



EFFECTIVENESS OF ROY ADAPTATION MODEL-BASED MODIFIED ADAPTATION TRAINING ON MENTAL RESILIENCE AMONG INDONESIAN NURSING STUDENTS: A QUASI- EXPERIMENTAL STUDY

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Abstract

Adolescence and early adulthood are transitional developmental periods characterized by psychological vulnerability, academic stress, and adaptation challenges. Limited evidence exists regarding theory-based resilience interventions that integrate physiological, psychological, and social adaptation processes among nursing students in Indonesia. The research aimed to analyze the effectiveness of Roy Adaptation Model-based modified adaptation training in improving mental resilience among first-year nursing students. Modified adaptation training consisted of adaptive exercises, autogenic relaxation, and adaptive card games, on the level of mental resilience in adolescents. This study utilized a quantitative approach with a quasi-experimental pre-test-post-test control group design. The research sample comprised 118 (n=59 intervention group, n=59 control group) first-year nursing students enrolled in a health higher education institution in West Java, Indonesia. The intervention group received modified adaptation training over two weeks (60–90-minute sessions), designed based on the four adaptation modes of RAM (physiologic, self-concept, role function, and interdependence). The control group received standard health information booklets. Resilience was measured using the Adolescent Resilience and Adaptation Scale (ARAS). The research findings indicated a significant increase in resilience within the intervention group. The Mann–Whitney U test revealed a significant difference in post-test resilience scores between the groups ($U = 719$, $p < 0.001$). The modified adaptation training intervention based on RAM significantly enhanced adolescent mental resilience, offering a theory-based approach with implications for developing intervention programs in school and community settings. The intervention may serve as an evidence-based mental health promotion strategy in educational settings.

Keywords: *Adaptation Training ; Adaptive Card Game ; Adolescents ; Autogenic Relaxation ; Mental Resilience ; Roy Adaptation Model.*

1. Introduction

Adolescence is a crucial transitional phase characterized by significant physical, psychological, and social changes. This period is often burdened by various internal and external stressors, including

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increasing academic pressure, social demands, identity exploration, and shifting family dynamics and peer relationships (Yang & Moon, 2024). Excessive stress in adolescents can negatively impact their mental health, well-being, and academic performance (Fatimah et al., 2024; Nordstokke & Hindes, 2025; Ross et al., 2024). Data indicate that mental health issues, such as depression and anxiety, frequently originate during adolescence and can persist into adulthood (Ciren et al., 2025; Luo et al., 2025).

The prevalence of mental disorders in the 10-25 age range is notably high, with depression and anxiety being the most reported diagnoses. It is estimated that 450 million people worldwide suffer from mental, neurological, or substance use disorders, contributing to 14% of the global disease burden. Approximately 154 million people among them have depression (Kementerian Kesehatan, 2023). Nationally, according to the Indonesian Health Survey 2023, the prevalence of depression in Indonesia in 2023 was 1.4%, with the highest rates observed in young adults (15-24 years) at 2%. Depression is a leading cause of disability among adolescents and is the fourth leading cause of death in this age group globally, often linked to suicide. Many of these psychological disorders go unrecognized or are inadequately treated (Kementerian Kesehatan, 2023). A survey on adolescent mental health in Indonesia in 2022 revealed that 5.5% of adolescents aged 10-17 years experienced mental disorders, including depression (1%), anxiety (3.7%), post-traumatic stress disorder (PTSD) (0.9%), and Attention-Deficit/Hyperactivity Disorder (ADHD) (0.5%) (Kementerian Kesehatan RI, 2024).

Mental health problems among adolescents and nursing students have become an increasingly important public health issue. Nursing students frequently encounter academic pressure, emotional stress, and adaptation challenges that may negatively affect psychological well-being and coping capacity. Previous studies in Indonesia reported that ineffective stress management among nursing students contributes to maladaptive coping behaviors and psychological distress (Gusni et al., 2022). Furthermore, adolescent anxiety is strongly influenced by psychosocial and environmental factors, highlighting the importance of resilience-based mental health interventions (Saputra et al., 2025).

