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MEASURING PSYCHO-SOCIAL-ECOLOGICAL RESILIENCE: VALIDATION IN AN INDONESIAN POPULATION

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A comprehensive assessment of resilience should involve attention to individual characteristics as internal protective factors and social-ecological characteristics as external protective factors. The Adult Resilience Measure-Revised (ARM-R) and Rugged Resilience Measure (RRM) facilitate the assessment of both kinds of protective factors. This study aims to validate and examine the psychometric properties of Indonesian versions of the measures as part of a holistic approach to the assessment of resilience. In a sample of $N = 754$ individuals ($\geq$ 18 years old), exploratory and confirmatory factor analyses show that the models have a good fit and acceptable item-factor loadings ($\geq$ .30). The best model for RRM is the same as the original version. Conversely, the best model for ARM-R is different, consisting of four factors (i.e., family resources, friends and community resources, personal resources, and meaning and opportunity). The measurements are reliable ($\omega_{ARM} = .909$; $\omega_{RRM} = .877$) and have good evidence for convergent (with the Resilience Scale; $r \geq .045$), predictive (low resilience is predicted in adverse childhood experience group), and incremental validity (significant improvement in predicting life satisfaction).

Keywords: Adult Resilience Measure; Higher education context; Rugged Resilience Measure; Psychometric evaluation; Socio-ecology of resilience.

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Internationally, resilience studies have grown significantly in number since the twentieth century, now not only attracting scholars but also practitioners and policymakers (Salisu & Hashim, 2017; Windle, 2011). However, resilience research in Indonesia has only begun relatively recently. According to Google Scholar, the database that records many Indonesian scholars' research, there were only 22 publications before 2000. In 2022, the number grew to around 13,800, indicating that resilience has become an essential issue in Indonesia. The recent COVID-19 outbreak also triggered a growth of resilience research across contexts such as family (Ramadhana, 2020), health systems (Firda & Haksama, 2020), local food systems (Paganini et al., 2020), climate and city tourism (Setiadi et al., 2021), education (Eva et al., 2021), disasters in the community (Qodarsasi et al., 2021), and national economic recovery (Supari & Anton, 2022).

Defining resilience is a complex task. It has evolved from early notions of personality or trait-based concepts to processes, outcomes, and recovery trajectories, as well as shifting from universal to context/culture-specific components (Van Breda, 2018; Wright et al., 2013). In general, resilience "as a process" is understood as a protective mechanism allowing the individual to achieve positive adaptation despite adversity (Van Breda, 2018). Resilience has been found to be a mediator between stress, childhood adversity, and psychological well-being (Kelifa et al., 2021; Klainin-Yobas et al., 2021). The level of psychological resilience has also been found to determine the level of life satisfaction in young adults (Temiz & Comert, 2018). Beyond mental health, resilience is also positively related to perceived physical health and perceived immune function (Van Schrojenstein Lantman et al., 2017).

In educational contexts, resilience has been associated with academic success through the mediation of academic satisfaction (Meneghel et al., 2019). Resilience resources that are combined with self-regulatory behaviors and intrinsic motivation have also been identified as a protective mechanism favoring adjustment and discoraging drop-out from university (Fullerton et al., 2021). Relational factors such as a sense of belonging and social support also improve the resilience process for students (Bozak, 2013). Resilience has likewise been identified as important for teachers to help them maintain their motivation, manage stress, and regulate emotions (Mansfield et al., 2016). In work-related contexts, fostering resilience can promote overall health in the workplace (Roy et al., 2019). In this study, higher resilience was found to moderate the negative association between stress and psychological distress. This did not only reduce the incidence of burnout, but also facilitated workers' capacity to stay productive under uncertain work conditions (MacEachen et al., 2008).

The definition of resilience affects what should be measured. Most existing measures of resilience are focused on identifying individual characteristics as protective factors that facilitate resilience. Of these, four have gained popularity in research studies and have been examined in Indonesian contexts. First, the Resilience Scale (RS-14) consists of five dimensions: equanimity, perseverance, self-reliance, meaningfulness, and existential aloneness (Wagnild, 2013). The Indonesian version of the RS-14 was adapted in the context of higher education students (Dewinda & Khairiyah, 2022). Second, the Connor-Davidson Resilience Scale (CD-RISC) consists of five factors: personal competence, trust, positive acceptance, control, and spiritual influence (Connor & Davidson, 2003). The Indonesian version of the CD-RISC consists of 25 items and was validated among higher education students (Wahyudi et al., 2020). Third, the Personal Resilience Questionnaire was specifically adapted for doctors in rural areas (Handoyo et al., 2021). Besides factors related to the self, such as life calling, responsibility, and self-actualization, this questionnaire also addresses social factors, such as social relationships and rural attachment. Fourth, the Academic Resilience Scale (ARS-30) consists of three factors: perseverance, reflective and adaptive help-seeking, and emotional response (Cassidy, 2016). The ARS-Indonesia also consists of three factors and was validated with a sample of higher education students (Dewi Kumalasari et al., 2020).

Despite an overwhelming focus on psychological protective factors, the role of context and social systems are recognized as essential aspects that also influence the dynamic process of resilience (Wright et al., 2013). A focus on such external factors can be found in the social-ecological framework, which defines resilience as the capacity of the individual to navigate to and negotiate for resources (i.e., personal and environmental resources) to steer through, persist, and adapt to adverse conditions to achieve desirable outcomes (Ungar, 2012). One measure that was developed to specifically assess the availability of external protective factors is the Adult Resilience Measure-Revised (ARM-R). The ARM-R is an adult version of the Child and Youth Resilience Measure, which was created through the collaboration with 14 communities in 11 countries to understand the essential resources individuals required to do well despite experiences of

adversity (Liebenberg et al., 2012). The ARM-R has been translated into 23 languages and used in diverse contexts around the world (Resilience Research Centre, 2018).

A fuller account of resilience should not only consider individual characteristics but also social characteristics as external protective factors that are relevant to Indonesia's broad population. This notion aligns with the current wave of resilience research, in particular, multisystemic approaches to resilience (e.g., Ungar, 2021), which promote a focus on protective factors in an individual's proximal and more distal environment. However, at present, no measure of resilience has focused specifically on both internal and external protective factors. In recognition of this, Jefferies and colleagues (2022) developed the Rugged Resilience Measure (RRM) as a counterpart to the ARM-R. The RRM is a brief measure of psychological factors associated with resilience (Resilience Research Centre, 2021). It was developed and tested with samples from Brazil, China, Vietnam, Thailand, Russia, Syria, Italy, the UK, and Canada. To sum up, the ARM-R measures the availability of resources in an individual's environment and the capacity to navigate to and negotiate for these resources (external protective factors). Whereas, the RRM measures an individual's psychological strengths (as internal protective factors).

