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# A Preliminary Adaptation and Validation of the Indonesian Version of the Loneliness and Aloneness Scale for Children and Adolescent (LACA)

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**Abstract**

Measuring loneliness in children and adolescents is crucial, as it is a prevalent issue that can impact their emotional and social development. Despite its importance, there are limited validated tools available to assess loneliness within the Indonesian cultural context. The Loneliness and Aloneness Scale for Children and Adolescents (LACA) is a widely used instrument for assessing feelings of loneliness and aloneness among children and adolescents. This study aimed to adapt and collect evidence of the validity of the Indonesian version of the LACA following the International Test Commission (ITC) Guidelines for Translating and Adapting Tests. Using the convenience sampling technique, 297 children and adolescents aged 10–18 years were selected as respondents in this study. The results show that the Indonesian version of four LACA sub-scales has good internal consistency. Confirmatory factor analysis shows that the four-factor model has an acceptable model fit. However, six items were omitted from the LACA loneliness measurement model for having a low contribution to loneliness. As a result, the four-factor model with fewer items shows a better fit. According to the research findings, the Indonesian version of the LACA can be used to measure loneliness and attitudes toward aloneness in the population of children and adolescents in Indonesia, with a recommendation to omit six items. The results of the tests on alternative two-factor models show that the loneliness in relationships with parents and loneliness in relationships with peers sub-scales can be used separately to measure the source of loneliness in children and adolescents in Indonesia.

Loneliness is an unpleasant state that arises due to a discrepancy between the interpersonal relationships people want to have and those they perceive they currently have (Peplau & Perlman, 1982). In previous research, loneliness was found to be positively correlated with poor physical and mental health and poor personal well-being (Loades et al., 2020; Pengpid & Peltzer, 2021; Siva, 2020). Those who experience loneliness tend to participate less in their social environments (Hawkley & Cacioppo, 2010) and even face a higher risk of death than those who are not lonely (Holwerda et al., 2016).

Loneliness is said to be felt more often and is more likely to occur in children and adolescents than in adults (Lasgaard et al., 2016; Perlman & Peplau, 1998). Developmental changes in companions, autonomy and individuation, social perspective, identity exploration, and cognitive and physical maturation that occur during child and adolescent development make these individuals more vulnerable to loneliness (Laursen & Hartl, 2013). Children and adolescents describe loneliness as an emotionally, cognitively, and interpersonally painful experience within the context of relationships with parents and peers. They feel lonely in situations such as being alone (i.e., having no one to accompany them during activities), being rejected, experiencing loss, having conflicts with friends, and so on (Galanaki, 2014). This suggests that individuals in childhood and adolescence may be more vulnerable to experiencing loneliness when faced with contextual situations. For example, during the COVID-19 pandemic, children and adolescents were found to frequently exhibit an increase in their levels of loneliness (Hards et al., 2022). In children and adolescents, loneliness was also found to be associated with poor physical health, sleep disturbances (Eccles et al., 2020; Matthews et al., 2017), and psychological problems, such as depressive and somatic symptoms (Lasgaard et al., 2010; Lohre, 2012; Stickley et al., 2016; Vanhalst et al., 2012). In addition, loneliness also in

creases risky behaviors in adolescents, such as smoking, drug abuse, and alcohol consumption (Stickley et al., 2016).

It is also important to address loneliness in children and adolescents in Indonesia. In a study of loneliness in seven ASEAN countries, 74.5% of adolescent participants aged 13–15 had experienced loneliness, with Indonesia being the country with the second highest prevalence of loneliness (Peltzer & Pengpid, 2017). Research findings show that many children and adolescents in Indonesia experienced loneliness, with 6.5% of Indonesian adolescent girls experiencing loneliness almost constantly (Agriyanti & Rahmasari, 2021). However, instruments for measuring loneliness in children and adolescents in Indonesia are scarce.

Screening for loneliness in children and adolescents is important for identifying those individuals in need of support and assistance among them. Therefore, a scale measuring loneliness, especially in children and adolescents, is important to prevent the emergence of mental health problems related to loneliness (Cole et al., 2021). There are various measurement tools that can be used to determine the level of loneliness in children and adolescents, with the three most commonly used being the UCLA Loneliness Scale Version 3 (Russell, 1996), the Children's Loneliness and Social Dissatisfaction Scale (CLS) (Asher et al., 1984), and the Loneliness and Aloneness Scale for Children and Adolescents (LACA), which is sometimes called the "Louvain Loneliness Scale for Children and Adolescents" (LLCA), or "Leuvense Eenzaamheidsschaal voor Kinderen en Adolescenten" (LEKA) in Dutch (Marcoen et al., 1987).

The UCLA Loneliness Scale Version 3 is a unidimensional measure of loneliness, a psychological condition that takes the same form even in different situations and can be measured with a single scale (Russell, 1996). It has been adapted to the Indonesian context (Nurdiani, 2013). It is more commonly used for adolescent groups than for children, but it lacks psychometric properties that are strong enough for adolescent groups (Cole et al., 2021). Unlike this scale, the CLS is more frequently used for children. The CLS was reported to be able to measure loneliness in a limited group of children in the school context (Asher & Wheeler, 1985).

Single-item and unidimensional loneliness measurement tools are considered insufficient in assessing loneliness (Maes et al., 2022). In children and adolescents, loneliness is generally more related to their dissatisfaction with their relationships with family and friends (Siva, 2020). Therefore, when measuring loneliness in children and adolescents, it is necessary to consider whether the measurement tool meets the need for examining feelings of loneliness in the context of relationships with parents and peers. The LACA is one of the measuring tools for assessing feelings of loneliness that uses a multidimensional approach, allowing researchers to see loneliness in various forms according to the situation. It enables researchers to see loneliness in the context of relationships with parents and peers.