Adolescence is also a period associated with a higher tendency for engagement in risky behaviors that endanger health and well-being (Ostaszewski, 2020). Adolescents become more vulnerable to mental health problems, including depression, suicidal ideation, eating disorders, substance abuse, and other addictive behaviors. The success of adolescent development hinges on the balance between risks and protective factors, thus underscoring the critical importance of developing resilience (Luo et al., 2025). Adolescents possess the potential to exert control over their development and actively influence adaptation processes (Mesman et al., 2021). Resilience is defined as a dynamic, multisystemic process of successful adaptation or recovery in the context of risk or adversity. Resilience theory provides a framework for understanding why some adolescents exposed to various risks do not experience negative outcomes and, against expectations, thrive successfully (Höltge et al., 2021).

Previous studies have shown that resilience plays an important role in helping adolescents manage stress, regulate emotions, and maintain psychological well-being (Mesman et al., 2021). Consequently, various resilience-based interventions have been developed, primarily focusing on psychoeducation, cognitive-behavioral approaches, and emotional coping strategies (Dray, 2021). These interventions have demonstrated positive outcomes; however, most studies mainly addressed cognitive and emotional aspects while giving limited attention to physiological adaptation and interactive social learning processes. Researchers using the Roy Adaptation Model (RAM) have further emphasized that individuals continuously adapt to environmental stimuli through physiologic, self-concept, role function, and interdependence modes (Callis, 2020; Hosseini & Soltanian, 2022). Nevertheless, existing RAM-based studies have largely focused on clinical populations and have rarely been translated into multidimensional resilience interventions for adolescents. Therefore, a research gap remains regarding the development of practical and theory-based resilience interventions that integrate cognitive, physiological, emotional, and social adaptation simultaneously. To address this gap, the present study developed a modified adaptation training program based on the Roy Adaptation Model by integrating adaptive exercises, autogenic relaxation, and adaptive card games into a multidimensional intervention approach. This integration represents the state of the art of the present study because it operationalizes the Roy Adaptation Model into a more interactive, holistic, and adolescent-centered resilience intervention. Acknowledging the significance of resilience in adolescence and the relevance of the Roy Adaptation Model, this study aimed to investigate the influence of modified adaptation training-encompassing adaptive exercises, autogenic relaxation, and adaptive card games-on enhancing adolescent mental resilience. This multidimensional intervention approach is expected to provide diverse stimuli, facilitate coping processes, and promote

better adaptive responses through the Roy Adaptation Model, ultimately leading to an improved level of adolescent mental resilience. This study aimed to analyze the effectiveness of Roy Adaptation Model-based modified adaptation training in improving mental resilience among first-year nursing students.

2. Method

This study employed a quasi-experimental pre-post-test with control group design to evaluate the intervention's effectiveness. This design was chosen due to practical limitations within the educational setting, yet it allows for a robust assessment of the intervention's impact by comparing the intervention group with a control group receiving standard care, while also considering baseline equivalence.

The target population consisted of all first-year nursing students enrolled in a health higher education institution in West Java, Indonesia, during the 2025 academic year ($N = 167$ students). Sample selection was performed using non-random purposive sampling. The research sample comprised 118 first-year nursing students in late adolescence (aged 17–19 years). The sample was divided by quasi-random assignment of participants into an intervention group ($n = 59$) and a control group ($n = 59$). Inclusion criteria included: active first-year students, aged 17–19 years, possessing cognitive abilities assessed through self-report and observation, and providing informed consent. Exclusion criteria included: a diagnosis of severe mental disorder or prior participation in similar interventions.

The intervention group received modified adaptation training, incorporating adaptive exercises, autogenic relaxation, and adaptive card games. The intervention consisted of two sessions, each lasting 60–90 minutes, conducted over two weeks. The control group received standard health information booklets covering adolescent well-being, stress management, and mental health tips. The control group's material was educational-didactic, devoid of game elements, and not based on the principles of the Roy Adaptation Model (RAM).

Pre-test and post-test measurements were administered before and after the two-week intervention period. The primary outcome variable, adolescent mental resilience, was measured using the Adolescent Resilience and Adaptation Scale (ARAS). This instrument was meticulously developed through the adaptation and integration of key conceptual elements from two psychometrically validated instruments: the Adolescent Resilience Questionnaire (ARQ) by Gartland and relevant components from the Roy Adaptation Model Adaptation Measurement Scale. The ARAS was developed to specifically meet the research objective of creating an instrument that not only measures general adolescent resilience but also aligns with the four adaptation modes (physiologic, self-concept, role function, and interdependence) of the Roy's Adaptation Model. Consequently, there is a direct theoretical congruence between the measurement tool and the RAM-based intervention. Validity testing showed corrected item-total correlation values ranging from 0.421–0.812. Reliability testing demonstrated excellent internal consistency with Cronbach's $\alpha = 0.91$.