By assessing resilience using these two measures, we can gain a multi-perspective of an individual's resilience, and potentially distinguish the factors (i.e., psychological, personal, or socio-ecological) that should be targeted for resilience interventions (Jefferies et al., 2022). Both measures work well in diverse contexts and cultural populations (Borualogo & Jefferies, 2019; Jefferies et al., 2022; Ungar & Liebenberg, 2011). Therefore, this study sought to review the appropriateness of the ARM-R and RRM for measuring resilience in Indonesia. By establishing the local validity of the measures, the combination of assessments can be recommended for a multisystemic approach of adult resilience in Indonesia. Furthermore, it lays the foundations for designing resilience intervention because assessments may reveal where particular internal and external protective factor strengths and deficits lie.

METHOD

Study Design

The study used the International Test Commission (ITC) for Translating and Adapting Tests as a guideline (International Test Commission, 2017). There are five processes of translating and adapting tests according to the ITC: (1) pre-condition; (2) test development; (3) confirmation; (4) administration; and (5) documentation (see Table 1). This study only focus on the first three processes of test adaptation.The study was approved by the research ethics committee in Universitas Padjadjaran (No. 629/UN6.KEP/EC/2022).

Pre-Condition

Following permission from the director of the Resilience Research Centre for the use of the measures, we conducted interviews with representatives from students, lecturers, and staff to better understand resilience in local resilience processes. From these interviews, we concluded that participants experienced resilience processes involving factors addressed in the ARM-R and RRM.

TABLE 1
Translating and adapting test processes

Process	Activities
Pre-condition	1. Test adaptation permission 2. Interview with stakeholders
Test development	3. Forward and backward translation 4. Expert review for content validity 5. User interview for face validity 6. Item revision
Confirmation	7. Factor analysis 8. Structural validity 9. Reliability analysis 10. Concurrent validity

Test Development

This process had three objectives: (1) translation procedures; (2) checking the linguistic, psychological, and cultural relevancy of construct with the experts; and (3) checking whether all intended populations comprehended the items and instruction. The study used forward and backward translation. This involved the principal investigator (PI) translating the English version of the measures into Indonesian, before two translators (the first being a graduate student in English education, and the second a scholar with IELTS grades > 7.5) were invited to translate the Indonesian versions back into English (see Table 2 for translation results). The PI then considered the equivalence of the versions produced.

Three experts with experience in studying resilience in the Indonesian context reviewed the final translations. They reviewed the items' language, the focus of the construct, and their cultural relevance by giving ratings from 1 (*not relevant at all*) to 4 (*very relevant*). The ratings were processed using the item content validity index (I-CVI). For each item, the I-CVI is computed as the number of reviewers giving a rating of either 3 or 4, divided by the number of reviewers. If the I-CVI is lower than 1, the item is considered irrelevant to measure and subjected to revision or elimination (Lynn, 1986).

The I-CVI analyses indicated that all items were relevant ($I\text{-}CVI_{ARM\text{-}R} = 3.3$; $I\text{-}CVI_{RRM} = 3.6$). Some suggestions were submitted for several items. For example, the experts suggest developing an item about "religiosity/spirituality" as a unique characteristic related to resilience for Indonesian people. This is in keeping with the measures, given that the original version of the ARM (prior to its refinement) included an item about spirituality. In parallel with the expert review, we asked representatives of students, lecturers, and staff to read and complete the measures. We asked whether they understood the instructions, the items, and the response choice. No issues were raised.

Confirmation

Confirmation processes became the central part of the study. We used an online cross-sectional survey to evaluate the psychometric properties of the measures. Psytoolkit was used to collect online data (Stoet, 2017). In the survey, participants were presented with five measures: the ARM-R, RRM, RS-14, Satisfaction With Life Scale (SWLS), and Adverse Childhood Experiences International Questionnaire (ACE-IQ). The SWLS and ACE-IQ instruments were used to measure concurrent (predictive and incremental) validity. The RS-14 was used to check convergent validity.

TABLE 2
Forward and backward translation of items

ID item	Original item	Forward (Indonesian)	Backward 1	Backward 2	Final item (Indonesian — after translation and review)
ARM1	I get along with people around me	Saya berteman baik dengan orang-orang di sekitar saya	I am able to be good friend with people around me	I am good with people around me	Saya menjalin kerja sama yang baik dengan orang-orang di sekitar saya
ARM2	Getting and improving qualifications or skills is important to me	Mendapatkan dan meningkatkan keterampilan diri adalah hal yang penting bagi saya	Gaining and improving self-skills is important to me	Getting and improving skills is important to me	Mendapatkan dan meningkatkan kualitas diri (seperti: pengetahuan, keterampilan) adalah hal yang penting bagi saya
ARM3	I know how to behave in different social situations (such as at work, home, or other public places)	Saya tahu bagaimana harus berperilaku di berbagai situasi sosial	I know how to behave in various social situations	I know how to behave in different social situations	Saya tahu bagaimana harus berperilaku di berbagai situasi sosial yang berbeda
ARM4	My family is supportive toward me	Biasanya, keluarga mendukung saya sepanjang hidup	Usually, my family supports me throughout my life	Usually, family supports me through life	Keluarga saya biasanya mendukung saya sepanjang hidup
ARM5	My family knows a lot about me (for example, who my friends are, what I like to do)	Keluarga tahu banyak tentang saya	My family knows a lot about me	My family knows a lot about me	Keluarga/pasangan tahu banyak tentang saya (misalnya tentang aktivitas saya, siapa teman baik saya, dsb)
ARM6	If I am hungry, I can usually get enough food to eat	Jika saya lapar, saya bisa mendapatkan makanan untuk dimakan	If I am hungry, I am able to have some food to eat	If I am hungry, I can get food to eat	Ketika saya membutuhkan sesuatu, saya dapat dengan mudah menemukan kemana atau pada siapa saya bisa mendapatkannya
ARM7	People like to spend time with me	Orang-orang senang menghabiskan waktu dengan saya	People love spending time with me	People like to spend time with me	Saya dapat membuat orang-orang agar nyaman menghabiskan waktu dengan saya
ARM8	I talk to my family/partner about how I feel (for example, when I am sad or concerned)	Saya berbicara kepada keluarga/pasangan tentang apa yang saya rasakan	I am able to talk to my family/partner about how I feel	I talk to my family/partner about how I feel	Keluarga/pasangan bersedia mendengarkan dengan seksama tentang perasaan-perasan saya (contoh: ketika senang, ketika cemas, dsb)
ARM9	I feel supported by my friends	Saya merasa didukung oleh teman-teman	I feel supported by my friends	I feel supported by my friends	Saya merasa didukung oleh teman-teman
ARM10	I feel that I belong in my community	Saya merasa menjadi bagian dari komunitas saya	I feel part of my community	I feel that I belong in my community	Saya merasa menjadi bagian dari komunitas saya
ARM11	My family/partner stands by me when times are hard (for example, when I am ill or in trouble)	Keluarga/pasangan menemani saya di saat sulit	Family/partner accompanies me in difficult situation	My family/partners accompany me during difficult times	Keluarga/pasangan menemani saya di saat sulit. (misalnya ketika saya sakit, kebingungan, dsb)

