



RESEARCH ARTICLE

Cognitive Flexibility and Resilience in Adolescents: Exploring Gender Differences and Cultural Implications

Lintang Mahardhika Artawijaya¹, Mahardika Supratiwi²

Published online: 26 November 2024

Abstract: This study explores the role of cognitive flexibility in enhancing resilience among Indonesian adolescents, using a cross-sectional research design. A total of 152 high school students from grades 10 and 11 participated, with data collected through the Cognitive Flexibility Scale (CFS) and the Brief Resilience Scale (BRS). The findings revealed a significant positive relationship between cognitive flexibility and resilience, indicating that cognitive flexibility is a crucial predictor of resilience. The study also identified significant gender differences in resilience, with male adolescents exhibiting higher resilience levels than females. These results align with existing research, emphasizing the importance of cognitive flexibility in psychological well-being and stress management. Furthermore, the study contributes to the broader literature by demonstrating that the relationship between cognitive flexibility and resilience is robust across different cultural contexts, including Indonesia. The practical implications of these findings are substantial, suggesting that educational programs should integrate cognitive flexibility into school curricula through targeted teacher training and specialized learning modules. Additionally, the development of gender-specific interventions is recommended to address the distinct needs of male and female adolescents. Future research should further investigate the mechanisms underlying the relationship between cognitive flexibility and resilience, particularly considering potential moderating factors such as family environment and school context. Longitudinal studies would be beneficial to track the development of these traits over time, providing deeper insights into their dynamic interaction. Understanding cultural influences on these constructs is also crucial for designing culturally appropriate and effective interventions.

Keywords: cognitive flexibility, resilience, adolescents, gender differences, cultural context

INTRODUCTION

Research on adolescent mental health has gained substantial attention in recent years, highlighting the growing concern over psychological issues during this critical developmental period (Martinez et al., 2022). Globally, it is estimated that one in seven adolescents aged 10-19 years experiences psychological issues such as anxiety disorders, depression, and behavioral problems (Salma, 2022; WHO, 2021). These psychological challenges often manifest in risky behaviors, including increased smoking, alcohol consumption, drug abuse, and risky sexual behaviors, alongside difficulties in emotional regulation (Barger et al., 2017). If these issues are not recognized and properly managed, they can persist into adulthood, adversely affecting the quality of life (Anghel, 2020).

Several factors contribute to the heightened psychological stress experienced by adolescents, including technological advancements, physiological growth phases,

and lifestyle patterns. For instance, research by Anjum et al. (2022) highlights that female adolescents are particularly vulnerable to higher stress levels due to emotional surges and physiological changes associated with puberty. Additionally, academic demands and parental expectations are significant stressors for both genders, exacerbated by poor lifestyle choices such as inadequate physical activity and poor sleep quality (Jakobsson et al., 2018). The increased use of technology further disrupts sleep quality, aggravating stress levels among adolescents (Jakobsson et al., 2018). Collectively, these factors place adolescents in a vulnerable position regarding psychological issues, necessitating the identification of protective factors that can mitigate these risks.

Resilience has emerged as a critical protective factor that can shield adolescents from various psychological problems (Anghel, 2020). Low resilience is associated with negative outcomes, including school dropouts, learning difficulties, violent behavior, social withdrawal, low self-esteem, and suicidal tendencies (Barger et al., 2017). Conversely, individuals with high resilience tend to engage in adaptive behaviors, adopt healthier lifestyles, and utilize active coping mechanisms, which contribute to overall well-being (Brewer et al., 2019; Wu et al., 2013). Given the potential benefits of resilience in addressing adolescents' psychological issues, it is essential to identify the factors that can enhance resilience.

^{1),2} Program Studi Psikologi Universitas Sebelas Maret
Surakarta

**) corresponding author*

Lintang Mahardhika Artawijaya

Email: lintangmahardhika@student.uns.ac.id

Cognitive flexibility has been increasingly recognized as a significant predictor of resilience, particularly in the context of mental health. Cognitive flexibility, which refers to the mental ability to switch between thinking about different concepts and adapt to changing environments, is crucial in managing stress and overcoming adversity (Diamond, 2013). It has been shown that individuals with higher cognitive flexibility are better equipped to handle stressful situations, as they can effectively shift their thoughts and perspectives, which is essential for emotional regulation and problem-solving (Cañas et al., 2003; Martin & Rubin, 1995).

Recent empirical studies have provided robust evidence supporting the link between cognitive flexibility and resilience. For example, Genet and Siemer (2011) found that cognitive flexibility plays a pivotal role in trait resilience by facilitating adaptive emotional responses to stress. Their research demonstrated that individuals with high cognitive flexibility are more capable of regulating their emotions and maintaining positive mental health outcomes during challenging times. Similarly, a study by Arici-Ozcan et al. (2019) revealed that cognitive flexibility mediates the relationship between distress tolerance and resilience, highlighting its role in helping individuals cope with emotional difficulties.

Further, research by Ram et al. (2019) emphasized the importance of cognitive flexibility in managing impulsivity and reactive stress responses, which are critical components of resilience. They found that individuals who exhibited greater cognitive flexibility were more likely to employ effective coping strategies, which in turn bolstered their resilience. This finding is consistent with other studies that have shown how cognitive flexibility enables individuals to adjust their coping mechanisms in response to environmental demands, thereby enhancing resilience (Rademacher et al., 2023; Sünbül, 2020).

