

The adaptation of self-regulation scale into Indonesian: Confirmatory factor analysis

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Abstract. Self-regulation is a key factor in supporting individuals in achieving their desired goals. Therefore, self-regulation needs to be measured accurately according to the language used by research participants. The purpose of this study was to adapt the Schwarzer's Self-Regulation Scale (SRS) into Indonesian language. This study was conducted in two stages, which were scale adaptation and Confirmatory Factor Analysis. The adaptation procedure was based on Beaton's Guidelines for the Cross-cultural Adaptation Process. The adaptation process involved two forward translators, one moderator, three back translators, four experts on committee review, and forty-one participants in pretesting. There were also 423 participants with various backgrounds of age, education, and occupation status on field-testing that the collected data were used for CFA. The result of this study was an Indonesian's SRS consisted of six items with decent quality, showing by the score of λ between .573 to .740 and the reliability Cronbach's α .754. The CFA results of the Indonesian's SRS showed a good model fit, as seen from the value of CFI = .993, TLI = .985, GFI = .992, RMSEA = .036, and SRMR = .024. It can be concluded that the Indonesian's SRS has good psychometric standards and is ready to be used for research.

1 Introduction

Self-regulation has emerged as a critical construct in understanding human behavior, motivation, and learning process across diverse domains, such as education, health behavior, and emotional well-being. Self-regulation allows individuals to make plans, make choices, block unwanted thoughts, and regulate behavior when conflicts or changes occur in the surrounding environment [1,2]. This is especially necessary when there are goals to be achieved. Self-regulation is a way for individuals to evaluate, approach, and achieve their set goals [3]. Self-regulation should not be confused with self-awareness and self-monitoring, which involve knowledge of the behaviors necessary to achieve desired behaviors or goals [4]. Individuals need to regulate cognitive and behavioral efforts to exert effort and attention on the tasks they must perform [3,5]. Self-regulation skills will facilitate goal-achieving behavior by allowing individuals to delay short-term gratification to achieve the desired goal.

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Self-regulation is related to developmental maturity and the effective regulation of behavior [6]. Although most of the skills and stages involved in self-regulation are dynamic, sequential, and recursive [7,8], self-regulation abilities are related to stable personality variables [6]. In general, self-regulation to achieve goals is assumed to occur consciously. However, developmentally, it has been shown that various cognitive and behavioral regulations can occur unconsciously through the interaction of situational cues, mental representations of desired stages, and routine behaviors conducted in an efficient yet flexible manner [5]. In adult populations, particularly women, self-regulation is closely associated with mental health outcomes, work-life balance, and effective interpersonal functioning. Given its broad implications, accurate assessment of self-regulation is essential for both research and applied intervention efforts.

One widely used instrument is Self-Regulation Scale [9] which conceptualize self-regulation as a general competence encompassing planning, goal setting, perseverance, and adaptive coping. The SRS [9] has been used in numerous studies on self-regulation, including those related to smartphone usage habits [10] which was the main variable of the research. Self-Regulation Scale [9] is a concise measurement tool with 10 items, meets the criteria for a reliable measurement tool with a Cronbach's α value > 0.6 , and has been used in research on smartphone usage habits. While the scale has demonstrated strong psychometric properties in western populations as evidenced by Cronbach's $\alpha = 0.82$ at German and $\alpha = 0.74$ at USA [9], its applicability in different cultural context – such as Indonesia – remains underexplored.

In Indonesia, the availability of culturally adapted and psychometrically validated instruments is still limited. Cultural values, gender role, and social expectations may influence how self-regulation behaviors are expressed and understood, particularly among adult women, who often navigate multiple roles in familial, professional, and social domains. Thus, it was imperative to ensure that measurement tools were not only linguistically translated but also conceptually equivalent and structurally valid within the target population. To address this gap, the present study aimed to adapt and validate the Self-Regulation Scale [9] for use with Indonesian adult women through Confirmatory Factor Analysis (CFA). This process would assess the factorial validity of the scale and contributed to the development of reliable and culturally relevant instrument for future research and practice in Indonesia.

2 Methods

2.1 Participants

This study consisted of two processes, which were adaptation and field testing. The adaptation process involved two forward-translators with English Education and Clinical Psychology background, a moderator with doctoral degree in Social Psychology, and three back translators which were Psychology Doctoral students in United Kingdom and Australia. There also expert committee consisted of three professors from English Education, Developmental Psychology, and Psychometry, also one Family Education expertise. The last stage of adaptation process was prefinal testing followed by forty-one participants. This process then followed with field testing with 423 participants. Below is the demographic data of the prefinal and field-testing participants.