(table 2 continues)

Table 2 (continued)

ID item	Original item	Forward (Indonesian)	Backward 1	Backward 2	Final item (Indonesian — after translation and review)
ARM12	My friends care about me when times are hard (for example, when I am ill or in trouble)	Teman-teman peduli pada saya di saat sulit	Friends care about me in difficult situations	My friends care about me during difficult times	Saya memiliki teman-teman yang peduli pada saat saya mengalami masa-masa sulit (misalnya ketika saya sakit, kebingungan, dsb)
ARM13	I am treated fairly in my community	Saya diperlakukan adil di dalam kelompok/komunitas saya	I am treated fairly in my group/community	I am treated fairly in my group/community	Saya diperlakukan adil di dalam kelompok/komunitas saya
ARM14	I have opportunities to show others that I can act responsibly	Saya memiliki kesempatan untuk menunjukkan pada orang lain bahwa saya adalah orang yang bertanggungjawab	I have the opportunity to show others that I am a responsible person	I have opportunities to show others that I am a responsible person	Saya memiliki kesempatan untuk menunjukkan pada orang lain bahwa saya adalah orang yang bertanggungjawab
ARM15	I feel secure when I am with my family/partner	Saya merasa aman ketika bersama keluarga/pasangan	I feel safe when I am with family/partner	I feel secure when I am with family/partner	Keluarga/pasangan memberikan rasa aman pada saya
ARM16	I have opportunities to apply my abilities in life (like using skills, working at a job, or caring for others)	Saya memiliki kesempatan untuk mengaplikasikan kemampuan saya dalam kehidupan sehari-hari	I have the opportunity to apply my skills in daily life	I have opportunities to apply my abilities in daily life	Saya memiliki kesempatan untuk menggunakan kemampuan saya dalam kehidupan sehari-hari. (seperti menyelesaikan tugas, menyelenggarakan acara, dsb)
ARM17	I like my family's/partner's culture and the way my family celebrates things (like holidays or learning about my culture)	Saya menyukai tradisi dan kebiasaan keluarga/pasangan saya	I like the traditions and customs of my family/partner	I like the tradition and customs of my family/partner	Terdapat beberapa tradisi dan kebiasaan keluarga/pasangan (seperti lebaran, makan ngga makan ngumpul, dsb) yang berdampak positif bagi kehidupan saya
ARM18	(No item related to religiosity/spirituality as meaning system)				Saya tahu bagaimana memanfaatkan nilai-nilai pribadi (seperti nilai agama, budaya, dsb) untuk bangkit dari keterpurukan
RRM1	I believe in myself	Saya yakin pada diri saya	I am confident of myself	I believe in myself	Saya yakin pada diri saya
RRM2	I can adapt to challenging situations	Saya dapat menyesuaikan diri dalam situasi yang menantang	I am able to adapt in challenging situations	I can adapt to challenging situations	Saya dapat menyesuaikan diri dengan situasi-situasi yang menantang
RRM3	I find solutions to problem I encounter	Saya dapat menemukan solusi dari permasalahan yang dihadapi	I am able to find solution to the problem at hand	I can find solution to problems I encounter	Saya dapat menemukan solusi dari setiap permasalahan yang dihadapi

(table 2 continues)

Table 2 (continued)

ID item	Original item	Forward (Indonesian)	Backward 1	Backward 2	Final item (Indonesian — after translation and review)
RRM4	I can keep going despite difficulties	Saya tetap bertahan meskipun mengalami kesulitan	I am able to persist despite difficulties	l can keep going even though I face difficulties	Saya tetap bertahan meskipun mengalami berbagai kesulitan
RRM5	I can cope with competing demands (for my time or attention)	Saya dapat mengatasi berbagai hal yang menuntut waktu dan/atau perhatian saya	I am able to cope with things that demand my time and/or attention	I can handle matters that demands my time and/or attention	Saya tetap dapat mengatasi berbagai hal yang menuntut waktu/perhatian saya di waktu yang bersamaan
RRM6	Even when there are setbacks or obstacles, I am hopeful about my future	Meskipun terjadi hambatan dan kemunduran,saya merasa tetap ada harapan di masa yang akan datang	Despite the obstacles and setbacks, I perceive there is hope for the future	Even though there will be obstacles and setbacks, I feel there is still hope in the future	Meskipun saya mengalami berbagai hambatan atau kemunduran, saya merasa tetap ada harapan untuk masa depan saya
RRM7	I am generally in control of my emotions	Secara umum, sayalah yang mengendalikan emosi saya	In general, I am the one who controls my emotions	In general, I am the one who control my emotions	Secara umum, sayalah yang mengendalikan emosi saya
RRM8	I take pride in the things I have achieved	Saya bangga dengan pencapaian saya	I am proud of my achievements	I take pride in my achievements	Saya bangga dengan pencapaian-pencapaian saya
RRM9	When faced with difficulties, I rise to the challenge	Ketika mengalami kesulitan, saya merasa tertantang	When I encounter difficulties, I feel challenged	When faced with difficulties, I feel challenged	Ketika mengalami kesulitan, saya tertantang untuk menghadapinya
RRM10	I can find meaning in my life	Saya dapat menemukan makna hidup	I am able to find life meaning	I can find meaning in my life	Saya dapat menemukan makna/tujuan dari kehidupan saya

Note. ARM = Adult Resilience Measure; RRM = Rugged Resilience Measure.

Participants

All measurements were administered to a snowball sample of 754 adults who identified as higher education stakeholders (students, lecturers, and academic staff). The participants came from public and private universities across the provinces. According to the Indonesian government, an individual is recognized as an adult when he or she is 18 (Mahkamah Agung Republik Indonesia, 2012). Thus, participants who did not meet this age requirement were excluded. The average age of participants was 27 (*SD* =10.6), the youngest was 18, while the oldest was 72 years old.

Measures

Adult Resilience Measure-Revised (ARM-R). As noted earlier, the ARM-R is a self-report questionnaire that measures resilience from a socio-ecological framework (Resilience Research Centre, 2018). The ARM-R measures the capacity to access resources in an individual's environment (personal resilience) and the extent to which social entities in the environment (e.g., family, peers, institutions) provide resources (relational resilience). The ARM-R originally consisted of 17 items, but based on a suggestion from the experts' review, we added an item regarding religiosity/spirituality as a part of meaning systems. Therefore, Indonesian version of ARM consist of 18 items. The ARM-R uses a Likert response scale ranging from 1 = *not at all like me* [*sama sekali tidak sesuai dengan diri saya*] to 5 = *a lot like me* [*sangat sesuai dengan diri saya*].