Conceptually, loneliness and aloneness both refer to a psychological state and an objective situation experienced by a person. People often feel lonely when alone. Therefore, measuring attitudes toward aloneness will help improve the understanding of an individual's level of loneliness. For example, individuals with negative attitudes toward aloneness may feel lonely more easily when alone (Goossens et al., 2009; Marcoen & Goossens, 1993). However, even individuals with positive attitudes toward aloneness can also have a high level of loneliness because they spend more time alone. They may potentially lose many opportunities to interact with other people, which will lead to experiences of loneliness (Wang, 2011). The LACA is considered the most comprehensive measuring tool that employs a hybrid model because it measures two attitudes toward aloneness at once: negative attitudes (i.e., aversion to aloneness) and positive attitudes (i.e., affinity for aloneness) toward loneliness. Negative attitudes toward aloneness are explained by a person's boredom and inadequacy when he or she is alone, while positive attitudes are shown by a person making use of his or her aloneness constructively or by considering aloneness as part of his or her habits (Cole et al., 2021; Goossens et al., 2009).

Not only is it comprehensive, the LACA also accommodates the widest range of participant ages (10–18 years old). In addition, it has good psychometric properties. The results of a Reliability Generalization (RG) study of it showed that its four sub-scales had fairly good Cronbach's alpha averages of 0.87 for loneliness in relationships with parents (L-Part), 0.87 for loneliness in relationships with peers (L-Peer), 0.8 for aversion to aloneness (Aloneness-Negative, A-Neg), and 0.81 for affinity for aloneness (Aloneness-Positive, A-Pos) (Cole et al., 2021).

Based on a search through various search engines, it was found that in Indonesia there have been multiple studies on loneliness among children and adolescents. However, none has reported the adaptation process of the measurement tools used, which means that there is no empirical evidence that these tools have undergone necessary adaptation stages. Therefore, considering that the LACA is a comprehensive loneliness measurement tool for children and adolescents with good psychometric properties and the widest age range applicability, this study aimed to adapt and evaluate the psychometric properties of the LACA in the context of children and adolescents in Indonesia. In addition to validating the four-factor model of the LACA, this study also tested several alternative models for comparison. This research is expected to offer an insight into the LACA as a useful tool for researchers in evaluating loneliness in Indonesian children and adolescents, particularly in the Indonesian context.

## Methods

The participants in this study fell within the age range of 10–18 years, the same age range for which the original version of the LACA was designed (Cole et al., 2021; Marcoen et al., 1987). In this study, the size of the target population was unknown. Therefore, participants were

selected using the convenience sampling method, where individuals in the nearest proximity to the researchers, easily accessible, and willing to participate in this study were selected as participants (Guilford & Fruchter, 1978; Stratton, 2021; Triwahyuni et al., 2019). Conclusions were drawn in relation to the reliability of the LACA.

Data collection was carried out for ten days using an online questionnaire. This online questionnaire came with an explanation of the research, a personal data form, and the Indonesian version of the LACA. Because the participants in this study were children and adolescents, the online questionnaire was also accompanied by a Parent/Guardian Consent Form and a Child & Adolescent Consent Form (assent). Participants only filled out the online questionnaire upon receiving consent from their parents/guardians.

A total of 354 participants filled out the online questionnaire. However, 13 of them did not fully agree to participate, and 44 were considered outlier data, which were not included in data processing because they had the potential to interfere with the data analysis process (Kwak & Kim, 2017; Osborne & Overbay, 2004). Therefore, data processing only used data from 297 participants. Of these participants, 193 (64.9%) were female and 104 (35.1%) were male. The participants were aged 10–18 years ($M$ = 15.5 years, $SD$ = 1.53) and were attending the fifth grade of elementary school to the third grade of junior high school, of whom the highest percentage was in the second grade of junior high school (43%). The participants were spread all over Indonesia, with the highest number of participants living on Sulawesi Island (40.4%) and Java Island (31.3%). Additionally, 22.2%, 3.0%, and 1.7% of participants were living on Sumatra Island, Kalimantan Island, and Nusa Tenggara and Bali Islands, respectively.

The Loneliness and Aloneness Scale for Children and Adolescents (LACA) consists of 48 statement items representing four sub-scales: loneliness in relationships with parents (L-Part), which is an unpleasant feeling that arises when relationships with parents is inadequate, especially if someone has been abandoned by his or her parents; loneliness in relationships with peers (L-Peer), which is an unpleasant feeling that arises when relationships with friends are inadequate, especially if someone has been abandoned by his or her friends; aversion to aloneness (Aloneness-Negative, A-Neg), which is a negative attitude toward being alone; and affinity for aloneness (Aloneness-Positive, A-Pos), which is a positive attitude toward being alone. Each sub-scale is represented by 12 statement items. Each of these statement items is measured using the following answer choices: never = score 1; rarely = score 2; sometimes = score 3; and often = score 4. There were nine unfavorable statement items (items 1, 3, 16, 25, 30, 37, 38, 43, and 48), which scored inversely.

The LACA adaptation followed the International Test Commission (ITC) Guidelines for Translating and Adapting Tests (ITC, 2018) in several steps: construct review and requesting permission from the original author; forward and backward translation, content review, reliability testing, and internal construct validity testing.

