yang berbeda.*

Table 4. (*continued*)

		(I always know how to initiate a conversation when interacting with people from different cultures)
12	MSS_3	*Saya sering melewatkan beberapa bagian dari apa yang sedang terjadi saat berinteraksi dengan orang dari budaya yang berbeda.* (I often miss parts of what is going on when interacting with people from different cultures)
13	IRX_4	*Saya merasa relaks atau tidak tegang ketika berinteraksi dengan orang dari berbagai budaya.* (I feel relaxed when interacting with people from different cultures)
14	BFL_3	*Saya sering berperilaku seperti orang yang sangat berbeda ketika berinteraksi dengan orang dari budaya yang berbeda.* (I often act like a very different person when interacting with people from different cultures)
15	IRS_2	*Selama kami berinteraksi, saya selalu menunjukkan rasa hormat terhadap rekan yang berbeda budaya.* (I always show respect for my culturally different counterparts during our interaction)
16	IMT_2	*Selama kami berinteraksi, saya selalu merasa ada jarak dengan rekan dari budaya berbeda.* (I always feel a sense of distance with my culturally different counterparts during our interaction)
17	IMT_3	*Selama kami berinteraksi, saya merasa memiliki banyak kesamaan dengan rekan yang berbeda budaya.* (I find I have a lot in common with my culturally different counterparts during our interaction)
18	BFL_4	*Saya menemukan cara terbaik untuk berperilaku adalah menjadi diri sendiri ketika berinteraksi dengan orang dari budaya yang berbeda.* (I find the best way to act is to be myself when interacting with people from different cultures)
19	IRX_5	*Saya merasa mudah untuk mengidentifikasi atau menentukan identitas diri ketika berinteraksi dengan rekan dari budaya yang berbeda.* (I find it is easy to identify with my culturally different counterparts during our interaction)
20	IRS_3	*Selama kami berinteraksi, saya selalu menunjukkan rasa hormat terhadap pendapat rekan dari budaya berbeda.* (I always show respect for the opinions of my culturally different counterparts during our interaction)

Notes. Items number 2, 4, 6, 8, 10, 12, 14, 16, and 18 are reverse-scored items.

Results of the Study Stage 2

Internal Consistency Reliability. Table 5 presents the internal consistency reliability of the ICSa and IES by conducting the single-trial administration approach. First, ICSa can produce data with good internal consistency ($\alpha = 0.883 > 0.700$), and the item-rest correlation score for each item is acceptable because it is above 0.300 with a range from 0.376 to 0.554. Second, the internal consistency reliability of IES is carried out per dimension because this instrument has a multidimensional construct consisting of six factors, with each contributing between 2.9% - 22.4% of the common variance (Portella & Chen, 2010), so the use of the alpha-stratified formula is more appropriate (Widhiarso & Ravand, 2014). The results obtained for each dimension, the item-rest correlation scores of items BFL_4, IMT_1, IMT_2, and IMT_3 are deficient, leading to low

α scores of the BFL and IMT. We tried to re-analyze without including the items with the lowest item-rest correlation scores BFL_4 (-0.065) and IMT _3 (-0.043) in the analysis so that we obtained results of increasing BFL and IMT α scores, and all items in both dimensions had item-rest correlation > 0.300. The overall internal consistency of IES is calculated using the stratified Alpha formula with a result of 0.788 (α strata > 0.700), which means this scale also has good internal consistency. Based on these results, we decided not to use data items BFL_4 and IMT_3 in further analysis.

Table 5
Internal Consistency Reliability Result

ICSa			IES				
Items	Item-rest correlation	α	Items	Item-rest correlation	α	Modified Item-rest correlation	Modified α
ICSa		0.833	BFL		0.488		0.668
ICSa_1	0.429		BFL_1	0.344		0.369	
ICSa_2	0.462		BFL_2	0.429		0.557	
ICSa_3	0.413		BFL_3	0.476		0.524	
ICSa_4	0.452		BFL_4	-0.065			
ICSa_5	0.505		IRX		0.676		
ICSa_6	0.468		IRX_1	0.457			
ICSa_7	0.490		IRX_2	0.463			
ICSa_8	0.554		IRX_3	0.486			
ICSa_9	0.468		IRX_4	0.438			
ICSa_10	0.471		IRX_5	0.321			
ICSa_11	0.534		IRS		0.607		
ICSa_12	0.504		IRS_1	0.323			
ICSa_13	0.376		IRS_2	0.508			
ICSa_14	0.450		IRS_3	0.442			
			MSS		0.582		
			MSS_1	0.441			
			MSS_2	0.373			
			MSS_3	0.368			
			IMT		0.271		0.511
			IMT_1	0.237		0.344	
			IMT_2	0.269		0.344	
			IMT_3	-0.043			
			IMM		0.537		
			IMM_1	0.367			
			IMM_2	0.367			