Rugged Resilience Measure (RRM). The RRM measures individuals' psychological or internal resources (Resilience Research Centre, 2021). Ten items represent 10 internal qualities (i.e., self-belief, adapting to challenging situations, problem-solving, perseverance, ability to cope with competing demands, optimism, emotion regulation, pride in achievements, willingness to take on challenges, and meaning-making). This self-report questionnaire uses a 5-point Likert scale with the same options as the ARM-R.

Resilience Scale (RS-14). This scale was based on Wagnild (2013) concept of resilience. They identified five themes (i.e., equanimity, perseverance, self-reliance, meaningfulness, and existential aloneness), which are said to become mechanisms of flexibility and of the ability to restore balance when one is faced with a challenging experience. The Indonesian version of the RS-14 was adapted by Valentino et al. (2021) for use with university students. This self-report questionnaire uses a 7-point Likert scale ranging from 1 = *strongly disagree* [*sangat tidak setuju*] to 7 = *strongly agree* [*sangat setuju*] with high internal consistency (α = .880).

Adverse Childhood Experiences International Questionnaire (ACE-IQ). The World Health Organization (WHO) developed this measure to identify adults with adverse childhood experiences. The measure was adapted to the Indonesian society and consists of 13 categories of adverse experiences with a total of 29 items. There are two types of response options: nominal scale responses, that is, *yes/no* (*ya/tidak*), and ordinal scale responses, that is, *often* (*sering*), *sometimes* (*kadang-kadang*), *once* (*sesekali*), and *never* (*tidak pernah*). If participants choose *often/sometimes/once,* it will be scored as 1, which means they experienced those kinds of adversity. The Indonesian version of the instrument has been found to have strong internal consistency (α = .742) (Rahapsari et al., 2021). In the current study, the internal consistency of each category is α = .40-.88. Emotional and physical neglect have lower reliability

(Cronbach's α < .50), while the other categories are acceptable. Combining all categories, the measure is still reliable (McDonald's ω = .859).

Satisfaction With Life Scale (SWLS). The SWLS was developed by Diener et al. (1985) and consists of five items with a 7-point Likert scale ranging from 1 = *strongly disagree* [*sangat tidak setuju*] to 7 = *strongly agree* [*sangat setuju*]. The Indonesian version of SWLS has good internal consistency (α = .849) (Muttaqin, 2022). The SWLS from this sample has high internal consistency (α = .840).

Statistical Analysis

Before further analysis, outlier detection was conducted using Mahalonobis distance with the aid of IBM SPSS 28.0 (Todeschini et al., 2013). From 778 complete responses, 24 outliers were detected. Therefore, for the following analysis, we analyzed 754 responses using JASP 16.1.0 (Love et al., 2019). Descriptive and comparative analyses were conducted for demographic data, including gender, university, education, occupation, ethnicity, and religion. The mean and standard deviation for each measurement is also provided (see Table 3 below).

Factor Analysis

Exploratory factor analysis (EFA) was used to identify the number of underlying dimensions of the measures (factors). EFA was administered because the child version of the ARM (CYRM) found varying factors depending on context and culture (van Rensburg et al., 2019). Prior to EFA, the data were randomly divided in half. The first half of the dataset (n = 377) showed moderate normal distribution: slightly skewed; skewness of ARM-R [RRM] = –.272[–.312]; kurtosis of ARM-R [RRM] = –.599[–.452]). Both normality tests (Kolmogorov-Smirnov and Shapiro-Wilk) showed that ARM-R and RRM data were not normally distributed (p < .050). This slightly skewed data distribution is a normal occurrence for these resilience measures (e.g., Jefferies et al., 2022). However, assumptions for sampling adequacy, sphericity, and item correlations were fulfilled: KMO ARM-R[RRM] = .911[.906]; Bartlett's tes significance level ARM-R[RRM] = .000[< .001]; item correlations ≥ .30. Hence, principal axis factoring was chosen as an extraction method that facilitates nonnormal distribution and direct oblimin as a rotation method that assumes intercorrelation among the items (Costello & Osborne, 2005). A number of factors were decided based on eigenvalues > 1.00, examination of scree plot, and pattern matrix of factor loadings.

Structural Validity

The second half of the sample (n = 377) was then used in a confirmatory factor analysis (CFA) as evidence for structural validity. CFA was used to verify the number of underlying factors and the pattern of the item-factor relationships (factor loadings; Brown, 2015). The CFA dataset also showed a slightly skewed distribution: skewness of ARM-R[RRM] = –.493[–647]; kurtosis of ARM-R[RRM] = .062[.054]. Hence, diagonally weighted least squares (DWLS) were used as an estimation method which is preferable for nonnormal distribution data (Koğar & Yilmaz Koğar, 2015). Structural validity was assessed using the following fit indices and thresholds: p < .050, χ^2/df < 5 (Cochran, 1952); standardized root-mean-square residual

(SRMR) < .080; comparative fit index (CFI) > .90; and root-mean-square error of approximation (RMSEA) < .080 (Hu & Bentler, 1999). Factor loadings represent the correlation between participants' scores and factors in the measures. The acceptable cut-off for an item's factor loading is greater than or equal to .30 or .40 (Brown, 2015).

Reliability Analysis

Cronbach's α is the most commonly used indicator of reliability. An α coefficient of .80 or .95 is preferred to indicate high reliability (Boateng et al., 2018; Cronbach, 1951). However, coefficient α, which indicate item-rest correlation, has several problems, such as biased assumption and point estimate (Dunn et al., 2014). Therefore, we also derived McDonald's ω to measure the reliability of each factor. A cut-off of at least .70 is recommended (Hayes & Coutts, 2020).

Criterion Validity

Criterion validity "pertains to evidence of a relationship between the attributes in a measurement tool with its performance on some other variable" (DeVon et al., 2007, p. 158). This study analyzed three types of criterion validity: convergent, predictive, and incremental validity. Convergent validity is the extent to which different measures of the same construct correlate with each other ($r \geq .45$) (DeVon et al., 2007). Thus, the ARM-R and RRM were analyzed to determine whether they correlated with the RS-14. Predictive validity shows how the variables predict the future performance of other variables ($r \geq .45$) (DeVon et al., 2007). In this study, childhood adversity (i.e., ACE-IQ > 4) was hypothesized to predict low resilience scores, both in the ARM-R and RRM. All correlation analyses used a Pearson's *r* test that is relatively robust to nonnormality (Bishara & Hittner, 2012). Finally, incremental validity was examined through stepwise hierarchical linear regressions to determine whether the ARM-R and RRM could significantly improve predicting life satisfaction (SWLS) scores status over the RS-14 (Jefferies et al., 2022).