In addition, Otero et al. (2020) reported that cognitive flexibility significantly predicted resilience among university students, indicating that this relationship extends across different age groups and contexts. Their study demonstrated that students with higher cognitive flexibility exhibited better adaptive responses to academic and social stressors, further solidifying the connection between these two constructs. This body of literature suggests that enhancing cognitive flexibility could be a key intervention target for promoting resilience, especially in populations vulnerable to stress and adversity.

Resilience is broadly defined as an individual's capacity to face and recover from adversity, with variations in its conceptualization (Masten, 2018; Rutter, 2012; Saklofske et al., 2023; Zautra et al., 2010). While some scholars view resilience as a personality trait that aids in adaptation, others see it as a dynamic process that leads to positive outcomes following adversity (Masten & Cicchetti, 2016). Despite these definitional differences, the utility of the construct lies in its ability to explain and measure relevant phenomena accurately. This study adopts Smith et al.'s (2008) definition of resilience, emphasizing the capacity to rebound from challenges.

Carver (1998) outlines three critical aspects necessary for resilience: directly confronting the source of adversity, maintaining a positive outcome orientation, and possessing internal resources for active coping. Although social support is often highlighted as an important factor in resilience, Carver (1998) argues that it should be considered an external resource rather than a core aspect of resilience. Smith et al. (2013) further distinguish resilience from potential enhancing factors, focusing on the individual's ability to recover from stress.

Cognitive flexibility plays a key role in resilience by aiding in reasoning, problem-solving, and planning (Diamond, 2013). It involves the awareness of alternative options, adapting cognitive processes, and believing in one's ability to be flexible (Cañas et al., 2003; Martin & Rubin, 1995). This flexibility extends to emotional regulation, where adaptable cognitive processes can replace inefficient ones (Rademacher et al., 2023). Cognitive flexibility allows individuals to shift perspectives, adapt thinking strategies, and reassess costs and benefits in response to changes, which are essential skills for resilience (Diamond, 2013; Martin & Rubin, 1995).

The dynamic interplay between cognitive flexibility and resilience is evident in numerous studies. Flexible cognition has been shown to aid in emotional regulation, perspective-taking, and coping with stress, all of which are crucial for enhancing resilience (Arici-Ozcan et al., 2019; Ram et al., 2019; Sünbül, 2020). Individuals with high cognitive flexibility are better equipped to confront problems directly, create new strategies spontaneously, and maintain high stress tolerance, which are vital components of resilience (Carver, 1998; Leipold et al., 2018).

Despite the growing body of research on resilience, much of it has focused on adults and college students, leaving a gap in our understanding of resilience among adolescents (Fullerton et al., 2021; Otero et al., 2020). Adolescents, as highlighted by Anjum et al. (2022), face significant vulnerabilities that require attention to enhance their psychological well-being and provide protective factors during their transition to adulthood. This aligns with Steinberg's (2005) assertion that adolescence is a phase vulnerable to maladaptive behaviors and psychopathological issues due to rapid biological, cognitive, and socio-emotional development.

This study aims to examine the relationship between cognitive flexibility and resilience among adolescents. The hypothesis for this research is that there is a positive relationship between cognitive flexibility and resilience among adolescents. By distinguishing resilience from enhancing factors, this study seeks to provide a clearer understanding of the relationship between cognitive flexibility and resilience, utilizing Smith et al.'s (2008) definition of resilience and Martin & Rubin's (1995) conceptualization of cognitive flexibility.

METHODS

Research Design

This study employed a quantitative research design with a cross-sectional approach. This approach was chosen because it allows researchers to measure the relationship between cognitive flexibility and resilience variables at a single point in time. The design is suitable for evaluating cause-and-effect relationships without the need to follow participants over an extended period. Additionally, the cross-sectional design provides a comprehensive overview of the variables under investigation within a specific population, namely high school adolescents (Creswell & Creswell, 2018).

Population and Sample

The population of this study consisted of high school students from a particular city, specifically those in the 10th and 11th grades. The selection of 10th and 11th

graders was based on the consideration of cognitive and emotional development during this critical age, which represents a significant transitional phase toward adulthood. At this stage, cognitive flexibility and resilience are still developing, making it a key period for gaining insights into the mechanisms by which adolescents adapt to challenges (Steinberg, 2005).

The total population comprised 732 students. The study sample was selected using a cluster random sampling technique to ensure the homogeneity and representativeness of the sample. This technique involved randomly selecting entire classes as units of analysis, so that each student within the selected classes had an equal chance of being included in the study (Sugiyono, 2021). Based on calculations using G*Power software with a significance level of $p \leq 0.05$ and a statistical power of 95% (Cohen, 1990), the ideal sample size was determined to be 109 students. However, to account for potential dropouts, the final sample size included 152 students, consisting of 66 male and 85 female students.

Research Instruments

Cognitive flexibility was measured using the Cognitive Flexibility Scale (CFS) developed by Martin & Rubin (1995). The scale consists of 12 items rated on a six-point Likert scale, where 1 indicates "strongly disagree" and 6 indicates "strongly agree." The CFS evaluates three main aspects: awareness of alternative options in various situations, willingness to be flexible and adapt to changes, and confidence in one's ability to be flexible. The scale was adapted into Indonesian through a back-translation process to ensure linguistic and cultural equivalence. The CFS has demonstrated good reliability in previous research, with a Cronbach's Alpha of 0.76 (Martin & Rubin, 1995). The adaptation process involved translating the scale into Indonesian by a bilingual expert, followed by back-translation into English by another expert who was not involved in the initial translation, to verify translation consistency (Beaton et al., 2000).