Data were analyzed using JASP version 0.95.4 software. Descriptive statistics were employed to characterize demographic profiles and resilience scores. The Shapiro-Wilk normality test indicated a non-normal data distribution ($p = 0.001$); therefore, non-parametric statistical tests, specifically the Mann-Whitney U test, were utilized.

3. Result and Discussion

The demographic profile of the research participants is presented in Table 1. The sample was predominantly composed of female adolescents in both groups, accounting for 84.75% ($n=50$) in the intervention group and 88.14% ($n=52$) in the control group. Male participants constituted a minority (15.25%, $n=9$ and 11.86%, $n=7$, respectively). Regarding living arrangements, most respondents resided at home (intervention group: 54.24%, $n=32$; control group: 44.07%, $n=26$) or in rented accommodation/dormitories (intervention group: 44.07%, $n=26$; control group: 54.24%, $n=32$). The primary sources of perceived emotional support mentioned by participants were parents (intervention group: 64.4%, $n=38$; control group: 74.58%, $n=44$), followed by partners (intervention group: 23.73%, $n=14$; control group: 16.95%, $n=10$). A small number of participants reported having siblings, a partner, or no trusted individuals. Crucially, statistical tests confirmed no significant demographic differences between the intervention and control groups at baseline.

Table 1: Demographic Characteristics of Participants (N=118)

Demographic Variable	Intervention Group (n=59)	Control Group (n=59)
	Frequency (%)	Frequency (%)
Gender		
Male	9 (15.25%)	7 (11.86%)
Female	50 (84.75%)	52 (88.14%)
Residence		
Stay at Boarding House	26 (44.07%)	32 (54.24%)
Stay at Home	32 (54.24%)	26 (44.07%)
Stay at a relative's house	1 (1.69%)	1 (1.69%)
Emotional Support		
Parent	38 (64.41%)	44 (74.58%)
Siblings	6 (10.17%)	5 (8.5%)
Partners	14 (23.73%)	10 (16.95%)
No trusted individual	1(1.69%)	0

Descriptive statistics for resilience scores are presented in Table 2. The median post-test scores were higher in the intervention group compared to the control group. The intervention group (M = 81.08, SD = 5.54) demonstrated higher resilience than the control group (M = 74.07, SD = 5.59).

Table 2. Descriptive Statistics for Resilience Scores

Group		Mean	Median	SD	Min	Max
Pre-test	Intervention (n=59)	72.4	72	7.14	61	85
	Control (n=59)	71.1	71	6.26	61	82
Post-test	Intervention (n=59)	74.1	75	5.59	61	84
	Control (n=59)	81.1	81.1	5.54	72	91

The Shapiro-Wilk normality test revealed that resilience scores were not normally distributed in either group for both pre-test and post-test measurements ($p < 0.05$). Consequently, non-parametric statistical tests were employed for data analysis. At baseline (prior to the intervention), the mean resilience score in the intervention group was 72.4, and in the control group, it was 71.1 (Table 2), indicating comparable initial resilience levels between the two groups. To assess the direct impact of the intervention, the Mann-Whitney U test was conducted on the post-test resilience scores between the groups. A significant difference was observed, with the intervention group exhibiting substantially higher resilience scores compared to the control group ($U = 719.00$, $p < 0.001$) (Table 3).

The findings of this study indicate that the modified adaptation training, integrating the Roy Adaptation Model approach, autogenic relaxation, and adaptive card games, proved to be significantly effective in enhancing adolescent mental resilience. This outcome aligns with previous research emphasizing the importance of psychosocial-based interventions in strengthening adaptive capacity among adolescents facing various stressors (Arif Budiman et al., 2024; Dray, 2021).