Table 1. Participants’ Demographic Data

Characteristics		Prefinal stage participants	Field-testing participants
N		41 (100% female)	423 (100% female)
Age	20-25	2 (4.9%)	32 (7.6%)
	26-30	11 (26.9%)	131 (31%)
	31-35	18 (43.9%)	153 (36.2%)
	35-40	6 (14.6%)	68 (16.1%)
	>40	4 (9.7%)	23 (5.4%)
	Not answered	0	16 (3.8%)
Highest education	Junior high school	0	12 (2.8%)
	Senior high school	3 (7.3%)	87 (20.5%)
	Diploma	4 (9.7%)	84 (20.5%)
	Bachelor	19 (46.3%)	201 (47.6%)
	Master	13 (31.7%)	38 (9%)
	Doctoral	2 (4.9%)	1 (0.2%)
Occupation	Housewife	12 (29.2%)	133 (31.4%)
	Part time worker	5 (12.2%)	121 (28.5%)
	Full time worker	24 (58.5%)	169 (40.1%)

2.2 Research Instrument

This study was scale adaptation process of Self-regulation Scale [9]. This scale was multidimensional, consisted of Attention Control (RAC1, RAC2, RAC3, RAC4, RAC5, RAC6, RAC7) and Emotion Regulations (RER1, RER2, RER3). The original Self-Regulation Scale consisted of ten items, seven items favorable and three items unfavorable. Each item on the scale was rated on a 4-point scale ranging from 1 (not at all true) to 4 (completely true) for the favorable items, reversely for the unfavorable items. The original SRS yielded an internal consistency (Cronbach’s α) .82 in German [9]. Cross cultural research of SRS yielded Cronbach’s α of .75, .74, and .73 in Costa Rica, Finland, and Poland [11].

2.3 Research Procedure

The adaptation process started by contacting the author of SRS original version by email and got reply that included link to website that contained the items and some adaptation versions of SRS in many languages. The adaptation procedures followed Beaton’s Guideline for Cross-Cultural Adaptation Process consisted of five stages, which were: 1) Forward-translations stage, the two forward-translators made translation of the item content and response options from English to Indonesian; 2) Synthesize stage, the written report of translation then given to the moderator led discussion among the two translators and a researcher that made consensus by considering the psychological term and daily language that can be easily understood by the following participants without changing the meaning of each item; 3) Back-translation stage, three back-translators worked independently based on the synthesized report. There are only minor differences of words without different meaning between the three back-translation drafted reports. Those reports were then summarized by

the research team and brought to the expert committee; 4) Expert review stage, four expertise consisted of three professors from English Education, Developmental Psychology, and Psychometry, and one doctoral level Family Education expertise, reviewed and gave recommendation for the prefinal version; and 5) Prefinal testing stage, the prefinal version scale then adjusted to be Google Form version. The prefinal version scale then spread to forty-one participants that gave comments about the clarity and understandability for each item and chosen response. The researcher then adjusted for the online version so it could be much more user friendly. The five stages adaptation process resulted the Indonesian version of SRS which then used in the field testing.

The field testing held by spreading Google Form link of Indonesian version SRS. The first model of Indonesian’s SRS consisted of two dimensions; attention control dimensions contained seven items and emotion regulation dimensions contained three items. This first model would be called M1. The M1 analyzed with CFA to check whether the M1 had fulfilled the fit model criterion. When the model did not meet the criteria, M1 was modified to M2 by dropping items that had loading factors below .4 and then analyzed again with CFA. When M2 still does not meet the criteria, the model was modified to be M3 used modification indices procedure. After evaluating the model fit, this study also calculated construct reliability (CR) and average variance extracted (AVE).

All the procedures had been reviewed by the Ethic Committee of Faculty of Psychology UGM and give ethical clearance with number 10339/UN1/FPsi.1.3/SD/PT.01.04/2024.

2.4 Data Analysis Techniques

Data analysis techniques that were used for quantitative research were descriptive statistics, confirmatory factor analysis, and reliability testing. This study used JASP 0.19.3.0 for the descriptive statistics and Confirmatory Factor Analysis, and Excel from Microsoft 365 Apps for other calculations.

3 Result

3.1 Adaptatipn

Table 2. Below presents the result of the five-stage adaptation process.

Item Number	Items
RAC1	Saya dapat berkonsentrasi pada satu aktivitas untuk waktu yang lama, jika diperlukan.
RAC2	Jika perhatian saya teralihkan dari suatu aktivitas, maka saya tidak mengalami kesulitan untuk segera kembali pada aktivitas tersebut.
RAC3	Saya sulit untuk menekan pikiran-pikiran yang mengganggu aktivitas yang harus saya lakukan. (UF)
RAC4	Saya dapat mengendalikan pikiran agar tidak teralihkan dari tugas yang sedang saya kerjakan.
RAC5	Setelah mengalami gangguan, mudah bagi saya untuk kembali konsentrasi bekerja.
RAC6	Saya sering memiliki pikiran-pikiran dan perasaan-perasaan yang mengganggu kemampuan saya untuk fokus bekerja. (UF)
RAC7	Saya tetap fokus pada tujuan dan tidak membiarkan apapun mengalihkan saya dari rencana kerja saya.
RER 1	Jika suatu aktivitas memicu perasaan yang berlebihan, maka saya dapat menenangkan diri dan segera kembali melanjutkan aktivitas tersebut.