RESULTS

Descriptive and Comparison Analysis of Demographic Data

Comparison analyses used the Mann-Whitney test (for two groups) and the Kruskal-Wallis test (for more than two groups; Table 3). Both nonparametric analyses were administered because of the slightly skewed distribution of resilience measures. Men reported significantly higher ARM-R ($W = 66.345$, $p < .05$) and RRM ($W = 73.079$, $p < .001$) scores than women with a small effect size for both measures, Cohen's *d* ARM-R[RRM] = 0.098[0.209]. Meanwhile, participants from private universities displayed higher RRM scores than participants from public universities ($W = 49.638$, $p < .05$, Cohen's $d = 0.103$). Significant differences were also detected for ARM-R and RRM scores in education and occupation with very small effect size ($\eta^2 = .046$-$.057$). Posthoc tests revealed that significant differences occurred between high school graduates and master's degree graduates ($t_{ARM\text{-}R} = -4.317$, $p < .01$; $t_{RRM} = -4.992$, $p < .01$); between high

school graduates and doctoral degree graduates ($t_{ARM-R} = –5.610$, $p < .01$; $t_{RRM} = –3.815$, $p < .01$); and between lecturers and students ($t_{ARM-R} = 6.099$, $p < .01$; $t_{RRM} = 6.046$, $p < .01$).

TABLE 3
Descriptive and comparison analysis

Demographics	Percentage	ARM-R			RRM		
		M(*SD*)	Statistic (*W*/*t*)	*p* (effect size)	*M*(*SD*)	Statistic (*W*/*t*)	*p* (effect size)
Gender				**.031**			**< .001 (.209)**
Male	32	75.3(10.3)	66.345	**(.098)**	42.8(5.6)	73.079	
Female	68	73.9 (9.4)			40.9(5.8)		
University				.144			**.029 (.103)**
Public	72	73.9(9.8)	51.515		41.2(5.9)	49.638	
Private	28	75.2(9.5)			42.3(5.4)		
Education			43.295	**< .001**		31.693	**< .001 (.046)**
High school diploma	60	72.8 (9.8)		**(.057)**	40.6		
Vocational degree	3	73.6(10.3)			42.1		
Bachelor's degree	17	74.9 (9.2)			41.7		
Master's degree	14	77.3 (8.8)			43.7		
Doctoral degree	6	80.9 (7.6)			43.9		
Occupation			39.398	**< .001**		35.917	**< .001 (.051)**
Student	70	72.9(9.7)		**(.054)**	40.6(5.9)		
Lecturer	20	78.3(8.6)			43.8(4.6)		
Academic staff	10	76.8(9.1)			42.6(5.2)		
Ethnicity			5.72	.455		8.137	.228
Sumatera	16	72.9(10.7)			40.9(6.2)		
Java	70	74.8 (9.3)			41.6(5.7)		
Kalimantan	2	75.9 (9.7)			41.7(3.7)		
Sulawesi	4	73.9(12.3)			42.4(5.5)		
Maluku dan Papua	1	74.9 (7.9)			41.4(7.6)		
Bali, NTT, dan NTB	3	73.7 (9.7)			42.1(5.1)		
Tionghoa	4	71.4(10.1)			38.8(5.6)		
Religion			3.11	.540		2.589	.629
Islamic	89	74.5 (9.8)			41.5(5.8)		
Christian-Protestant	6	73.9 (8.5)			40.9(5.2)		
Christian-Catholic	3	71.4 (9.8)			40.9(6.5)		
Buddhist	1	71.5(11.5)			39.2(7.1)		
Hindu	1	76.2(11.2)			43.0(5.0)		

Note. ARM-R = Adult Resilience Measure-Revised; RRM = Rugged Resilience Measure. Bold = the effect size is significant.

Test Confirmation 1: Factor Analysis and Structural Validity

Structure of ARM-R. EFA produced a 4-factor model according to eigenvalue > 1 (Table 4) and screeplot (Figure 1). Those four aspects explained 60.74% of the variance. According to the pattern matrix, Factor 1 (Items 4, 5, 8, 11, and 15) is related to family as ecology resources. Factor 2 (Items 6, 9, 10, 12, and 13) is related to friends and community. Factor 3 (Items 1, 3, 7, and 18) is about the personal ability to navigate resources. Finally, Factor 4 (Items 2, 14, 16, and 17) is related to contextual and cultural aspects of resilience. The definition of each factor will be explained in the Discussion section. The factor correlation matrix showed a moderate correlation between factors (.30-.58).

TABLE 4
Eigenvalues, percentage of variance, and cumulative percentage for factors for the ARM-R Indonesian version

Factor	Eigenvalue	% of variance	Cumulative %
1	6.883	38.239	38.239
2	1.739	9.660	47.899
3	1.302	7.231	55.130
4	1.010	5.610	60.741

Note. ARM-R = Adult Resilience Measure-Revised.

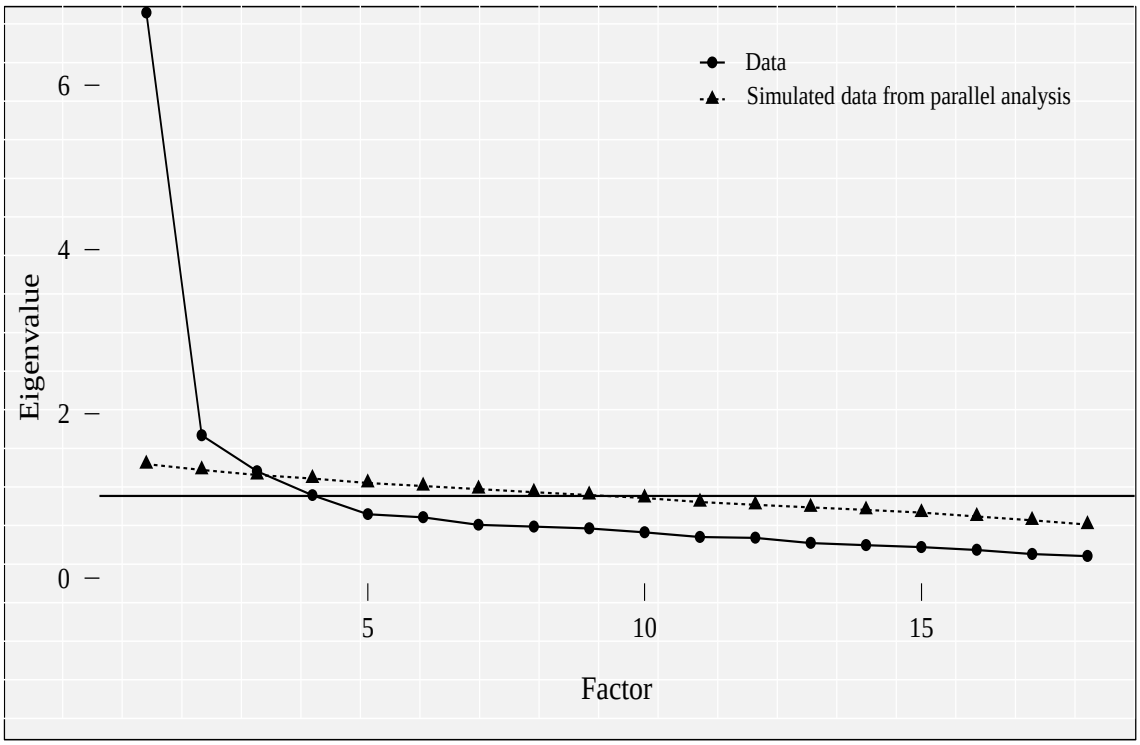

FIGURE 1
Adult Resilience Measure-Revised (ARM-R) scree plot

We validated this 4-factor model with CFA and the model showed a good fit: $p < .001$, $\chi^2/df = 1.37$; SRMR = .063; RMSEA = .031, 90% CI [.019, .042]; CFI = .992. The model with item loadings is plotted in Figure 2.