This study specifically examined the influence of three intervention components. First, the adaptive exercise itself, within the framework of the Roy Adaptation Model, aims to assist adolescents in managing various stimuli (focal, contextual, residual) by enhancing coping abilities and adaptive responses across distinct modes (physiologic, self-concept, role function, interdependence) (Callis, 2020; Hosseini & Soltanian, 2022). By facilitating adolescents' understanding and response to environmental changes, both internal and external, it is expected that they will develop more adaptive and proactive mindsets when facing challenges. This aligns with the concept of resilience as the ability to bounce back and adapt positively to adversity (Mesman et al., 2021).

Second, the integration of autogenic relaxation within this intervention sought to target adolescents' physiological and emotional responses. Autogenic relaxation techniques, which focus on the mind-body interaction to achieve a deep state of relaxation, are known to be effective in reducing stress and anxiety levels (Rasmawati et al., 2023; Seo & Kim, 2019; Sintia Wardany et al., 2025). As a self-suggestion-based

technique, autogenic relaxation has been shown to trigger relaxation responses counteracting physiological stress responses, thereby assisting individuals in achieving internal balance through enhanced self-regulation and optimized homeostatic mechanisms. This technique has consistently demonstrated efficacy in alleviating symptoms of anxiety and depression, which are important indicators of an individual's adaptive capacity and resilience (Breznoscakova et al., 2023). By mitigating the physical and psychological tension often accompanying stress, adolescents are better equipped with the cognitive and emotional capacity to process stimuli, forming part of the cognator process within the Roy Adaptation Model (Chen, 2025; Tatoğlu & Ayyildiz, 2025). This implicitly strengthens mental resilience by improving an individual's ability to maintain emotional equilibrium amidst pressure. The study by Subbiah et al. (2025) reported a significant reduction in depression and anxiety symptoms following autogenic relaxation intervention, implicitly supporting enhanced resilience due to reduced psychological stressors.

Third, the use of adaptive card games aimed to facilitate the learning and application of adaptation concepts and resilience strategies through more interactive and engaging methods. Gamification in psychological interventions has proven effective in increasing participant engagement and motivation (Alexander et al., 2019; Hart et al., 2021). Adaptive card games designed to simulate adaptation scenarios and challenges allow adolescents to experiment with self-adjustment strategies, engage in collaborative problem-solving, and learn from experiences in a safe environment. This aligns with the principles of active learning, which is often integral to resilience interventions (Llistosella et al., 2023). Through these games, adolescents can be trained to identify influences affecting them (stimuli), develop effective coping strategies (cognator process), and ultimately produce positive adaptive responses (effectors), all of which contribute to the strengthening of mental resilience.

The great improvement in resilience observed in this study can be explained by the synergistic interaction between the cognitive, emotional, physiological and social components embedded in the intervention. Unlike single-focus interventions targeting only psychoeducation or emotional coping, the current intervention simultaneously targeted multiple adaptive dimensions using adaptive exercises, autogenic relaxation, and adaptive card games. This multidimensional approach likely allowed participants to process stressors in a more comprehensive manner, thus enhancing adaptive coping mechanisms and psychological resilience. The adaptive exercises provided an opportunity for cognitive appraisal and self-reflection processes that enabled participants to reinterpret stressful experiences more constructively and develop problem-solving abilities. Autogenic relaxation also contributed to physiological stabilization and emotional regulation by reducing psychological tension and stress responses. Better emotional regulation skills may be a means to sustain psychological equilibrium in the face of academic and social pressures. Meanwhile, adaptive card games fostered active engagement, peer interaction and experiential learning, which are vital for enhancing social adaptation and behavioral coping skills. These results are in line with previous research that suggests resilience interventions are more effective when they take a multi-adaptive domain approach rather than focusing on one psychological trait (Dray, 2021). Similarly, Budiman et al. (2024) reported that Roy Adaptation Model-based adaptation training significantly enhanced resilience among adolescents via the strengthening of adaptive coping responses. However, the present study extends previous findings by integrating physiological relaxation techniques and game-based adaptive learning within the framework of the Roy Adaptation Model. This integration is an important contribution as it operationalizes Roy's theoretical adaptation concepts into a more practical, interactive, and adolescent-centered resilience intervention. The findings also provide evidence for the holistic assumption of the Roy Adaptation Model which views effective adaptation as a result of the interaction of physiologic, self-concept, role function and interdependence modes. Addressing these adaptive dimensions collectively could have facilitated participants' more flexible responses to environmental stressors and the preservation of a better psychological balance. Thus, this study can not only support the previous studies of resilience, but also provide a wider theoretical and practical view of multidimensional adaptation-based interventions for enhancing adolescent mental resilience in the educational context.