Resilience was measured using the Brief Resilience Scale (BRS) developed by Smith et al. (2008). The scale consists of 6 items rated on a five-point Likert scale, where 1 indicates "strongly disagree" and 5 indicates "strongly agree." The BRS measures an individual's ability to bounce back from difficulties and challenges, with items divided into three favorable and three unfavorable items. The BRS was also adapted into Indonesian through a back-translation procedure to ensure that the scale was linguistically and culturally appropriate in the Indonesian context. The scale has been tested and shown to have high reliability, with Cronbach's Alpha values ranging from 0.80 to 0.91 in previous studies (Smith et al., 2008).

Data Collection Procedures

Data were collected in several stages. First, ethical and administrative approvals were obtained from the school and the research ethics committee. Following this, the researchers conducted informational sessions with the students and their parents to explain the purpose and procedures of the study, and to ensure informed consent for participation. The research instruments, namely the CFS and BRS, were then distributed to students who had provided consent to participate. Each instrument was administered and completed anonymously by the students in the classroom, under the supervision of the researchers to ensure proper understanding and adherence to the

filling procedures. The time allotted for completing the questionnaires was approximately 30 minutes.

Data Analysis

The collected data were analyzed using simple linear regression analysis to determine the extent to which cognitive flexibility affects resilience (Tabachnick & Fidell, 2019). Prior to the main analysis, several regression assumptions were tested to ensure the validity of the model. Normality was tested using the Kolmogorov-Smirnov test, chosen for its effectiveness with large samples and its common use in regression analysis. The normality test results indicated that the data were normally distributed if the significance value was greater than 0.05 (Field, 2018). Subsequently, linearity was tested to ensure a linear relationship between cognitive flexibility and resilience. This test was conducted using ANOVA to assess deviations from linearity, with non-significant results ($p > 0.05$) indicating that the relationship between the variables was linear (Tabachnick & Fidell, 2019). Additionally, heteroscedasticity was tested using the Glejser test to check for unequal variance in the residuals. A good regression model shows no heteroscedasticity, as indicated by a significance value greater than 0.05 (Ghozali, 2018). Finally, multicollinearity was assessed using the Variance Inflation Factor (VIF) to ensure that there was no high correlation between independent variables that could distort the regression results. A VIF value lower than 10 indicates that there was no significant multicollinearity (Hair et al., 2014).

Ethical Considerations

This study received ethical approval from the Ethics Committee of the Faculty of Psychology, Universitas Sebelas Maret. All participants involved in the study provided informed consent after receiving a comprehensive explanation of the study's objectives, procedures, and their rights as participants, including the right to withdraw at any time without consequences. The data collected were kept confidential and used solely for research purposes. Additionally, the students' names and personal information were not recorded, ensuring the anonymity of the data. The research findings will also be communicated to the school to support student development programs.

RESULTS

Reliability Checking

Given the language adaptation of the Cognitive Flexibility Scale (CFS) and the Brief Resilience Scale (BRS) from English to Indonesian, it was crucial to assess the reliability of these instruments in the new cultural context. The reliability of both scales was evaluated using Cronbach's Alpha, a measure of internal consistency that indicates how well the items in a scale are correlated with one another. A higher Cronbach's Alpha score suggests that the items in the scale are more consistently measuring the same underlying construct, which is essential for ensuring the reliability of the instrument in research settings.

The Cognitive Flexibility Scale (CFS) demonstrated a Cronbach's Alpha score of 0.826, indicating good reliability. This suggests that the items within the CFS are well-correlated and consistently measure cognitive flexibility

among the participants. The high reliability score provides confidence that the CFS, despite being adapted into Indonesian, effectively captures the construct of cognitive flexibility in this cultural context.

Similarly, the Brief Resilience Scale (BRS) showed a Cronbach's Alpha score of 0.811, also indicating good reliability. This score suggests that the BRS items are reliably measuring resilience, and that the translation process has not compromised the scale's ability to accurately assess this construct among Indonesian adolescents. Overall, the reliability analysis confirms that both the CFS and BRS are reliable tools for measuring cognitive flexibility and resilience, respectively, in the Indonesian context. These results support the continued use of these adapted scales in further research and practice, ensuring that the measurements are both valid and reliable in assessing the psychological constructs of interest.

Descriptive Statistics

This study aims to understand the contribution of cognitive flexibility to resilience in adolescents. Table 1 presents the descriptive statistics and categorization of the two main variables—cognitive flexibility and resilience—as well as the gender distribution of the participants. The

study involved 151 adolescents, consisting of 66 males (43.4%) and 85 females (56.6%). The cognitive flexibility variable showed a mean score of 54.49 with a standard deviation of 6.937. Based on the categorization, 19% of the participants fell into the high cognitive flexibility category, 72% were in the medium category, and 9% were in the low category. The resilience variable had a mean score of 22.09 with a standard deviation of 3.859. The categorization results indicated that 22% of the participants had high resilience levels, 65% had medium resilience levels, and 13% were categorized as having low resilience.

The data indicate that the majority of participants have cognitive flexibility and resilience levels that fall within the medium category. This suggests that most adolescents in the sample have sufficient adaptive abilities to cope with challenging situations, although they have not yet reached optimal levels. A small proportion of adolescents exhibited high cognitive flexibility and resilience, indicating variation in adaptive and resilience capacities among adolescents. These findings imply a potential relationship between cognitive flexibility and resilience, which could be an important subject for further research. With the majority of participants in the medium category for both variables, these results highlight opportunities for developing intervention programs aimed at enhancing cognitive flexibility and resilience in adolescents.