Translation was carried out using the forward and backward translation method to maintain its quality and equivalence (Tyupa, 2011). The criterion for the translators was that they were Indonesian citizens, able to speak English (as indicated by a minimum TOEFL score of 600 or an educational experience abroad), and with an educational and scientific background in measuring instrument adaptation and/or psychology.

Results of the translation were peer-reviewed by three individuals, consisting of undergraduate psychology and Master's professional psychology students. Along with the blueprint of the instrument, they were also reviewed by four experts, consisting of psychologists and academics in the field of psychology, to assess their suitability with the theoretical context and their language in terms of comparability and similarity of meaning. The assessment used a Likert scale from 1 (highly comparable/very similar) to 7 (not at all comparable/not at all similar) (Sperber, 2004).

The experts also conducted a review of the relevance of each item using the Content Validity Index (CVI) method at the item level (I-CVI) and scale level (S-CVI). Items with an I-CVI of 0.78 or higher from three or more experts can be considered to have good content validity (Polit & Beck, 2006). At the scale level, the Content Validity Index (CVI) was calculated in two ways, with an S-CVI/AU of 0.9 or more and an S-CVI/Ave of 0.8 or higher considered evidence of good content validity (Shi et al., 2012).

Reliability analysis was carried out using the internal consistency method with the aim of seeing consistency between each item and another in measuring the same construct (Kaplan & Saccuzzo, 2017). Cronbach's alpha ($\alpha$ ) $\geq$ 0.70 indicates that the measuring instrument is reliable (Hair et al., 2010; Kaplan & Saccuzzo, 2017). The discriminating power of items in this study was measured by calculating the item-rest correlation (i.e., the association of an item of interest with the total score of other items on the scale, which can differentiate the results of the respondents) (Young et al., 2017). Items with low item-rest correlations are not as closely related to the scale relative to other items on the scale, and higher item-rest correlations on the test result in higher $\alpha$ coefficients (Cappelleri et al., 2014; Lord et al., 1968). An item is good when it has an item-rest correlation value greater than 0.30 (Ebel & Frisbie, 1991).

Evidence of the validity of the internal structure was obtained through Confirmatory Factor Analysis (CFA) by analyzing the suitability of the items in the instrument against the construct being measured. The reliability and internal construct validity testing used JASP Version 0.16 (JASP Team, 2021) and Lisrel for Windows 8.80 (Joreskog, 2008).

## Results

The results of the preliminary study generally encompassed construct review, translation process, content review, reliability and item properties, and evidence of internal structure validity.

A literature study related to loneliness and the LACA was carried out to ensure the suitability of the construct of loneliness and the LACA to conditions in Indonesia. Requests for permission to adapt the LACA were submitted via e-mail to Alfons Marcoen and Luc Goossens as the creators of the LACA, who subsequently provided permission to the researchers.

The English version of the LACA was translated into Indonesian by two translators, and the translation results were then translated back into English by two other translators. These translation results were then synthesized. An example of the forward and backward translation results and the synthesized results can be seen in Table 1.

The purpose of the content review was to assess the suitability of the instrument with the theoretical context and the language used in terms of the comparability of language and similarity of meaning. Based on inputs from peer-reviewers and experts, several words and sentences in the instrument were changed to better suit the sub-scales and to make it easier to understand for young individuals age 10–18 years. For example, the phrase "*kedua orang tua*" was changed into "*orang tua*" and the word "*serupa*" was replaced with "*sama*". The results of the Content Validity Index (CVI) calculation are presented in Table 2.

Table 3 shows that the reliability of the four sub-scales of the LACA was good ($\alpha = 0.789$–$0.901$). The correlation between sub-scales of the Indonesian version of the LACA had a significant positive value between 0.168 and 0.446.

Based on the results of the calculation of item-rest correlation using JASP Version 0.16, 48 items of the Indonesian version of the LACA had item-rest correlation values in the range from 0.28 to 0.769. Item 9 of the loneliness in relationships with peers (L-Peer) sub-scale, "Saya ingin lebih bisa bergabung dengan kelompok-kelompok pertemanan di kelas," had an item-rest correlation value less than 0.30. Values of 0.20 to 0.29 indicate good discriminatory power, particularly in the early stages of instrument development or for exploratory purposes (Alagumalai et al., 2005).

The four-factor model of the instrument under study was tested with CFA according to previous studies (Maes, Van den Noortgate, et al., 2015). As Chi-square statistics ($X^2$) and $p$-value are affected by sample size (Barrett, 2007; Kline, 2016), it is important to consider some other index-fit indices. The model fit criteria used consisted of three types of fit indices: absolute fit indices (normed Chi-square statistics ($X^2$/df), RMSEA, SRMR), incremental fit indices (CFI, NFI), and parsimony fit index (PNFI). The model is called fit if $X^2/df < 2$, RMSEA $\leq 0.05$, SRMR $\leq 0.05$, CFI $\geq 0.95$, and NFI $\geq 0.90$. Meanwhile, the model is considered acceptable if the $X^2$/df ranges from 2 to 3, the RMSEA ranges from 0.05 to 0.08, the SRMR ranges from 0.05 to 1, the CFI ranges from 0.90 to 0.95, and the NFI ranges from 0.80 to 0.90 (Bentler & Bonett, 1980; Hu & Bentler, 1999; Schermelleh-Engel et al., 2003). However, Hair, Risher, et al. (2019) state that if the model has a sample size $> 250$, the number of observed variables $> 30$, CFI $> 0.92$, RMSEA $< 0.7$, and SRMR $< 0.08$, it can be said to be fit. Lacking a cut-off category, the PNFI was used because this research tested several models, with higher PNFI values indicating greater degrees of fit (Hair, Risher, et al., 2019). See 4