Confirmatory Factor Analysis. Before conducting CFA, we performed a multivariate non-normality test on all data from both instruments to determine the appropriate estimator method in Mplus (Wang & Wang, 2020). The results show that the multivariate skewness test ($p < .001$) and kurtosis tests ($p < .001$) are statistically significant, which means the multivariate normality assumption is violated in the research data. Thus, we chose the robust maximum likelihood (MLR) estimator method, which is considered capable of handling non-normality data (Li, 2016; Muthén, 1984, 2004; Wang & Wang, 2020).

CFA is used separately between ICSa and IES data. The CFA results on ICSa show that the unidimensional model of this instrument is fit because it meets all model fit indices (RMSEA =

0.042, SRMR = 0.047, CFI = 0.921, TLI = 0.906). Likewise, IES's multidimensional model is acceptable because three of the four model fit indices are met (RMSEA = 0.044, SRMR = 0.048, CFI = 0.921), even though the TLI = 0.888 < 0.900. The model fit indices fulfilled in ICSa and IES are also supported by factor loadings on each item (see Table 6). All items have factor loadings that exceed the cut-point of standardized factor loadings, which is 0.300 (Brown, 2015; Ondé & Alvarado, 2020).

Table 6
Factor Loading (β) of ICSa and IES

ICSa model		IES model	
Items	β	Items	β
ICSa_1	0.468	BFL	
ICSa_2	0.516	BFL_1	0.549
ICSa_3	0.466	BFL_2	0.684
ICSa_4	0.506	BFL_3	0.707
ICSa_5	0.563	IRX	
ICSa_6	0.515	IRX_1	0.542
ICSa_7	0.549	IRX_2	0.626
ICSa_8	0.618	IRX_3	0.596
ICSa_9	0.517	IRX_4	0.517
ICSa_10	0.514	IRX_5	0.461
ICSa_11	0.582	IRS	
ICSa_12	0.551	IRS_1	0.434
ICSa_13	0.403	IRS_2	0.748
ICSa_14	0.483	IRS_3	0.653
		MSS	
		MSS_1	0.657
		MSS_2	0.507
		MSS_3	0.537
		IMT	
		IMT_1	0.567
		IMT_2	0.606
		IMM	
		IMM_1	0.656
		IMM_2	0.559

MIMIC Model. The MIMIC model analysis is used in the ICSa and IES models because this analysis explicitly tests an instrument's vulnerability to population heterogeneity (Widhiarso, 2012). We created six covariate groups as population heterogeneity that we used in the MIMIC model, including gender, religion, ethnicity, domicile status, university status, and current year of study. Woods and Edwards (2007) recommend that each group contain at least 100 samples, where in this study, the lowest covariate group is the current year of study category, which is the 4th year and above (n = 128, see Table 2).

As shown in Table 7, the effects of socio-demographic covariates differ for the MIMIC model of ICSa and MIMIC model of IEC, but all factor loadings remain substantial and statistically significant. The MIMIC model of ICSa can still be said to fit when referring to RMSEA (0.049 < 0.060) and SRMR (0.057 < 0.080) because these two indices are more considered in assessing model fit with a threshold as in general (Montoya & Edwards, 2021; Mutiah et al., 2023; Shi et al., 2020). For The MIMIC model of IES, three model fit indices were met (CFI = 0.902, RMSEA = 0.039, and SRMR = 0.041) except TLI = 0.875 < 0.900.

Table 7
Factor Loadings and Fit Indices of The MIMIC Model

MIMIC Model of ICSa		MIMIC Model of IES	
Items	β	Items	β
ICSa_1	0.469	BFL	
ICSa_2	0.515	BFL_1	0.557
ICSa_3	0.465	BFL_2	0.681
ICSa_4	0.505	BFL_3	0.700
ICSa_5	0.561	IRX	
ICSa_6	0.517	IRX_1	0.544
ICSa_7	0.552	IRX_2	0.629
ICSa_8	0.615	IRX_3	0.589
ICSa_9	0.518	IRX_4	0.519
ICSa_10	0.515	IRX_5	0.460
ICSa_11	0.582	IRS	
ICSa_12	0.550	IRS_1	0.450
ICSa_13	0.402	IRS_2	0.749
ICSa_14	0.486	IRS_3	0.641
Model fit		MSS	
TLI	0.819	MSS_1	0.662
CFI	0.840	MSS_2	0.512
RMSEA	0.049	MSS_3	0.528
SRMR	0.057	IMT	
		IMT_1	0.529
		IMT_2	0.649
		IMM	
		IMM_1	0.655
		IMM_2	0.560
		Model fit	
		TLI	0.875
		CFI	0.908
		RMSEA	0.039
		SRMR	0.041