Table 1 Descriptive Statistics and Categorization of Cognitive Flexibility and Resilience

Variable	Mean	SD	Category	N (%)
Gender			Male	66 (43.4)
			Female	85 (56.6)
Cognitive Flexibility	54.49	6.937	High	29 (19)
			Medium	110 (72)
			Low	13 (9)
Resilience	22.09	3.859	High	33 (22)
			Medium	99 (65)
			Low	20 (13)

Assumption Tests

Table 2 presents the results of assumption tests, including the normality test, linearity test, and heteroscedasticity test. The normality test results showed a statistic of 0.069 for both variables, with a significance (Sig.) value of 0.076. The linearity test, specifically the deviation from linearity test, showed an F value of 1.217 with a significance of 0.229. Lastly, the heteroscedasticity test for the cognitive flexibility variable resulted in a t value of -0.841 with a significance of 0.402.

The normality test results indicate that the data for both variables follow a normal distribution, meaning the normality assumption is met, allowing for the continuation of statistical analyses that assume normality. The linearity test results indicate no significant deviation from linearity,

suggesting that the relationship between cognitive flexibility and resilience can be considered linear. This allows for the use of linear regression analysis to explore the relationship between these two variables. The heteroscedasticity test results indicate no heteroscedasticity in the data, meaning that the variability of the residuals remains constant across the range of the independent variable, thus meeting the homoscedasticity assumption. This is important for ensuring the validity of the regression model to be used. Overall, the assumption tests in this study support the continuation of statistical analyses that require normality, linearity, and homoscedasticity assumptions, allowing the researcher to proceed with further analysis of the relationship between cognitive flexibility and resilience in adolescents.

Table 2. Assumption Test Results

Test Type	Variable	Statistic	t/F	Sig.
Normality Test	Cognitive Flexibility	0.069		0.076
	Resilience	0.069		0.076
Linearity Test	Deviation from linearity		1.217	0.229
Heteroscedasticity Test	Cognitive Flexibility		-0.841	0.402

Hypothesis Testing

Table 3 presents the results of simple linear regression analysis and related coefficients, followed by the resulting regression equation. The regression model shows an R value of 0.730, indicating a strong correlation between cognitive flexibility and resilience. The R Square (R^2) value of 0.533 indicates that approximately 53.3% of the variability in resilience can be explained by cognitive flexibility. The Adjusted R Square value, which accounts for

the number of variables in the model, is 0.529, confirming the model's explanatory power with minimal adjustment. In the coefficient section, the B value for the constant is -0.048 with a significance (Sig.) value of 0.978, indicating that the constant is not significant in this model. In contrast, the coefficient for the cognitive flexibility variable is 0.406 with a t value of 13.094 and a significance value of 0.000, meaning that cognitive flexibility significantly predicts resilience.

Table 3. Simple Linear Regression Results and Coefficients

Model Summary	R	R Square	Adjusted R Square	Std. Error of the Estimate	
	0.730	0.533	0.529	2.645	
Coefficients	Model	B	Std. Error	t	Sig.
	(Constant)	-0.048	1.704	-0.028	0.978
	Cognitive Flexibility	0.406	0.031	13.094	0.000

The regression analysis results show that cognitive flexibility significantly contributes to adolescent resilience. With an R value of 0.730, there is a strong relationship between the two variables, and the R^2 value of 0.533 indicates that more than half of the variability in resilience can be explained by cognitive flexibility. This suggests that cognitive flexibility is a strong predictor of resilience in adolescents.

The resulting regression equation is $Y = -0.048 + 0.406X$, where Y is resilience and X is cognitive flexibility. This equation indicates that for every one-unit increase in cognitive flexibility, resilience increases by 0.406 units. Although the constant in this model is not significant, this does not diminish the importance of cognitive flexibility's contribution to resilience, as indicated by the statistically significant coefficient. Overall, these results support the hypothesis that cognitive flexibility plays an important role

in enhancing adolescent resilience, suggesting that efforts to increase cognitive flexibility in adolescents can directly enhance their resilience in facing challenges.

Additional Analysis

Table 4 compares male and female adolescents in terms of cognitive flexibility and resilience. For the cognitive flexibility variable, the mean score for male adolescents was 55.64 with a standard deviation of 6.602, while the mean score for female adolescents was 53.62 with a standard deviation of 7.096. The t-test results showed a t value of 1.793. For the resilience variable, the mean score for male adolescents was 22.92 with a standard deviation of 3.710, while the mean score for female adolescents was 21.45 with a standard deviation of 3.870. The t-test results showed a t value of 2.364.

Table 4. Gender Differences and T-test Results for Cognitive Flexibility and Resilience

Variable	Gender	N	Mean	Std. Deviation	t
Cognitive Flexibility	Male	66	55.64	6.602	1.793
	Female	85	53.62	7.096	
Resilience	Male	66	22.92	3.710	2.364
	Female	85	21.45	3.870	

The results indicate a difference in the mean cognitive flexibility scores between male and female adolescents, with male adolescents having a higher mean score (55.64) compared to female adolescents (53.62). However, the t value of 1.793 indicates that this difference is not statistically significant, suggesting that there is no significant difference in cognitive flexibility between male and female adolescents in this sample.