The CFA results of the four-factor correlated model presented in Table 4 show that the fit indices of this model were acceptable. After examining the model fit, an evaluation of the factor loading components was carried out. Factor loading indicates the extent to which items contribute to the construct of interest, which ideally should be $> 0.4$ and $< 1.0$ (Kline, 2016; Samuels, 2017). It was found that 48 items in the four-factor correlated model of the Indonesian version of the LACA had standardized factor loading values in the range from 0.30 to 0.82, with seven of them having values $< 0.4$. The seven items were item 9 (L-Peer sub-scale), items 12, 22, 29, 32, and 39 (A-Neg sub-scale), and item 2 (A-Pos sub-scale). With factor loading values $< 0.4$, these items had a low contribution to the construct measurement. However, considering that the sample size used in this study was greater than 250, item 2, which had a factor loading value of 0.39, could still be deemed significant and thus retained (Hair, Black, et al., 2019).

Corrections were made in two ways: deleting items and modifying the model according to recommendations (Hooper et al., 2008). This study also tested a four-factor correlated model with six items being removed (i.e., items 9, 12, 22, 29, 32, and 39). The removals were based on the results of the standardized factor loading and item-rest correlation evaluations. The results of reliability analysis show that the reliability of the LACA increased in the L-Peer sub-scale after the six items were removed, with $\alpha = 0.876$. Meanwhile, the reliability in the A-Neg sub-scale decreased, with $\alpha = 0.774$, but remained within the medium reliability category. Table 4 indicates that all fit indices changed from the acceptable to the fit category.

This study also analyzed the four-factor correlated model after some recommended modifications. The modifications were made by correlating three measurement errors in the Indonesian version of the LACA: item 32 "*Saat saya bosan, saya pergi menemui teman saya.*" was correlated with item 39 "*Saat saya kesepian, saya pergi menemui orang lain.*" and item 12 "*Saat saya merasa kesepian, saya harus bertemu dengan beberapa teman.*" and item 33 "*Saya merasa tidak dipedulikan oleh teman-teman saya.*" was correlated with item 35 "*Saya merasa ditinggalkan oleh teman-teman saya.*" The CFA results of the modified model, as presented in Table 4, show changes in the RMSEA and CFI from the acceptable to fit category, while other fit indices remained in the acceptable category. See 1

This study also tested four alternative models for comparison with the original four-factor correlated model. Model 1 was a two-factor model used to see whether loneliness (L-Part and L-Peer) and attitudes toward loneliness (A-Neg and A-Pos) could be distinguished. Model 2 was a two-factor model measuring parent-related loneliness and peer-related loneliness. Model 3 was a two-factor model measuring negative attitudes toward aloneness and posi-

**Table 1**
*Examples of Results of Forward and Backward Translation*

| Original Item | Forward Translation | Backward Translation | Synthesis |
|---|---|---|---|
| Item 4<br>I think I have fewer friends than others. | *Saya pikir saya memiliki teman yang lebih sedikit dibandingkan orang lain.* | I think I have fewer friends than other people. | *Saya pikir saya memiliki lebih sedikit teman dibandingkan dengan orang lain.* |
| Item 11<br>I feel left out by my parents. | *Saya merasa ditinggalkan oleh orang tua saya.* | I feel left out by my parents. | *Saya merasa ditinggalkan oleh kedua orang tua saya.* |

**Table 2**
*The CVI of the Indonesian Version of the LACA*

| CVI Classification | Criteria | Score | Interpretation |
|---|---|---|---|
| I-CVI | I-CVI $> 0.79$ | 1 (41 items) $< 0.79$ (items 2, 9, 13, 16, 22, 25, 34) | Good content validity Need revision |
| S-CVI/UA | S-CVI/UA $\geq 0.80$ | 0.85 | Good content validity |
| S-CVI/Ave | S-CVI/Ave $\geq 0.90$ | 0.96 | Good content validity |

Note. I-CVI: Content Validity Index at the item level; S-CVI: Content Validity Index at the scale level; UA: Universal agreement; Ave.: Average

**Table 3**
*Cronbach's Alpha, Descriptive Statistics, and Correlation between the Sub-scales of the Indonesian Version of the LACA*

| Sub-scale | | Mean | Standard Deviation | L-Peer | A-Neg | A-Pos |
|---|---|---|---|---|---|---|
| Loneliness in relationships with parents (L-Part) | 0.901 | 20.896 | 7.277 | 0.274 | 0.187 | 0.212 |
| Loneliness in relationships with peers (L-Peer) | 0.871 | 26.805 | 7.933 | | 0.324 | 0.446 |
| Aversion to aloneness (Aloneness-Negative, A-Neg) | 0.789 | 32.785 | 6.664 | | | 0.168 |
| Affinity for aloneness (Aloneness-Positive, A-Pos) | 0.861 | 36.017 | 7.007 | 0.96 | | |