Structure of RRM. EFA produced a 1-factor model according to eigenvalue > 1 (eigenvalue = 4.89) and screeplot (Figure 3). The model explains 48.91% of the variance.

We validated the 1-factor model of RRM with CFA and the model showed a good fit: $p < .001$, $\chi^2/df = .79$; SRMR = .044; RMSEA = .000, 90% CI = [.000, .024]; CFI = 1.000. The model with item loadings is plotted in Figure 4. Table 5 shows factor loadings from EFA and CFA.

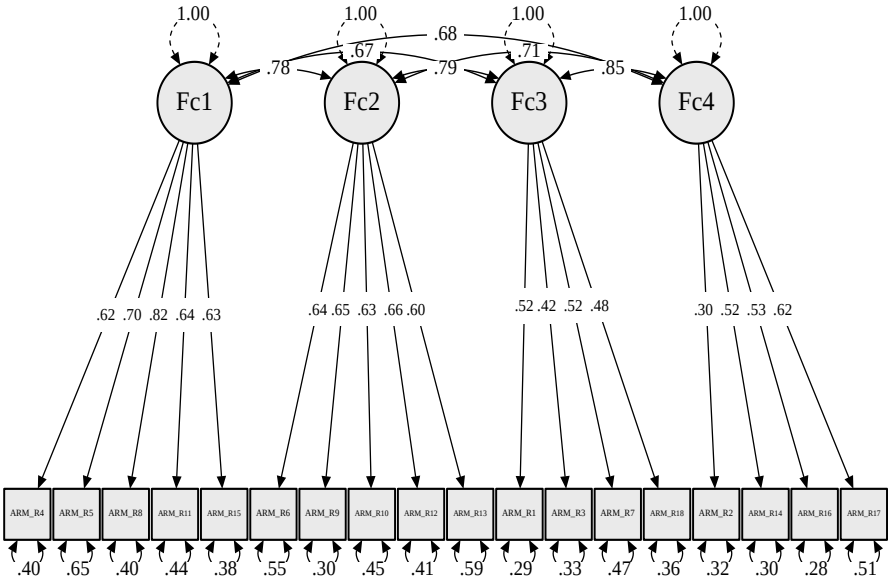

FIGURE 2
Adult Resilience Measure-Revised (ARM-R) path diagram

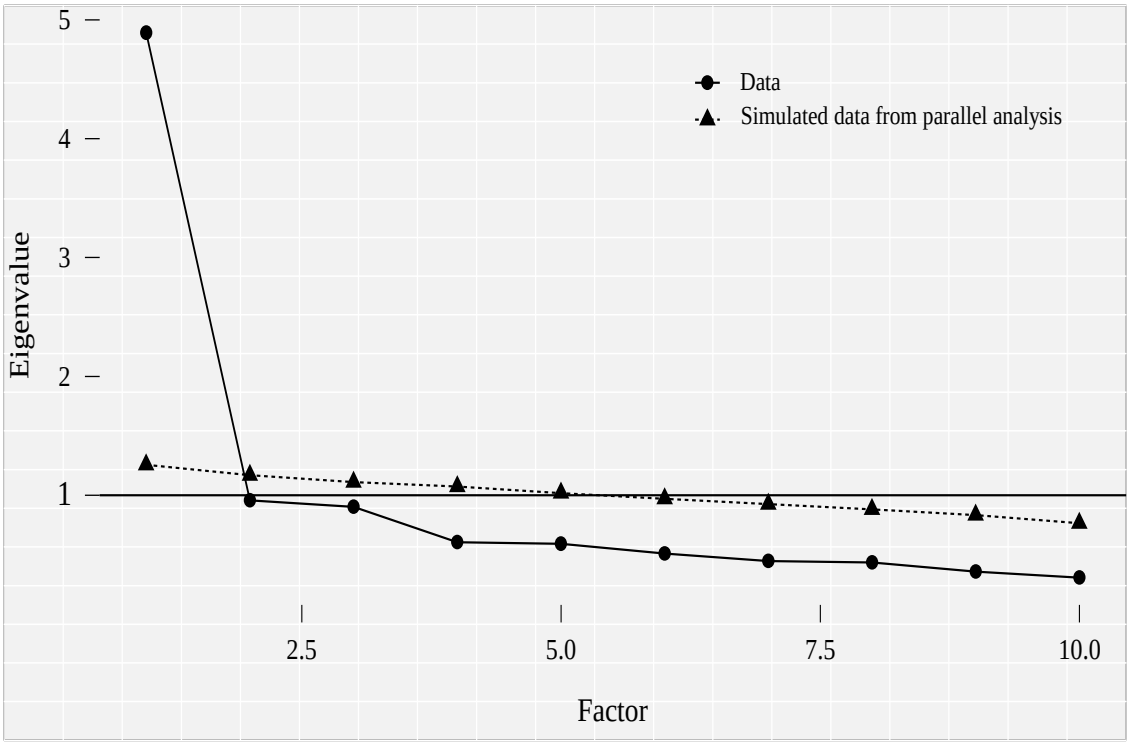

FIGURE 3
Rugged Resilience Measure (RRM) scree plot

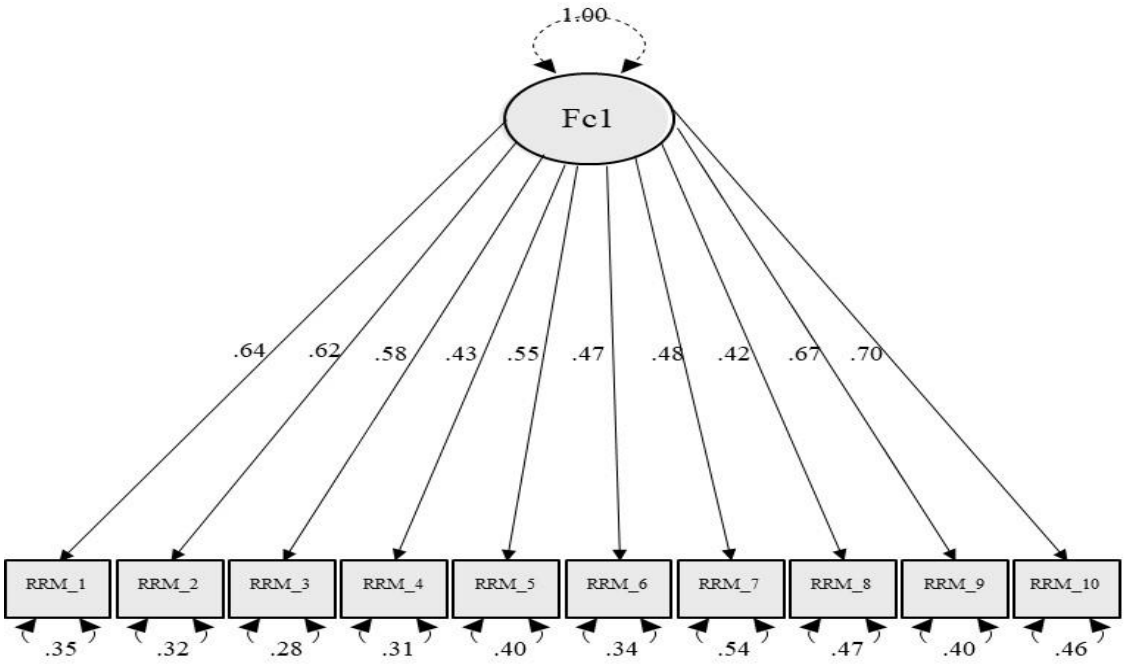

FIGURE 4
Rugged Resilience Measure (RRM) path diagram

TABLE 5
Individual items statistics and factor loading

ID item	*M*(*SD*)	Item-rest correlation	$\omega_{h,}$ when deleted	EFA loadings	CFA loadings
ARM-R:					
ARM1	4.2(.73)	.534	.906	.667	.518
ARM2	4.6(.61)	.369	.908	.331	.300
ARM3	4.3(.75)	.454	.907	.692	.422
ARM4	4.2(.90)	.577	.904	.723	.621
ARM5	3.9(1.09)	.559	.905	.704	.703
ARM6	3.8(.97)	.592	.904	.345	.635
ARM7	3.9(.85)	.524	.906	.431	.531
ARM8	3.8(1.07)	.644	.901	.652	.819
ARM9	4.0(.89)	.620	.903	.693	.653
ARM10	3.9(.91)	.628	.903	.670	.633
ARM11	4.2(.94)	.612	.903	.733	.636
ARM12	4.1(.89)	.621	.903	.686	.646
ARM13	3.9(.90)	.548	.905	.675	.600
ARM14	4.3(.73)	.538	.905	.366	.517
ARM15	4.2(.88)	.619	.903	.760	.626
ARM16	4.3(.73)	.557	.905	.647	.525
ARM17	4.2(.88)	.570	.904	.334	.617
ARM18	4.3(.73)	.559	.905	.385	.477

(table 5 continues)

Table 5 (continued)

ID item	*M*(*SD*)	Item-rest correlation	$\omega_{h,}$ when deleted	EFA loadings	CFA loadings
RRM:					
RRM1	4.2(.86)	.686	.870	.719	.638
RRM2	4.1(.81)	.674	.872	.710	.624
RRM3	3.9(.78)	.694	.871	.753	.585
RRM4	4.4(.69)	.575	.879	.618	.432
RRM5	4.0(.79)	.602	.877	.642	.545
RRM6	4.4(.72)	.580	.879	.601	.550
RRM7	4.2(.88)	.496	.885	.502	.479
RRM8	4.2(.83)	.556	.880	.633	.424
RRM9	3.9(.91)	.663	.872	.692	.667
RRM10	4.1(.95)	.664	.872	.683	.702

Note. EFA = exploratory factor analysis; CFA = confirmatory factor analysis. ARM-R = Adult Resilience Measure-Revised; RRM = Rugged Resilience Measure. All scores are significant $p < .05$. For ARM-R factors: Factor 1 (ecology resources: family) = 4, 5, 8, 11, 15; Factor 2 (ecology resources: friends and community) = 6, 9, 10, 12, 13; Factor 3 (personal resources) = 1, 3, 7, 18; Factor 4 (opportunity and meaning) = 2, 14, 16, 17.

Test Confirmation 2: Reliability

The internal consistency analysis showed that the ARM-R ($\alpha = .906$; $\omega_h = .909$) and RRM ($\alpha = .885$; $\omega_h = .887$) are highly reliable. Item-rest correlations also demonstrated an acceptable correlation with the total score for both measurements (ranging from .369 to .686). Reliability would also be diminished with the removal of any item (for details, see Table 5).