The effects of the six socio-demographics on latent factors in ICSa and IES have also been determined (see Table 8). Five of the six socio-demographic covariates did not significantly affect ICSa, except for the male gender covariate (β = 0.422, *p* = .000), indicating that male students had higher ICSa latent scores than female students. In IES, socio-demographic effects differ for each latent factor, including: 1) Male students are known to have more latent scores for interaction relaxation (IRX: β = 0.208, *p* = .000) and interaction management (IMM: β = 0.183, *p* = .002) higher than female students; 2) There is a negative effect of religion status as non-Muslim on behavioral flexibility (BFL: β = -0.155, *p* = .032) and message skills (MSS: β = -0.170, *p* = .025) in other words, Muslim students have higher scores on both measures of ability; 3) Private university status has a significant negative influence on identity maintenance (BMI: β = -0.281, *p* = .000), which means that students at state universities can maintain their identity than those studying at private universities; 4) Status as a migrant student is the covariate most related to the IES latent factor, namely migrant student status has a positive effect on interaction relaxation (IRX: β = 0.149, *p* = .004). A negative effect was also found on immigrant student status on behavioral flexibility (BFL: β = -0.122, *p* = .023) and identity maintenance (BMI: β = -0.281, *p* = .000). In other words, local students will be more able to behave flexibly and maintain their identity. In general, ethnicity and

the current year of study are covariates that do not affect the latent factors of ICSa and IES. Likewise, interactant respect (IRS) is the only latent factor not affected by the six covariates.

Table 8
The Impact of Covariates on ICSa and IES Latent Factors

Predictor	MIMIC Model		
	β	*SE*	*p*
ICSa			
Male	0.190	0.048	.000
Non-Muslim	-0.056	0.061	.357
Non-Java	-0.001	0.043	.980
Migrant Students	0.058	0.047	.216
Private Universities	-0.041	0.050	.416
4th year and above	-0.048	0.047	.314
BFL			
Male	-0.024	0.052	.641
Non-Muslim	-0.155	0.072	.032
Non-Java	-0.064	0.054	.235
Migrant Students	-0.122	0.054	.023
Private Universities	0.035	0.057	.547
4th year and above	-0.027	0.053	.618
IRX			
Male	0.208	0.048	.000
Non-Muslim	0.113	0.067	.091
Non-Java	-0.018	0.053	.732
Migrant Students	0.149	0.052	.004
Private Universities	-0.014	0.059	.806
4th year and above	0.043	0.051	.393
IRS			
Male	0.038	0.057	.505
Non-Muslim	-0.117	0.070	.097
Non-Java	-0.033	0.050	.511
Migrant Students	0.070	0.055	.206
Private Universities	-0.069	0.055	.214
4th year and above	0.059	0.053	.262
MSS			
Male	0.044	0.056	.425
Non-Muslim	-0.170	0.076	.025
Non-Java	-0.080	0.056	.155
Migrant Students	-0.004	0.056	.949
Private Universities	-0.094	0.063	.135
4th year and above	-0.093	0.056	.096
IMT			
Male	-0.002	0.058	.976
Non-Muslim	-0.118	0.078	.130
Non-Java	-0.027	0.055	.630
Migrant Students	-0.166	0.056	.003
Private Universities	-0.281	0.065	.000
4th year and above	-0.006	0.058	.924

Table 8. (*continued*)

IMM			
Male	0.183	0.059	.002
Non-Muslim	0.148	0.078	.059
Non-Java	0.002	0.056	.973
Migrant Students	0.055	0.058	.345
Private Universities	-0.058	0.062	.345
4th year and above	0.043	0.058	.454

After obtaining a statistically significant MIMIC model from the covariates to the latent factors, we looked at the modification index (MI) to see if there were significant Beta scores from the covariates directly to the individual items (Cheng et al., 2016). Reviewing the MI results, no suggestions indicated the need to add direct regression from covariates to items. These findings indicate no differential item function (DIF) on the ICSa and IES. In other words, all items can accurately estimate the measured construct and minimize the influence of extraneous factors, thereby reducing testing bias (Opariuc-Dan et al., 2017; Su & Tsai, 2019).