Note. p-value $< 0.05$

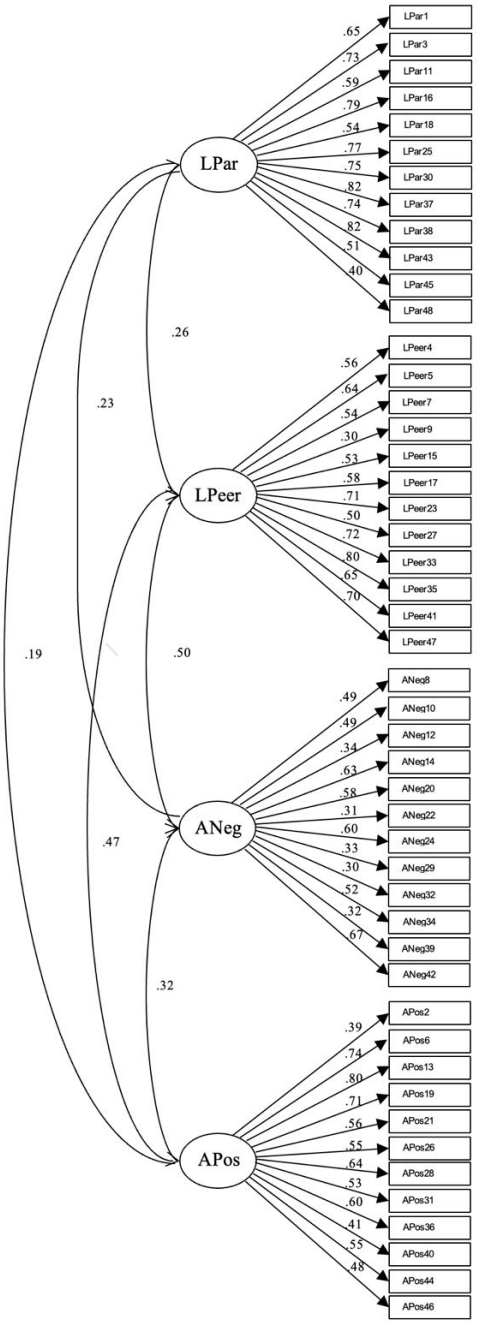
**Table 4**
*CFA Results of the Indonesian Version of the LACA*

| Category | Index | 4 Factors | | 4 Factors with 6 items deleted | | 4 Factor with 3 modifications | |
|---|---|---|---|---|---|---|---|
| | | Result | Note | Result | Note | Result | Note |
| Absolute Fit Indices | $X^2$ /df | 2.48 | Accepted | 1,93 | Fit | 2.17 | Accepted |
| | RMSEA | 0.071 | Accepted | 0.056 | Fit | 0.063 | Fit |
| | SRMR | 0.098 | Accepted | 0.078 | Fit | 0.094 | Accepted |
| Incremental Fit Indices | CFI | 0.92 | Accepted | 0.95 | Fit | 0.93 | Fit |
| | NFI | 0.87 | Accepted | 0.90 | Fit | 0.88 | Accepted |
| Parsimony Fit Index | PNFI | 0.82 | | 0.85 | | 0.83 | |

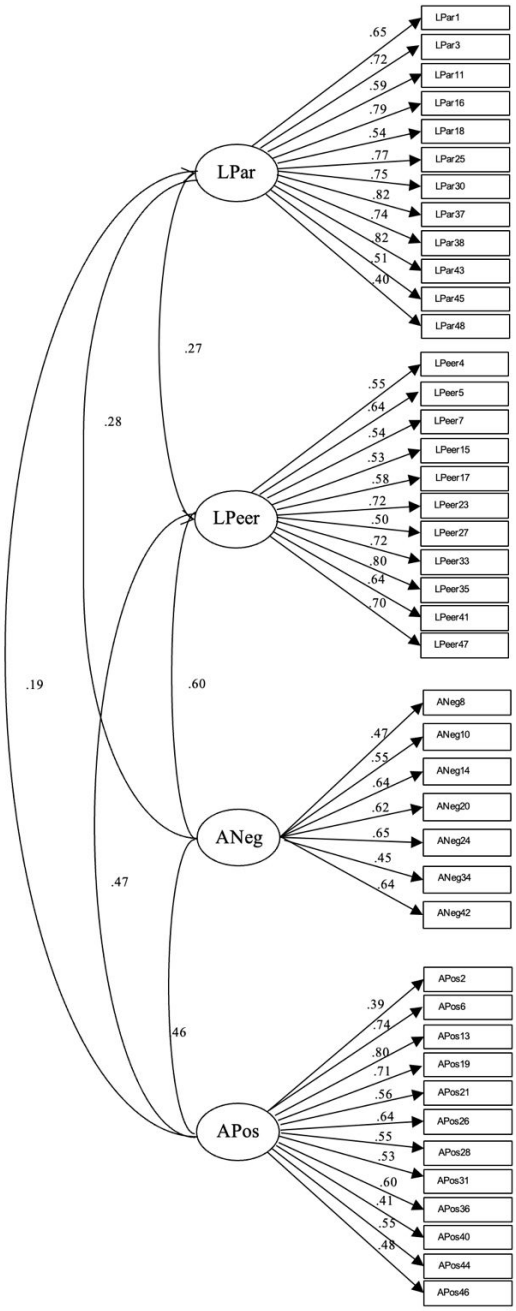
Note: $p$-value $< 0.001$

**Figure 1**
*Four-factor Correlated Model of the Indonesian Version of the LACA*

**(a)** *Original*



**(b)** *After Elimination of Six Items*




tive attitudes toward aloneness. Model 4 was a three-factor model measuring two types of loneliness and negative attitudes toward aloneness.