For the resilience variable, male adolescents also showed a higher mean score (22.92) compared to female adolescents (21.45). The t value of 2.364 indicates that this difference is statistically significant, suggesting that male adolescents in this study have significantly higher resilience levels compared to female adolescents. Overall, the analysis results indicate that while there is no significant gender difference in cognitive flexibility, there is a significant difference in resilience between male and female adolescents, with male adolescents showing higher resilience. These findings can provide further insights into

the development of interventions that consider gender differences in enhancing adolescent resilience.

DISCUSSION

This study significantly contributes to the existing body of knowledge by exploring the relationship between cognitive flexibility and resilience among Indonesian adolescents, a population that has been underrepresented in previous research. The findings reinforce the well-established positive association between cognitive flexibility and resilience, consistent with prior studies conducted in different cultural contexts (Genet & Siemer, 2011; Martin & Rubin, 1995). Cognitive flexibility, which involves the ability to adapt to new situations and think creatively, is crucial for effectively managing stress and overcoming challenges. In the context of Indonesian

adolescents, this study demonstrates that fostering cognitive flexibility can be a key strategy in promoting resilience, which is essential for their psychological well-being and academic success (Diamond, 2013; Rutter, 2012).

The study's emphasis on Indonesian adolescents also highlights the importance of considering cultural nuances when examining psychological constructs like cognitive flexibility and resilience. Indonesia's collectivist culture, which prioritizes group harmony and conformity, may influence how cognitive flexibility and resilience manifest among adolescents (Hofstede, 2001). Unlike in individualistic cultures, where personal achievement and independence are emphasized, Indonesian adolescents may face unique challenges that require a different set of adaptive strategies. This study adds to the literature by showing that, even in a collectivist context, cognitive flexibility remains a critical predictor of resilience, suggesting that this relationship may be universally applicable, albeit with cultural modifications (Masten, 2018; Ungar, 2011).

The significant gender differences observed in resilience, with male adolescents displaying higher levels of resilience than their female counterparts, align with findings from previous research but also raise important questions about underlying mechanisms. Research indicates that gender socialization plays a pivotal role in shaping how boys and girls develop coping strategies. Boys are often encouraged to be more independent and assertive, traits that may enhance resilience, whereas girls may be socialized to be more emotionally expressive, which can sometimes make them more vulnerable to stress (Rose & Rudolph, 2006; Kessler et al., 1994). In the Indonesian context, these gender norms are reinforced through cultural and educational practices that often emphasize traditional gender roles (Nilan, 2008). This study suggests that these norms might contribute to the observed differences in resilience, highlighting the need for gender-sensitive interventions that address the specific needs of both male and female adolescents (Hyde, 2014; Leadbeater et al., 1999).

The practical implications of these findings are significant for educators and psychologists working with adolescents. Given the strong link between cognitive flexibility and resilience, educational programs should prioritize the development of cognitive flexibility skills. This can be achieved through incorporating problem-solving activities, fostering creative thinking, and encouraging exposure to diverse perspectives in the curriculum (Baron & Kenny, 1986; Sternberg, 2003). Such programs are particularly relevant in the Indonesian education system, where the focus has traditionally been on rote memorization and standardized testing, which may limit students' ability to develop flexible thinking (Setiawan, 2019; Subandowo & Wahyuningtyas, 2015). By integrating cognitive flexibility training into the educational framework, schools can better equip students to handle academic pressures and life challenges, thereby enhancing their resilience (Blair & Diamond, 2008; Zimmerman, 2013).

In addition to educational interventions, the study's findings have broader implications for public policy and mental health services. Policymakers should consider integrating cognitive flexibility and resilience training into national educational standards, ensuring that these critical skills are taught across all levels of schooling (Pasi, 2011; Seligman et al., 2009). Furthermore, mental health professionals working with adolescents should be aware of the potential gender differences in resilience and tailor their interventions accordingly. Programs that focus on

strengthening resilience in girls, for instance, could include components that address emotional regulation and social support, which are known to buffer against stress and enhance resilience (Garmezy, 1991; Werner & Smith, 2001).

Despite its contributions, this study has several limitations that must be acknowledged. The sample, while sufficient for the study's purposes, was limited to a specific region in Indonesia, which may not fully capture the diversity of the adolescent population across the country. Future research should aim to include a more diverse sample that reflects the various cultural, social, and economic backgrounds present in Indonesia (Patton, 2002; Silverman, 2013). Additionally, the cross-sectional design of the study only provides a snapshot of the relationship between cognitive flexibility and resilience. Longitudinal studies would be valuable in examining how these constructs evolve over time, particularly through key developmental stages in adolescence (Coleman & Hendry, 1999; Steinberg & Morris, 2001).

In conclusion, this study provides important insights into the relationship between cognitive flexibility and resilience among Indonesian adolescents, highlighting the significance of these psychological traits in promoting mental health and academic success. By integrating these findings with existing research, the study underscores the need for culturally sensitive educational and psychological interventions that can effectively enhance cognitive flexibility and resilience in diverse adolescent populations. These findings not only contribute to the theoretical understanding of cognitive flexibility and resilience but also offer practical applications that can inform educational practices, mental health services, and public policy in Indonesia and beyond (Rutter, 2006; Ungar, 2012).

CONCLUSION AND RECOMMENDATIONS

This study concludes that cognitive flexibility significantly contributes to resilience among adolescents, with important implications for both theory and practice. The findings extend existing theories by demonstrating that cognitive flexibility is not only a crucial skill for adaptive functioning but also a key predictor of resilience, particularly among Indonesian adolescents. These results align with previous research emphasizing the role of cognitive flexibility in promoting psychological well-being and coping with stress (Genet & Siemer, 2011; Diamond, 2013). Additionally, this study contributes to the literature by underscoring the relevance of cognitive flexibility across diverse cultural contexts, suggesting that this relationship is robust across different settings. This insight is valuable not only for Indonesia but also for broader global applications, indicating that interventions aimed at enhancing cognitive flexibility could be beneficial in various cultural environments, thereby supporting the universal applicability of this psychological construct (Hofstede, 2001; Ungar, 2011).