Discussion

The adaptation stage of the original ICSa and IES has been carried out (Beaton et al., 2000) involving experts in the fields of language and psychology. Its limited trials have also been conducted, and the final draft of the Indonesian version of the ICSa and IES has been produced. Furthermore, the Indonesian versions of both instruments were analyzed for their psychometric properties. The analysis results found that the measurement model has been empirically confirmed with our empirical data, indicating the Indonesian versions of both instruments have an internal structure similar to the original ICSa (Lantz-Deaton & Golubeva, 2020) and IES (Portella & Chen, 2010). Nevertheless, the total number of IES items utilized to validate the model deviated from the original because two items had item-rest correlation scores beneath the 0.300 threshold (Kotian et al., 2022).

In the internal consistency reliability analysis, BFL_4 and IMT_3 of IES were correlated negatively with the total scale (BFL_4, r = -0.065; IMT_3, r = -0.043), and JAMOVI suggested data of these items should be reversed. However, we did not follow that suggestion because the experts did not provide notes regarding the two items, and the Aiken score as a content validation index was also met in the first study stage. The negative item-rest correlation in BFL_4 and IMT_3 may be due to participants' opinions regarding their abilities during intercultural interactions, which are different from the concept of intercultural effectiveness theory that underlies the IES. To build intercultural relationships more effectively, a person needs behavioral flexibility or the ability to adapt by differentiating behavior and then choosing the proper behavior in intercultural situations and identity maintenance as the ability to maintain the uniqueness of one's identity while maintaining the identity of those from different cultures (Portella & Chen, 2010). Meanwhile, participant responses tend to agree with the BFL_4 statement "*Saya menemukan cara terbaik untuk berperilaku adalah menjadi diri sendiri ketika berinteraksi dengan orang dari budaya yang berbeda"* (as reverse-scored item, see note on Table 4) and disagree with the IMT_3 statement "*Selama kami berinteraksi, saya merasa memiliki banyak kesamaan dengan rekan yang berbeda budaya",* which means the opposite of ability according to the concept of intercultural effectiveness.

Paige and Bennett (2015) argue that if someone is still focused on their behavior, like the participant's response to the BFL_4 statement, they tend to have an orientation that does not want to adapt during intercultural interactions. Stereotypes and prejudices often influence young people's perceptions of intercultural interactions, which can cause rejection or fear of adapting to other cultures (Blair, 2015; Cabanova, 2014; McDonald-Doh, 2019). From the perspective of

intercultural sensitivity, IMT_3's response also shows the tendency of participants to be more oriented towards cultural differences, indicating that they want to maintain differences as a polarizing view of us-them so that growing intercultural recognition based on cultural differences but with an emphasis on similarities will be challenging to achieve (Hammer, 2015; Paige & Bennett, 2015). Furthermore, we have verified the construct of intercultural competence (IC) using Confirmatory Factor Analysis (CFA) on data obtained from ICSa and IES (without using BFL_4 and IMT_3 data).

The CFA results on ICSa (RMSEA = 0.042, SRMR = 0.047, CFI = 0.921, TLI = 0.906) and IES (RMSEA = 0.044, SRMR = 0.048, CFI = 0.921) show that the model fit indices of both instruments are fulfilled. These results prove that conceptual terms such as intercultural effectiveness and their derived latent factors (Deardorff, 2015; Hammer, 2015; Portella & Chen, 2010) remain related to IC as an ability used in intercultural contexts. Apart from that, the constructs of ICSa and IES proved similar to previous studies on IC exploration, where communication skills, understanding, and accepting cultural differences are essential abilities for Indonesian participants (Idris, 2021; Lugman, 2023; Melati et al., 2021).

The ICSa and IES's model fit indices change when the MIMIC model is applied to test measurement invariance. The TLI is not fulfilled in the MIMIC model of both instruments (ICSa: TLI = 0.819 < 0.900; IES: TLI = 0.875 < 0.900) and also CFI only in the MIMIC model of ICSa (CFI = 0.840 < 0.900). TLI and CFI are often low due to their sensitivity to misspecifications, average correlation of the data, and correlated residuals, so both indices may not be appropriate for one-factor or unidimensional models (McNeish & Wolf, 2022; Mutiah et al., 2023; Reise et al., 2013; Shi et al., 2020; Wang & Wang, 2020) such as ICSa. Therefore, the MIMIC model of both instruments can be claimed to be fit because the RMSEA and SRMR indices remain fulfilled.