Based on the comparison of the test results of the seven models, as shown in Table 5, it can be concluded that the two-factor correlated model measuring L-Part and L-Peer had more fit indices in the fit (CFI, NFI) and acceptable categories ($X^2$/df, RMSEA, SRMR), with PNFI = 0.85. A comparison of PNFI values also shows that this model was fitter than the other models.

To strengthen the validity of the Indonesian version of the LACA, this study also evaluated the Composite Reliability (CR) and Average Variance Extracted (AVE) of the four-factor correlated model (48 items), the four-factor correlated model with deletion of six items (42 items), and the alternative two-factor model (L-Part and L-Peer). CR measures internal reliability in a construct by taking into consideration the weight of each item, thereby addressing the limitations of the alpha coefficient in representing reliability (Hair, Risher, et al., 2019). It provides evidence that all items consistently represent the same latent construct when the value is $\geq 0.7$ (Hair, Risher, et al., 2019). Meanwhile, AVE strengthens reliability. It indicates how far the variation of all items is explained by the construct or whether all the items measure a construct, with a cut-off value of $> 0.5$ (Hair, Black, et al., 2019).

**(c)** *After Modifications*

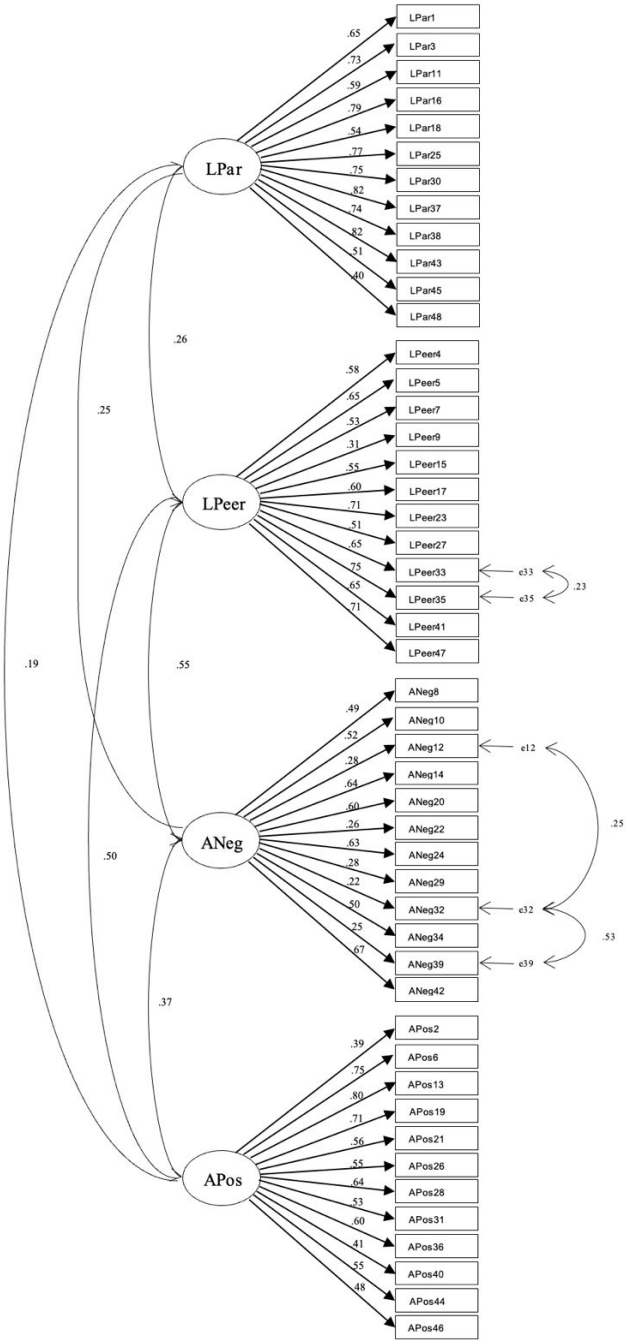



Table 6 shows that the three models had construct CR $\geq$ 0.7, but the AVE values were slightly below the cut-off value.

## Discussion

According to inputs from experts and results of field trials, the LACA that was adapted and translated into Indonesian based on ITC's guidelines can be used to measure loneliness in children and adolescents aged 10–18 years in Indonesia. In general, the Indonesian version of the LACA has adequate psychometric properties, as evidenced by a reliability coefficient greater than 0.7, good content validity, and good internal structure validity.

The original Dutch version of the LACA has been adapted and translated into several languages, such as Arabic, Chinese, Hebrew, Italian, Spanish, Portuguese, and French (Cole et al., 2021; Goossens, 2016). English translations have also been used in England, Ireland, and Canada (Goossens, 2016). The forward and backward translation, peer review, and expert review conducted in this study produced translated statement items that have the same meaning and relevance as the English version. However, based on inputs from peer-reviewers and experts, some words needed revision to increase their familiarity for children and adolescents in Indonesia. For example, the phrase "*untuk benar-benar*" and the word "*menyatu*" were

**Table 5**
*CFA Results of Alternative Models of the Indonesian Version of the LACA (p-value < 0.001)*

| Index | Model 1 (Lon, Alo) | | Model 2 (L-Par, L-Peer) | | Model 3 (A-Neg, A-Pos) | | Model 4 (L-Par, L-Peer, A-Neg) | |
|---|---|---|---|---|---|---|---|---|
| | Result | Note | Result | Note | Result | Note | Result | Note |
| $X^2$/df | 6.15 | Not Fit | 2.22 | Accepted | 4.4 | Not Fit | 2.90 | Accepted |
| RMSEA | 0.13 | Not Fit | 0.064 | Accepted | 0.11 | Not Fit | 0.080 | Accepted |
| SRMR | 0.14 | Not Fit | 0.069 | Accepted | 0.12 | Not Fit | 0.097 | Accepted |
| CFI | 0.84 | Not Fit | 0.96 | Fit | 0.86 | Not Fit | 0.92 | Accepted |
| NFI | 0.79 | Accepted | 0.93 | Fit | 0.82 | Accepted | 0.88 | Accepted |
| PNFI | 0.75 | | 0.85 | | 0.74 | | 0.82 | |