The findings of this study reinforce the fundamental assumption of the Roy Adaptation Model that individuals continuously interact with environmental stimuli and develop adaptive responses to maintain psychological equilibrium (Yang & Moon, 2024). The significant improvement in resilience observed among participants suggests that strengthening adaptive coping mechanisms may enhance adolescents' capacity to manage academic, emotional, and social stressors more effectively. Adolescents with better adaptive abilities are more likely to regulate emotions constructively, maintain positive interpersonal

functioning, and respond flexibly to challenging situations, which ultimately contributes to improved psychological well-being. The mechanism underlying this improvement may be explained through the multidimensional nature of the intervention. The integration of adaptive exercises, autogenic relaxation, and adaptive card games enabled participants to simultaneously process cognitive, emotional, physiological, and interpersonal stress responses. This comprehensive approach likely facilitated more balanced adaptation across the four adaptive modes of the Roy Adaptation Model. Previous international studies similarly reported that resilience is strongly associated with emotional regulation, adaptive coping, social connectedness, and psychological flexibility (Fatimah et al., 2024; Höltege et al., 2021). In addition, resilience-enhancing interventions have been shown to improve academic functioning, stress management, and emotional stability among adolescents and young adults (Ross et al., 2024; Steel et al., 2024). However, the present study also expands previous findings by demonstrating that resilience enhancement may be strengthened when adaptation-based nursing theory is operationalized into practical and interactive intervention strategies. While earlier studies commonly focused on resilience as an individual psychological construct, this study emphasizes resilience as a dynamic adaptive process influenced by physiological regulation, experiential learning, and social interaction simultaneously. This distinction is important because adolescents often experience stress through interconnected emotional, cognitive, and social pathways rather than isolated psychological dimensions. Nevertheless, the effectiveness of the intervention may still be influenced by several contextual factors, including intervention duration, participant engagement, family support, and environmental conditions. Active participation and supportive interpersonal environments may facilitate stronger adaptive responses and increase the sustainability of resilience outcomes over time. Therefore, the findings of this study provide not only empirical support for the Roy Adaptation Model but also a broader practical implication for developing multidimensional, adaptation-based mental health promotion programs for adolescents within educational and community settings.

The limitations of this study should be recognized. First, the study used a non-randomized quasi-experimental design, which may increase the likelihood of selection bias. Second, participants were recruited from a single institution, thus limiting the generalizability of the results. Third, resilience outcomes were measured only immediately after the intervention, making it difficult to assess the long-term sustainability of the intervention. Fourth, the application of self-report questionnaires could be a source of social desirability bias. Future studies should be conducted in a randomized controlled trial design with a larger and more diverse population. Longitudinal follow-up studies are also needed to evaluate the sustainability of the intervention effects over time. Also, future research could investigate which components of the intervention are most effective in increasing resilience.

4. Conclusion and Suggestion

This study successfully demonstrated that modified adaptation training, integrating the Roy Adaptation Model (RAM) with elements of autogenic relaxation and adaptive card games, significantly influenced the enhancement of mental resilience in adolescents. These findings corroborate the effectiveness of a multidimensional approach aligned with the theoretical framework of RAM in strengthening adolescents' adaptive capacity to navigate life's challenges. The observed improvement in resilience, both statistically and practically, suggests that the combination of adaptive exercises, relaxation techniques, and active learning methods through games can effectively equip adolescents with better coping strategies, healthier emotion regulation, and more positive outlooks. This outcome provides empirical support for the application of theory-based strategies from the Roy Adaptation Model in mental health interventions for the adolescent population.

Based on the findings of this study, several suggestions can be proposed for future research: 1) Research could explore adapting this intervention for specific adolescent groups with distinct characteristics or challenges (e.g., adolescents with a history of mild mental disorders, adolescents from different socioeconomic backgrounds). 2) Studies are needed to investigate the specific components of the modified adaptation training (i.e., whether autogenic relaxation or card games have the most significant impact, or if the synergy of all three is optimal) for future intervention optimization. 3) Evaluate the factors that support or hinder the successful implementation of these interventions in different settings.

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