The MIMIC model analysis found no effect covariate of non-Javanese ethnicity (Java as a referred group) on all latent factors. Also, it indicated that the Indonesian ICSa and IES functioned consistently across ethnicity status. That indication could be because a person's psychological consequences, often from cultural differences in social class, region, and religion, are sometimes more unique or dynamic than ethnicity and nationality (Cohen & Varnum, 2016). Hence, it becomes clear that religion, domicile status, and university status, as covariate variables inherent to Indonesian students, can significantly impact latent factors, which we will discuss in the following paragraphs.

Not only ethnic status but also the current year of study as a covariate did not affect all latent factors, which we assume is the time students have spent attending lectures and meeting other students from different cultures. Several studies note that whether or not someone can establish intercultural relationships depends not only on the duration they live in the same place but also on the intensity of meetings for contact and dialogue (Lohy & Faturochman, 2018; Wilson et al., 2013). Formal and informal meetings on campus play an essential role in almost all variables of intercultural competence, especially the attitudes and feelings necessary for successful integration and participation in a multicultural society (Honen-Delmar & Rega, 2023; Lev Ari & Husisi-Sabek, 2020).

Covariate effects on latent factors were found from gender (ICSa: $\beta = 0.422$, $p = .000$; IRX: $\beta = 0.208$, $p = .000$; IMM: $\beta = 0.183$, $p = .002$) and religion (BFL: $\beta = -0.155$, $p = .032$; MSS: $\beta = -0.170$, $p = .025$). The effect caused by the gender covariate can also be seen from the inconsistent results of intercultural competence measurements where male students get higher scores (Tompkins et al., 2017), which are the same as our results. On the other hand, some studies also found that women have higher levels of intercultural competence than males (Makhmutova et al., 2020; Solhaug & Kristensen, 2020). Regarding religion, studies in Malaysia have found that religion can strengthen or weaken intercultural competence among students (Nadeem, 2022). More specifically, students' religion or religiosity has been proven to influence behavioral control or flexibility (Susilowati et al., 2022) and the development of communication skills, which play an

essential role in shaping their understanding of intercultural issues (Nadeem et al., 2017; Shamoa-Nir, 2024; Sjöborg, 2013).

Apart from the relatively unchanged socio-demographics of gender and religion, the covariate of domicile status as a migrant or local student and status as a state or private university may change over a certain period, also causing measurement invariance in the IEC data. Differences in the ability to establish intercultural relations between local and migrant students often occur, mainly due to language proficiency (Dalib et al., 2019), an orientation that encourages the desire to learn about other cultures (Byrne et al., 2012; Migacheva & Tropp, 2013), intercultural sensitivity or their assessment of other cultures tends towards ethnocentrism or ethnorelativism (Paige & Bennett, 2015). Furthermore, the effect of status as a public or private university makes differences in students' identity maintenance a latent factor in IEC because brand knowledge, university prestige, and intensity with which students compare themselves with the majority or minority groups play an essential role in developing social identity (Balaji et al., 2016; Huang et al., 2015; Ncube et al., 2018). Previous research explains that this difference could occur due to the definition of IC also varying between the two types of institutions, with state university students emphasizing interaction, communication, and cultural harmony (Odağ et al., 2016), and private university highlights the development of cultural knowledge, linguistics, and attitudes or soft skills as a component of IC (Gierke et al., 2018; Holubnycha et al., 2021).

This study's implications for higher education institutions are that the ICSa and IES (Indonesian version) can be used as instruments for assessing IC among students in Indonesia. The institutions can use both instruments' measurement outcomes as base data to design IC development programs for their students. We argue that universities in Indonesia should prioritize IC development programs so students can adapt to globalization and increase social mobility, as worldwide higher education institutions have done (Brüstle & Vogt, 2023; Messelink et al., 2015; Odağ et al., 2016; Wolff & Borzikowsky, 2018).

Conclusion

Based on the research results, it can be proven that the Intercultural Competences Self-assessment (ICSa) and the Intercultural Effectiveness Scale (IES), which we have adapted in the Indonesian version, have good internal consistency, the construct of instruments is fit and have been tested for measurement invariance. However, ICSa can produce data that is less susceptible to covariate effects (except gender) than IES. It should also be noted that the instruments do not experience differential item functioning (DIF). In other words, covariates have no direct significant effect on all items. There are still effects of gender, religion, domicile status, and university status on latent factors, so we recommend further studies: 1) Exploring the dynamics of the four socio-demographic variables in the development of intercultural competence using different methods, and 2) Studies regarding student IC with a survey design can also involve socio-demographic data as a covariate in statistical analysis to obtain unbiased results.

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