Note: Lon (loneliness); Alo (aloneness); L-Par (loneliness in relationships with parents); L-Peer (loneliness in relationships with peers); A-Neg (aversion to aloneness - aloneness negative); A-Pos (affinity for aloneness - aloneness positive)

**Table 6**
*Composite Reliability (CR) and Average Variance Extracted (AVE)*

| Models | Composite Reliability | Average Variance Extracted |
|---|---|---|
| Four-factor correlated model | 0.96 | 0.36 |
| Four-factor correlated model (with six items deleted) | 0.96 | 0.39 |
| Two-factor model (L-Par, L-Peer) | 0.94 | 0.42 |

revised. In addition, the phrase "*kedua orang tua*" was changed to "*orang tua*," considering that some children and adolescents only have one parent. The version that was revised based on these inputs was then tried out to test its reliability and validity. This sequence of forward and backward translation, peer review, and expert review is consistent with that conducted in a research study that adapted the Dutch version of the LACA into French for Belgian and Chinese adolescents (Maes, Wang, et al., 2015). Interviews with children and adolescents to evaluate individual understanding of statement items that were conducted in that study were not conducted in this study, which constitutes a limitation to this study.

The Cronbach's alpha for each sub-scale of the Indonesian version of the LACA was as follows: loneliness in relationships with parents had a Cronbach's alpha value of 0.901, which is considered high, while loneliness in relationships with peers, aversion to aloneness, and affinity for aloneness had Cronbach's alpha values of 0.871, 0.789, and 0.861, respectively, which are considered moderate (Cohen et al., 2012). These results are not much different from those of previous studies, which found that the four LACA sub-scales had good reliability, with Cronbach's alpha values greater than 0.80 (Maes, Van den Noortgate, et al., 2015). Similarly, the English version of the LACA has Cronbach's alpha values of 0.89 for loneliness in relationships with parents, 0.88 for loneliness in relationships with peers, 0.79 for aversion to aloneness, and 0.83 for affinity for aloneness (Goossens, 2016). This shows that each item of the Indonesian version of the LACA for each sub-scale is consistent and reliable for measuring loneliness in the same population.

In addition, all items but one in the Indonesian version of the LACA had values of item discrimination greater than 0.3. This shows that almost all of the items in the Indonesian version of the LACA could distinguish between children and adolescents with high and low loneliness scores. Only item 9, "*Saya ingin lebih bisa bergabung dengan kelompok-kelompok pertemanan di kelas*," needs revision because it could not distinguish children and adolescents with high and low loneliness scores. It is part of the loneliness in relationships with peers sub-scale, which measures negative emotions that arise in children and adolescents because of a discrepancy between what is expected and what is received from their relationships with peers.

Based on the American Educational Research Association (AERA), validity is not only seen from the score; it is also related to the use of measuring instruments (American Educational Research Association (AERA), 2014). Evidence of content validity was collected through expert research and calculated using the Content Validity Index method at the item level (I-CVI) and scale level (S-CVI) (Polit & Beck, 2006). Results show that, overall, the Indonesian version of LACA items are in accordance with the construct and aligned with the English version. There were seven items with an I-CVI value < 0.79; items 16 and 25 (loneliness in relationships with parents), item 9 (loneliness in relationships with peers), items 2 and 13 (affinity for aloneness-aloneness positive), items 22 and 34 (aversion to aloneness-aloneness negative) were revised according to expert suggestions to make them more suitable and familiar to children and adolescents. For example, the phrase "*untuk benar-benar*" in item 22 was replaced with "*agar bisa*" and the word "*menyatu*" in item 9 was replaced with "*tergabung*."

Evidence of the validity of the internal structure was collected to determine the internal structure of the LACA as a basis for interpretation. In this study, the internal structure was calculated using confirmatory factor analysis (CFA). CFA is used to test the extent to which a factor model can explain the pattern of relationships between

measurement variables (Hair et al., 2016). The factor structure of the LACA in this study is relevant to the four-factor model of the Dutch version (Maes et al., 2022) and the French version (Danneel et al., 2018) of the LACA examined in previous research involving Italian and Belgian adolescent samples. Overall, the Indonesian version of the LACA construct model with four correlated factors is acceptable. The positive correlation between sub-scales in the Indonesian version of the LACA indicates that the four sub-scales are related but do not measure the same thing. This means that the sub-scales of the Indonesian version of the LACA can be used to describe aspects of loneliness in children and adolescents aged 10–18 in Indonesia. These sub-scales can describe sources of loneliness that may differ between children and adolescents due to the different needs, expectations, and experiences of social interaction at each age level (Parkhurst & Hopmeyer, 1999).

It was found that the correlation factors of loneliness in relationships with parents and loneliness in relationships with peers in this study ($r = 0.274$) had correlation values below those expected by the LACA research that involved fifth-grade and sixth-grade children in Belgium, which were 0.36 and 0.55, while the correlation with other factors was not hypothesized in this study (Goossens & Beyers, 2002). Other findings on adolescents in Belgium found a significant positive correlation between affinity for aloneness and loneliness in relationships with peers, which supports the hybrid loneliness model of the LACA (Goossens et al., 2009).