Test Confirmation 3: Criterion Validity

Convergent validity. Pearson's *r* was used to measure the correlation between the three resilience scales: ARM-R, RRM, and RS-14. The RRM and RS-14 had the highest correlation ($r = .731$, $p < .001$), followed by RRM and ARM-R ($r = .672$, $p < .001$), and finally ARM-R and RS-14 ($r = .665$, $p < .001$).

Predictive validity. Both resilience measures were negatively correlated with childhood adversity ($r_{ARM\text{-}R} = –.338$, $r_{RRM} = –.165$, $p < .001$). We also found that adverse childhood experiences predicted a lower score in both ARM-R (standardized $\beta = –.338$, adjusted $R^2 = .113$, $p < .001$) and RRM (standardized $\beta = –.244$, adjusted $R^2 = .058$, $p < .001$).

Incremental validity. We administered stepwise hierarchical linear regression with life satisfaction (SWLS) as the outcome and RS-14 as the predictor in the first step. This model was significant (adjusted $R^2 = .414$; $t = 23.001$, $p < .001$). The ARM-R followed by RRM was then entered and both significantly strengthened the predictive capacity (Models 1 and 3 $\Delta R^2 = .049$, Models 1 and 2 $\Delta R^2 = .046$, $p < .001$; see Table 6 for details).

Discussion

The study adapted and evaluated the psychometric properties of the Adult Resilience Measure-Revised (ARM-R) and Rugged Resilience Measure (RRM) in an Indonesian adult population. We covered

adults from 18 to 72 years old, with an average age of 27 years. Both measures were found to be valid (i.e., structural, convergent, predictive, and incremental validity) and reliable.

TABLE 6
Hierarchy linear regression model of resilience toward life satisfaction

Model	Standardized β	Adjusted R^2	*t*	*p*
Model 1:				
RS-14	.644	.414	23.001	< .001
Model 2:				
RS-14	.452	.460	12.552	< .001
ARM-R	.289		8.034	
Model 3:				
RS-14	.403	.463	9.499	< .001
ARM-R	.259		6.737	
RRM	.094		2.192	

Note. RS-14 = Resilience Scale; ARM-R = Adult Resilience Measure-Revised; RRM = Rugged Resilience Measure.

From a descriptive analysis, both scores had a left-skewed distribution, indicating the tendency to perceive better resilience. The initial development of RRM also showed that Indonesia has the highest scores among other countries (Jefferies et al., 2022). This finding implies that we need to set different cut-offs for the "normal," "good," or "poor" level of resilience for the Indonesian populations. We also found significant differences between the socio-demographic groups in ARM-R and RRM.