Table 2 (contidued). Below presents the result of the five-stage adaptation process.

Item Number	Items
RER2	Jika menemui suatu aktivitas yang memerlukan fokus pada masalah, saya dapat mengendalikan perasaan saya
RER3	Ketika mengkhawatirkan sesuatu, saya tidak bisa berkonsentrasi pada suatu aktivitas. (UF)

Note. UF = Unfavorable item

3.2 Confirmatory Factor Analysis

Before the Confirmatory Factor Analysis, there were requirements to check the data normality by checking the skewness value with criteria $-1 < \text{Skewness} < +1$. Data normality test analyzed with descriptive statistics using JASP software. The result showed that skewness value of M1 ranging from $-.810$ to $.256$ that could be concluded as excellent (Hair et al., 2022) that meant the data was normal and could be continued for CFA, so that the result could be seen on Table 3 below.

Table 3. Result of Self-regulation Scale CFA

Good fit index	M1	M2	M3
CFI $>.9$	.862	.961	.993
TLI $>.9$	.817	.928	.985
RMSEA $<.05$	.085	.079	.036
SRMR $<.08$	.063	.038	.024
GFI $>.90$	.941	.979	.992

On the Table 3 could be seen that the first model of Indonesian SRS (M1) fits indices was as follows: CFI = .862, TLI = .817, GFI = .941, RMSEA = .085, and SRMR = .063. From the result we could see that only GFI value that met the criteria. To modified M1 done by checking the loading factor and dropped items that had loading factor < 0.4 that could be seen on Table 4 below.

Table 4. Loading Factor of Indonesian Self-Regulation Scale

Item Number	M1	M2	M3
RAC1	.501	.518	.573
RAC2	.362		
RAC3	.300		
RAC4	.656	.673	.651
RAC5	.570	.552	.604
RAC6	.357		
RAC7	.597	.609	.612
RER 1	.740	.735	.740
RER2	.672	.696	.692
RER3	.286		
Cronbach's α	.743	.754	.754

As can be seen in Table 4 that the loading factors for items RAC2 (.362), RAC3 (.300), RAC6 (.357), and RER3 (.286) were below .4 then dropped and became model M2.

Back to Table 3, CFA values of M2 resulted in CFI = .961, TLI = .928, GFI = .979, RMSEA = .079, and SRMR = .038. This result showed that most of the good fit indexes had been increased, but the RMSEA value still <0.06 . There was a need to do the modification indices by connecting the residual covariances between RAC1 and RAC5 as the M3. The CFA of M3 showed CFI = .993, TLI = .985, GFI = .992, RMSEA = .036, and SRMR = .024.

This result indicated that all the good fit indexes of M3 met the criteria. The model plot based on M3 results was presented below.

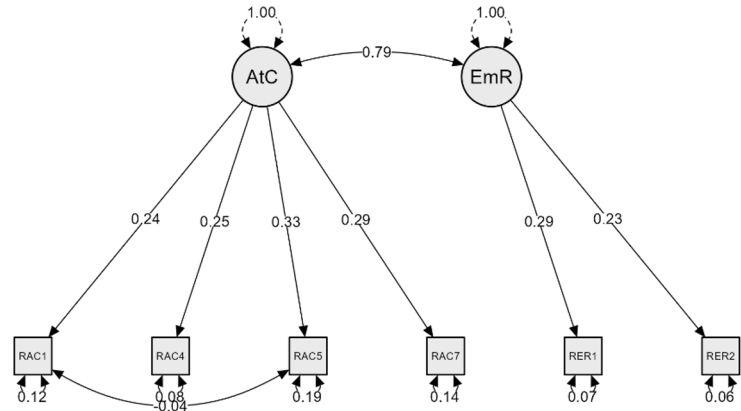


Fig 1. Model Plot of CFA Result

Beside CFA result, we also count the AVE (*Average Variance Extracted*) and CR (*Construct Reliability*) of the Indonesians' SRS. The formula for calculating AVE and CRA values was presented below.

$$\text{AVE} = \frac{\sum \text{Standardized Loading}^2}{\sum \text{Standardized Loading}^2 + \sum e_j}$$

$$\text{CR} = \frac{(\sum \text{Standardized Loading})^2}{(\sum \text{Standardized Loading})^2 + \sum e_j}$$

The AVE value for Attention Control was .860 and .873 for Emotion Regulation. Meanwhile the CR for Attention Control was .96 and .93 for Emotion Regulation. The result showed that AVE and CR value had passed the cut-off criteria (AVE > .5; CR > .9).