To advance the practical applications of these findings, it is recommended that cognitive flexibility be integrated into school curricula through targeted teacher training and the development of specific learning modules. These educational interventions should be designed to foster critical thinking, problem-solving, and adaptability among students, as these are essential components of cognitive flexibility (Blair & Diamond, 2008; Sternberg, 2003). Moreover, it is important to implement robust evaluation methods to assess the effectiveness of these programs,

ensuring they achieve the intended outcomes in enhancing cognitive flexibility and resilience.

Given the significant gender differences observed in resilience, gender-specific interventions should also be developed. These could include resilience-building programs tailored for female adolescents, focusing on stress management and strengthening social support networks, which have been shown to be particularly effective in enhancing resilience among girls (Rose & Rudolph, 2006; Leadbeater et al., 1999). Furthermore, future research should explore the mechanisms underlying the relationship between cognitive flexibility and resilience, considering potential moderating factors such as family environment and school context. Longitudinal studies would be particularly useful in tracking the development of these traits over time, providing deeper insights into their interaction (Steinberg & Morris, 2001; Zimmerman, 2013).

Finally, further research is needed to understand how cultural norms influence resilience and cognitive flexibility. Understanding these cultural dynamics is crucial for developing interventions that are not only effective but also culturally appropriate, thereby ensuring that the strategies employed are relevant and impactful across different cultural settings (Masten, 2018; Ungar, 2012). This approach will help design more nuanced and context-sensitive programs that can be implemented globally.

DECLARATION

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. All expenses were fully covered by the author.

Conflicts of interest

The author declares that there are no conflicts of interest regarding the publication of this paper.

Ethics approval

This study was approved by the Ethics Committee of the Faculty of Psychology, Universitas Sebelas Maret.

Consent to participate

Informed consent was obtained from all individual participants included in the study.

Consent for publication

All participants provided consent for the publication of anonymized responses.

Availability of data and material

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

REFERENCES

- Anghel, R. E. (2020). Resource factors for psychological resilience in children and adolescents. *Research and Science Today*, 2(20), 99–111.
- Anjum, A., Hossain, S., Hasan, M. T., Christopher, E., Uddin, E., & Sikder, T. (2022). Stress symptoms and associated factors among adolescents in Dhaka, Bangladesh: Findings from a cross-sectional study. *BMC Psychiatry*, 22(807), 1–11. <https://doi.org/10.1186/s12888-022-04340-0>
- Arıcı-Ozcan, N., Cekici, F., & Arslan, R. (2019). The relationship between resilience and distress tolerance in college students: The mediator role of cognitive flexibility and difficulties in emotion regulation. *International Journal of Educational Methodology*, 5(4), 525–533. <https://doi.org/10.12973/ijem.5.4.525>
- Barger, J., Vitale, P., Gaughan, J. P., & Feldman-Winter, L. (2017). Measuring resilience in the adolescent population: A succinct tool for outpatient adolescent health. *The Journal of Pediatrics*, 189, 201–206. <https://doi.org/10.1016/j.jpeds.2017.06.030>
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182. <https://doi.org/10.1037/0022-3514.51.6.1173>
- Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*, 25(24), 3186–3191. <https://doi.org/10.1097/00007632-200012150-00014>
- Blair, C., & Diamond, A. (2008). Biological processes in prevention and intervention: The promotion of self-regulation as a means of preventing school failure. *Development and Psychopathology*, 20(3), 899–911. <https://doi.org/10.1017/S0954579408000436>
- Brewer, M. L., Kessel, G. von, Sanderson, B., Naumann, F., Lane, M., Rubenson, A., & Carter, A. (2019). Resilience in higher education students: A scoping review. *Higher Education Research & Development*, 38(6), 1–16. <https://doi.org/10.1080/07294360.2019.1626810>
- Cañas, J., Quesada, J., Antolí, A., & Fajardo, I. (2003). Cognitive flexibility and adaptability to environmental changes in dynamic complex problem-solving tasks. *Ergonomics*, 46(5), 482–501. <https://doi.org/10.1080/0014013031000061640>
- Carver, C. S. (1998). Resilience and thriving: Issues, models, and linkages. *Journal of Social Issues*, 54(2), 245–266. <https://doi.org/10.1111/j.1540-4560.1998.tb01217.x>
- Cohen, J. (1990). Things I have learned (so far). *American Psychologist*, 45(12), 1304–1312. <https://doi.org/10.1037/0003-066X.45.12.1304>
- Coleman, J. C., & Hendry, L. B. (1999). *The nature of adolescence* (3rd ed.). Routledge.

- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Diamond, A. (2013). Executive functions. *Annual Review of Psychology*, 64, 135-168. <https://doi.org/10.1146/annurev-psych-113011-143750>
- Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.
- Fullerton, D. J., Zhang, L. M., & Kleitman, S. (2021). An integrative process model of resilience in an academic context: Resilience resources, coping strategies, and positive adaptation. *PLOS ONE*, 16(2), 1-22. <https://doi.org/10.1371/journal.pone.0246000>
- Garmezy, N. (1991). Resilience in children's adaptation to negative life events and stressed environments. *Pediatric Annals*, 20(9), 459-466. <https://doi.org/10.3928/0090-4481-19910901-05>
- Genet, J. J., & Siemer, M. (2011). Flexible control in processing affective and non-affective material predicts individual differences in trait resilience. *Cognition and Emotion*, 25(2), 380-388. <https://doi.org/10.1080/02699931.2010.491647>
- Ghozali, I. (2018). *Aplikasi Analisis Multivariate dengan Program SPSS* (9th ed.). Universitas Diponegoro.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis* (7th ed.). Pearson Education.
- Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations* (2nd ed.). SAGE Publications.
- Hyde, J. S. (2014). Gender similarities and differences. *Annual Review of Psychology*, 65, 373-398. <https://doi.org/10.1146/annurev-psych-010213-115057>
- Jakobsson, M., Josefsson, K., Jutengren, G., Sandsjö, L., & Hogberg, K. (2018). Sleep duration and sleeping difficulties among adolescents: Exploring associations with school stress, self-perception, and technology use. *Scandinavian Journal of Caring Sciences*, 33(1), 1-10. <https://doi.org/10.1111/scs.12621>
- Kessler, R. C., McGonagle, K. A., Swartz, M., Blazer, D. G., & Nelson, C. B. (1994). Sex and depression in the National Comorbidity Survey I: Lifetime prevalence, chronicity, and recurrence. *Journal of Affective Disorders*, 29(2-3), 85-96. [https://doi.org/10.1016/0165-0327\(94\)90025-6](https://doi.org/10.1016/0165-0327(94)90025-6)
- Konaszewski, K., Niesiołowska, M., & Surzykiewicz, J. (2021). Resilience and mental health among juveniles: Role of strategies for coping with stress. *Health Quality of Life Outcomes*, 19(58), 1-12. <https://doi.org/10.1186/s12955-021-01701-3>
- Leadbeater, B. J., Kuperminc, G. P., Blatt, S. J., & Hertzog, C. (1999). A multivariate model of gender differences in adolescents' internalizing and externalizing problems. *Developmental Psychology*, 35(5), 1268-1282. <https://doi.org/10.1037/0012-1649.35.5.1268>
- Leipold, B., Munz, M., & Michèle-Malkowsky, A. (2018). Coping and resilience in the transition to adulthood. *Emerging Adulthood*, 7(1), 12-20. <https://doi.org/10.1177/2167696817752950>
- Martin, M. M., & Anderson, C. M. (1998). The cognitive flexibility scale: Three validity studies. *Communication Reports*, 11(1), 1-9. <https://doi.org/10.1080/08934219809367680>
- Martin, M. M., & Rubin, R. B. (1995). A new measure of cognitive flexibility. *Psychological Reports*, 76(2), 623-626. <https://doi.org/10.2466/pr0.1995.76.2.623>
- Martinez, V., Crockett, M. A., Chandra, A., Suwasrawala, S. S., Ramaprasad, A., Núñez, A., & Gómez-Rojas, M. (2022). State of mental health research of adolescents and youth in Chile: An ontological analysis. *International Journal of Environmental Research and Public Health*, 19(16), 9889. <https://doi.org/10.3390/ijerph19169889>
- Masten, A. S. (2018). Resilience theory and research on children and families: Past, present, and promise. *Journal of Family Theory & Review*, 10(1), 12-31. <https://doi.org/10.1111/jftr.12255>
- Masten, A. S., & Cicchetti, D. (2016). Resilience in development: Progress and transformation. In D. Cicchetti (Ed.), *Developmental Psychopathology* (3rd ed., Vol. 4, pp. 271-333). Wiley. <https://doi.org/10.1002/9781119125556.devpsy406>
- Nilan, P. (2008). Youth transitions to urban, middle-class marriage in Indonesia: Faith, family, and finances. *Journal of Youth Studies*, 11(1), 65-82. <https://doi.org/10.1080/13676260701701744>
- Otero, J., Muñoz, M. A., Fernández-Santaella, M. C., Verdejo-García, A., & Sánchez-Barrera, M. B. (2020). Cardiac defense reactivity and cognitive flexibility in high- and low-resilience women. *Psychophysiology*, 57(11), 1-10. <https://doi.org/10.1111/psyp.13656>
- Pasi, R. J. (2011). *Building your school's capacity to implement character education*. Association for Supervision and Curriculum Development.
- Rademacher, L., Kraft, D., Eckart, C., & Fiebach, C. J. (2023). Individual differences in resilience to stress are associated with affective flexibility. *Psychological Research*, 87, 1862-1879. <https://doi.org/10.1007/s00426-022-01779-4>
- Ram, D., Chandran, S., Sadar, A., & Gowdappa, B. (2019). Correlation of cognitive resilience, cognitive flexibility, and impulsivity in attempted suicide. *Indian Journal of Psychological Medicine*, 41(4), 362-367. https://doi.org/10.4103/IJPSYM.IJPSYM_189_18
- Rose, A. J., & Rudolph, K. D. (2006). A review of sex differences in peer relationship processes: Potential trade-offs for the emotional and behavioral development of girls and boys. *Psychological Bulletin*, 132(1), 98-131. <https://doi.org/10.1037/0033-2909.132.1.98>