The fit model indicator for the four-factor correlated model with the elimination of six items shows that this model is fitter for measuring aspects of loneliness in children and adolescents aged 10–18 years in Indonesia. Five of the six items removed were from the aversion to aloneness sub-scale. This finding is in line with research by Marcoen and Goossens (1993), who found that there was a confusing pattern of results for the aversion to aloneness sub-scale. The study suspected that this was because most of the statement items reflected reactivity as opposed to the desire to be alone (affinity for aloneness or aloneness positive), which should be re-focused on the active and constructive use of solitude (Roiste, 2000). Meanwhile, the deletion of item 9 was supported by a similar study on a sample of Italian adolescents (Melotti et al., 2006). The study found that item 9 and two other items, item 45 (loneliness in relationships with parents sub-scale) and item 27 (loneliness in relationships with peers sub-scale), were removed based on reliability analysis results (Maes et al., 2022). This deletion consequently caused changes in the ranges of scores on the aversion to aloneness and loneliness in relationships with peers sub-scales. As the aversion to aloneness sub-scale is represented by seven items, the total score ranges from 7 to 28. Meanwhile, the loneliness in relationships with peers sub-scale is represented by 11 items, so that the total score ranges from 11 to 44. This makes the four-factor correlated model with item deletion unapplicable for comparing loneliness and aloneness in cross-cultural contexts with other countries.

Even though the minimum number of items in one dimension was still met despite the item deletion (Hair, Risher, et al., 2019; Kline, 2016), the six deleted items can still be reviewed because in this study a cognitive interview was not conducted before the Indonesian version of LACA items was piloted. Cognitive interviews were supposed to be used to confirm the meaning of items that seem ambiguous when tested on child and adolescent participants in this study.

In the four-factor correlated model of the Indonesian version of the LACA, three modifications were found. In the study of Melotti et al. (2006), two modifications were made to obtain a fit four-factor correlated model (Maes et al., 2022). The correlation of errors in item 32 and item 39, as well as item 32 and item 12, may imply a coping strategy (i.e., social diversion) (Endler & Parker, 1990). Meanwhile, the correlation errors in item 33 and item 35 were perceived by participants as social or intergroup exclusion, which refers to a rejection by individuals or groups of peers because of bias or prejudice due to ethnicity, social status, gender, or other reasons (Killen et al., 2013; Killen & Rutland, 2011).

Tests on alternative models other than the four-factor correlated model were carried out in a population of French-speaking and Dutch-speaking adolescents in Belgium (Danneel et al., 2018). As found in this study, the two-factor model that assessed loneliness and attitudes towards aloneness did not meet the fitness criteria. That study also found that a two-factor model assessing loneliness in relationships with parents and loneliness in relationships with peers was fitter than the four-factors correlated model, unlike the finding of this study, which did not test this model. This is in line with the findings of Goossens (2016), which support the conceptualization of loneliness in relationships with parents and loneliness in relationships with peers as two different constructs in comparison to one-factor models or other more complex models.

The Average Variance Extracted (AVE) values of the original four-factor correlated model and those with factor removals (loneliness in relationships with parents and loneliness in relationships with peers) were slightly below the cut-off value but remained acceptable because all the models had CR $> 0.7$ (Fornell & Larcker, 1981). This means that all items consistently represent the same latent construct, and the indicators in the three models measure the intended construct rather than others.

## Conclusion

The process of translation into Indonesian according to the International Test Commission (ITC) rules resulted in an Indonesian version of the LACA with relevance and similarity in meaning to the original version. The collected preliminary validity evidence for the Indonesian version of the LACA shows that the four-factor correlated model with the elimination of six items can be used to measure four domains of loneliness—loneliness in relationships with parents, loneliness in relationships with peers, negative at-

titudes towards aloneness, and positive attitudes towards aloneness—in children and adolescents in Indonesia. This model is recommended for use due to its ability to explain loneliness better than other models. However, this model is inapplicable for comparing the loneliness of children and adolescents in Indonesia with the loneliness of children and adolescents in other countries on the aversion to aloneness and loneliness in relationships with peers sub-scales. It is the original four-factor correlated model (48 items) that is recommended for use if researchers intend to compare loneliness in cross-cultural contexts because it still has an acceptable model fit. Explorations on alternative models also show that the loneliness in relationships with parents and loneliness in relationships with peers sub-scales can be used separately when researchers seek to measure loneliness in children and adolescents in Indonesia based on the source of the relationship.

### Recommendation

Based on the process, analysis results, and limitations of this study, several recommendations are offered for further research. First, it is recommended to further examine the six deleted items using cognitive interviews. The results obtained from this process can be used to revise items and re-analyze their validity. Second, the measure of convergent validity can be added by including other measurement tools that assess loneliness (e.g., the Indonesian version of UCLA) (Nurdiani, 2013).

## Declaration

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### Authors' contributions

LAG contributed to the research design, data collection, data analysis, and data reporting, wrote the method and finding sections, and corresponded with the original authors of the scale. AT contributed to the research design supervision, data analysis consulting, manuscript review, and manuscript finalization. Finally, LQ contributed to the manuscript review and manuscript translation. All authors have read and approved the final version of the manuscript.

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### Conflict of Interest

We declare that no conflict of interest can influences this research.

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