4 Discussion

In this study, we investigated whether a new dataset from field testing participants was suitable for the 2-factor model devised in the original model [9]. To evaluate the model fit of CFA, it was important to consider the criteria associated with various model fit indices. It has been suggested that RMSEA values less than .05 were good, values between .05 and .08 were acceptable, values between .08 and .1 were marginal, and values greater than .1 were poor [12]. Therefore, even though the RMSEA value in M2 has shown .79 which means acceptable fit, to make the more optimal model for the data, the modification indices (MIs) were considered. It was found that based on the residual covariance results showed that RAC1 and RAC5 allowed to be correlated with modification indices = 16.492 and EPC = -.039. The inter-item correlation in the final two-factor model (Fig. 1) yielded on the M3 value of RMSEA = .036, indicated that the Indonesian's SRS was good fit. Further examination was conducted to items RAC1 and RAC5, where RAC1 was "*Saya dapat berkonsentrasi pada satu aktivitas untuk waktu yang lama, jika diperlukan.*" while RAC5 was "*Setelah mengalami gangguan, mudah bagi saya untuk kembali konsentrasi bekerja.*". Both items had

similarity of item wording, which was konsentrasi or concentrate in the origin item. Both items also came from the same dimension, Attention Control.

The other model fit indexes, namely CFI, TLI, and GFI should be over .9 for a good fit [13]. That could be seen that those three indexes already indicated the good fit on the M2 with CFI = .961, TLI = .928, and GFI = .979. The modifications made to the M3 had increased the model fit indexes, with values of CFI = .993, TLI = .985, and GFI = .992, RMSEA = .036, and SRMR = .024. This final model result indicated that all the model fit indexes were on good criteria. The resulting model had two factors, Attention Control and Emotion Regulation. There were two items loading and correlated errors for two items on the Attention Control factor. There were also two items loading on the Emotion Regulation factor.

Another interesting finding was that most items with low lambda values ($<.4$) and need to be dropped were unfavorable items (RAC3, RAC6, and RER3). The item RAC3 was “Saya sulit untuk menekan pikiran-pikiran yang mengganggu aktivitas yang harus saya lakukan.”, RAC6 was “Saya sering memiliki pikiran-pikiran dan perasaan-perasaan yang mengganggu kemampuan saya untuk fokus bekerja.”, and RER3 was “Ketika mengkhawatirkan sesuatu, saya tidak bisa berkonsentrasi pada suatu aktivitas.”. Those three items had meaning when individual has thought and feeling distracted from task, work, or activity that needs to be done. It can be indicated that the unfavorable items could assess another dimension than Attention Control and Emotion Regulation. This condition similar with [14] that negative worded item could misleading interpretations of the items.

Apart from the CFA results which are in the accepted category, the Indonesian’s SRS version had quite good reliability, namely Cronbach alpha = .754. This result was not much different from SRS adaptation in other languages with Cronbach’s α .75, .74, and .73 in Costa Rica, Finland, and Poland, and 0.76 in USA [11].

5 Conclusion

This study had successfully adapted Schwarzer’s Self-regulation Scale into Indonesian and conducted a Confirmatory Factor Analysis on the results. The Indonesian’s SRS version consisted of six items, down from the previous ten. This Indonesian’s SRS version had decent quality, showing by the score of λ between .573 to .740 and the reliability Cronbach’s α .754. This Indonesian version has met the good fit model, with the value of CFI = .993, TLI = .985, GFI = .992, RMSEA = .036, and SRMR = .024.

6 Implication

The Indonesian version of the Self-Regulation Scale (SRS) has demonstrated its potential to be used as a data collection instrument in quantitative research on self-regulation. Although the field trial was limited to female participants – reflecting the characteristics of the main study – the results indicate that the instrument functions adequately within that sample. Future studies could extend the validation process by including both male and female participants across a broader age range and diverse demographic backgrounds to enhance the generalizability of the instrument. Additionally, the present study did not employ parallel instruments to assess convergent and discriminant validity. Thus, future research is recommended to strengthen the psychometric properties of the Indonesian SRS and confirm its utility as a robust tool for data collection in various research contexts.

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Data Availability Statement: The data that supports the findings of this study are not openly available and are available from the corresponding author on reasonable request.

Authors' Contribution Statement: ASF, TA, and AF designed the study. ASF conducted the data collection with help from the research assistants. ASF, TA, and AF discussed the scale adaptation result, ASF performed the statistical analysis. ASF preparing the draft paper. All authors read and approved the last version of the manuscript.

Completing Interest: The authors declare that they have no competing interest in the study.

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