The resilience scores were significantly different by gender, education, and occupation. Gender differences in resilience align with the notion that "men and women differ in almost all aspects of health and well-being" (Hirani et al., 2016, p. 458). This contrasts with a recent meta-analysis study in Turkey that showed that males' and female's resilience were equal (Arı & Ersoy, 2020). Yet another study found that resilience's role in psychological distress differed depending on gender (Zhang et al., 2018), and women demonstrated different resilience processes from men because of different roles in the community (Smyth & Sweetman, 2015). The difference in education was shown between the person who had graduated from secondary education and post-secondary (i.e., graduate studies) education. A study conducted by Weitzel et al. (2022) found a similar pattern in which adults with a high level of education had significantly higher resilience compared to a low level, while no difference was found between middle-level and low levels of education. This study was conducted in higher education and found that resilience scores also differed between students and lecturers. All these variations need to be accounted for when administering the measurements.

Both measurements demonstrated good internal consistency ($\omega_{ARM\text{-}R}$ = .909; ω_{RRM} = .887). Each item was reliable, which means they correlated with each other for measuring resilience. Even the deletion of one item led to lower internal consistency. Although correlated, the items still had a unique contribution to resilience factors. For example, in ARM-R, Item 5 (related to family) and Item 6 (related to the community) correlated under ecology resources. However, the former contributed more appreciably (EFA loading = .816) than the latter (EFA loadings = .586). All items in ARM-R and RRM explained the variation in resilience scores.

The study reveals a 1-factor model for RRM. The result shows that the Indonesian version's structure is similar to the original version. However, findings demonstrate a different trend for the Indonesian version of ARM-R, with the 4-factor model outperforming the 2-factor and 3-factor models that have been existed form previous studies. The Persian version confirmed the 2-factor model, which is the same as the original (Aghebati et al., 2023) while the Spanish (Llistosella et al., 2019) and Brazilian versions (Ferreira et al., 2022) confirmed the 3-factor model. These findings are reasonable given that the socio-ecological framework of resilience highlights the importance of culture and context (Ungar, 2004). The resilience process may be different depending on them. People from different cultures and contexts may perceive resilience factors differently.

To label the four factors found in ARM-R, we refer to the definition of resilience in the socio-ecological framework: "[w]here there is potential for exposure to significant adversity, resilience is both the capacity of individuals to navigate their way to the psychological, social, cultural, and physical resources that build and sustain their well-being, and their individual and collective capacity to negotiate for these resources to be provided and experienced in culturally meaningful ways" (Ungar, 2012, p. 17).

From the definition, four essential aspects of resilience interact with each other, namely the person's strengths and challenges (P_{SC}), ecology (E), availability and accessibility of opportunities (O_{AV} and O_{AC}), and meaning system (M). P_{SC} include the person's advantages and disadvantages that may influence the process of achieving good outcomes. Ecology is not just the environment but the relation between a person and their environment. O_{AV} and O_{AC} represent the capacity of physical and social ecology to provide resources. Finally, the meaning system is the set of values, beliefs, and assumptions that individuals and society adhere to. All aspects are expressed in this formula:

$$R_B = \frac{f(\mathrm{P_{SC}}, \mathrm{E})}{(\mathrm{O_{AV}}, \mathrm{O_{Ac}})(\mathrm{M})}$$

Analyzing both the items and the concept, we formulated four factors of ARM-R: (1) ecology resources: family; (2) ecology resources: friends and community; (3) personal resources; and (4) opportunity and meaning. ARM-R and RRM have good criterion validity, which is supported by three pieces of evidence. First, both measurements highly correlated with other resilience measures (i.e., RS-14). RRM has a higher correlation with RS-14 than ARM-R because they measure internal psychological characteristics related to resilience. Whereas ARM-R focuses more on personal resources and person-environment relationships to bounce back from adversities. Second, ARM-R and RRM are associated negatively with adverse childhood experiences. The finding supports the notion that resilience becomes a protective factor for those experiencing many childhood adversities (Daníelsdóttir et al., 2022; Masten et al., 1999; Soleimanpour et al., 2017). Third, the notion that resilience predicts higher life satisfaction (Temiz & Comert, 2018; Yildirim, 2019) is supported. Variations of life satisfaction scores by resilience were increased by 5% after adding ARM-R and RRM into the model ($\Delta R^2 = .049$, $p < .001$). This improvement is quite meaningful because a similar analysis of the Indonesian children's version of the resilience measure (i.e., CYRM) produced a 1% improvement (Borualogo et al., 2023).

The current progression of resilience research find that resilience is multidimensional and involves multiple levels/systems (Liu et al., 2017; Masten, 2019; Ungar et al., 2021; Xu & Kajikawa, 2018). Bronfenbrenner (1994) identified five systems surrounding an individual: the microsystem, mesosystem, exosystem, macrosystem, and chronosystem. The RRM, which measures internal strengths, represents the psychological aspect of a resilient adult at the center of Bronfenbrenner's model and thus how they interact with aspects of their micro- and mesosystem. Family, friends, and community resources are dimensions of the ARM-R that represent environmental influences (the micro-, meso-, and exosystem). Furthermore,

opportunity and cultural resources in the ARM-R may be linked to the macrosystem of Bronfenbrenner's model. In this way, the use of both measurements facilitates a multisystemic understanding of resilience in Indonesian adults.

The study has three limitations of note, which are related to context, culture, and imbalanced demographic characteristics. According to the socio-ecological framework of resilience, context will specify adversities and positive outcomes experienced by individuals. For example, a lecturer such as a researcher in a university is expected to publish a peer-reviewed article and is prone to be the victim of a predatory journal. Conversely, the market researcher is expected to find consumer preferences, and the main challenges are related to the competitor's product and the customer's demand. Since this study was conducted in higher education institutions, we need further research to explore how scores on the measure relate to various contexts (e.g., the adult population in ministry offices, manufacturing industries, businesses, private companies, etc.).

A similar suggestion also applies to culture. Culture, represented by ethnicity and religion, shapes an individual's meaning system in the resilience process. Furthermore, this meaning system moderates the effect of protective factors on positive outcomes (Ungar & Theron, 2020). This study, instead, has limited cultural and religious variations. Addressing these issues would provide evidence for external validity and would support the generalizability of measurements across different populations and settings. Related to previous limitations regarding cultural and religious variations, this study also had an imbalance among types of university, occupation, and gender, which has implications for the generalization of findings. In further research, instead of snowball sampling, we recommend that scholars administer maximum variation sampling to achieve a greater balance across demographic characteristics.

Conclusion

The Indonesian versions of ARM-R and RRM are valid and reliable. The validity of measurements is indicated by fit structural validity and good criterion validity. Reliability is indicated by high internal consistency and good factor loadings of the items. Both measurements are ready to use to identify the resilience process. We encourage scholars and practitioners to use both measurements to capture the resilience process comprehensively, covering both internal and external resources.

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