- Rutter, M. (2006). *Implications of resilience concepts for scientific understanding*. Annals of the New York Academy of Sciences.
- Rutter, M. (2012). Resilience: Causal pathways and social ecology. In M. Ungar (Ed.), *The Social Ecology of Resilience: A Handbook of Theory and Practice* (pp. 33–42). Springer.
- Saklofske, D. H., Plouffe, R. A., Wilson, C. A., & Prince-Embury, S. (2023). Assessing resiliency in children and young adults: Constructs, research, and clinical application. In S. Goldstein & R. B. Brooks (Eds.), *Handbook of Resilience in Children* (3rd ed., p. 252). Springer. <https://doi.org/10.1007/978-3-031-14728-9>
- Salma. (2022, November 15). Burden of adolescent mental disorders in Indonesia: Results from Indonesia's first national mental health survey. Universitas Gadjah Mada. <https://ugm.ac.id/en/news/23169-burden-of-adolescent-mental-disorders-in-indonesia-results-from-indonesia-s-first-national-mental-health-survey/>
- Seligman, M. E. P., Ernst, R. M., Gillham, J., Reivich, K., & Linkins, M. (2009). Positive education: Positive psychology and classroom interventions. *Oxford Review of Education*, 35(3), 293–311. <https://doi.org/10.1080/03054980902934563>
- Setiawan, J. (2019). The challenge of nurturing creative thinking in the Indonesian education system. *Journal of Education and Learning*, 13(1), 107–115. <https://doi.org/10.11591/jedulearn.v13i1.11816>
- Silverman, D. (2013). *Doing qualitative research* (4th ed.). SAGE Publications.
- Smith, B. W., Dalen, J., Wiggins, K., Tooley, E. M., Christopher, P. J., & Bernard, J. (2008). The Brief Resilience Scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine*, 15(3), 194–200. <https://doi.org/10.1080/10705500802222972>
- Smith, B. W., Epstein, E. M., Ortiz, J. A., Christopher, P. J., & Tooley, E. M. (2013). The foundations of resilience: What are the critical resources for bouncing back from stress? In S. Prince-Embury & D. H. Saklofske (Eds.), *Resilience in Children, Adolescents, and Adults: Translating Research into Practice* (pp. 167–187). Springer. https://doi.org/10.1007/978-1-4614-4939-3_13
- Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Sciences*, 9(2), 69–74. <https://doi.org/10.1016/j.tics.2004.12.005>
- Steinberg, L., & Morris, A. S. (2001). Adolescent development. *Annual Review of Psychology*, 52, 83–110. <https://doi.org/10.1146/annurev.psych.52.1.83>
- Sternberg, R. J. (2003). *Wisdom, intelligence, and creativity synthesized*. Cambridge University Press.
- Subandowo, M., & Wahyuningtyas, N. (2015). The effect of cognitive flexibility training on the enhancement of problem-solving skills among Indonesian elementary students. *Journal of Educational and Developmental Psychology*, 5(1), 1–12. <https://doi.org/10.5539/jedp.v5n1p1>
- Sugiyono. (2021). *Statistika untuk Penelitian*. Alfabeta.
- Sünbül, Z. A. (2020). Mindfulness, positive affection, and cognitive flexibility as antecedents of trait resilience. *Studia Psychologica*, 62(4), 277–290. <https://doi.org/10.31577/sp.2020.04.805>
- Tabachnick, B. G., & Fidell, L. S. (2019). *Using multivariate statistics* (7th ed.). Pearson Education.
- Ungar, M. (2011). The social ecology of resilience: Addressing contextual and cultural ambiguity of a nascent construct. *American Journal of Orthopsychiatry*, 81(1), 1–17. <https://doi.org/10.1111/j.1939-0025.2010.01067.x>
- Ungar, M. (2012). *Social ecologies and their contribution to resilience*. Springer.
- Wang, C., Zhang, Z., Wiley, J. A., Fu, T., & Yan, J. (2022). Gender differences in pleasure: The mediating roles of cognitive flexibility and emotional expressivity. *BMC Psychiatry*, 22(320), 1–8. <https://doi.org/10.1186/s12888-022-03945-9>
- Werner, E. E., & Smith, R. S. (2001). *Journeys from childhood to midlife: Risk, resilience, and recovery*. Cornell University Press.
- WHO. (2021, November 17). *Mental health of adolescents*. World Health Organization. <https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health>
- Wu, G., Feder, A., Cohen, H., Kim, J. J., Calderon, S., Charney, D. S., & Mathé, A. A. (2013). Understanding resilience. *Frontiers in Behavioral Neuroscience*, 7(10), 1–15. <https://doi.org/10.3389/fnbeh.2013.00010>
- Zautra, A. J., Hall, J. S., & Murray, K. E. (2010). Resilience: A new definition of health for people and communities. In J. W. Reich, A. J. Zautra, & J. S. Hall (Eds.), *Handbook of Adult Resilience* (pp. 3–34). The Guilford Press.
- Zayed, A. M. (2024). Academic self-efficacy and its relationship to academic competitiveness, academic procrastination, and cognitive flexibility among undergraduate students. *International Journal of Higher Education*, 13(1), 57–68. <https://doi.org/10.5430/ijhe.v13n1p57>
- Zheng, P., Gray, M. J., Duan, W.-J., Ho, S. M. Y., Xia, M., & Clapp, J. D. (2019). Cultural variations in resilience capacity and posttraumatic stress: A tri-cultural comparison. *Cross-Cultural Research*, 54(2–3), 1–23. <https://doi.org/10.1177/1069397119887669>
- Zimmerman, M. A. (2013). Resiliency theory: A strengths-based approach to research and practice for adolescent health. *Health Education & Behavior*, 40(4), 381–383. <https://doi.org/10.1177/1090198113493782>

This page has been intentionally left blank