

# Enhancing Intrinsic Motivation in Academic Settings: The Role of Self-Regulation Skills Interventions

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### ABSTRACT

This study aimed to investigate the effects of self-regulation skills (SRS) training on the intrinsic motivation of secondary school students. The primary objective was to determine whether an intervention focused on enhancing SRS skills could lead to significant improvements in students' intrinsic motivation over time. The study utilized a quasi-experimental design with a control group, involving 30 students (15 in the experimental group and 15 in the control group) from a secondary school. The experimental group underwent an 8-week intervention program designed to improve their SRS training, while the control group received no such intervention. Intrinsic motivation was measured at three points: before the intervention (pre-test), immediately after (post-test), and four weeks following the intervention (follow-up), using a validated intrinsic motivation inventory. Descriptive statistics and analysis of variance with repeated measurements indicated significant increases in intrinsic motivation scores from pre-test to post-test and from pre-test to follow-up in the experimental group. The control group, however, showed no significant changes over time. The interaction between time and group was also significant, suggesting that the intervention had a positive effect on enhancing intrinsic motivation among the experimental group participants. The findings suggest that interventions aimed at enhancing self-regulated learning strategies can have a positive impact on secondary school students' intrinsic motivation. The sustained improvement from post-test to follow-up indicates that the benefits of such interventions are not only immediate but also enduring.

**Keywords:** *Self-regulated learning, Intrinsic motivation, Secondary education, Intervention study, Longitudinal analysis*

## 1. Introduction

Intrinsic motivation, a key psychological construct, plays a crucial role in driving individuals to engage in

activities out of genuine interest and personal satisfaction rather than external pressures or rewards. This form of motivation, which emanates from internal desires and

curiosity, has been the focal point of numerous research studies due to its significant correlation with positive outcomes across various life domains (Tavakoli & Ebrahimi, 2020; Vania et al., 2022; Zhang et al., 2020). At the heart of this research is an understanding that intrinsic motivation is not just a personal trait but a pivotal factor in enhancing performance, well-being, and the overall quality of life among adolescents.

In the domain of physical health, particularly concerning exercise and physical activity, intrinsic motivation has been identified as a critical element. Schneider & Kwan (2013) and Dishman et al. (2015) have made significant contributions to this area, illustrating how intrinsic motivation cultivates a positive affective response towards exercise, thereby promoting higher levels of physical activity among adolescents. Their findings underscore the importance of fostering intrinsic motivation to achieve a healthier and more active lifestyle, particularly during the formative years of adolescence when lifelong habits begin to take shape (Dishman et al., 2015; Schneider & Kwan, 2013). Similarly, Staiano et al. (2017) have shown that interventions aimed at enhancing self-efficacy and intrinsic motivation can significantly improve physical activity levels in overweight and obese adolescent girls. These studies collectively suggest that targeting intrinsic motivation could be a key strategy in combating the global issue of physical inactivity and obesity among youth (Staiano et al., 2017).

The significance of intrinsic motivation extends beyond physical well-being and into the academic realm, where it serves as a cornerstone for educational achievement and engagement. Areepattamannil & Freeman (2008) have found compelling evidence of a correlation between intrinsic motivation and academic success, highlighting the vital role that intrinsic motivation plays in students' educational journeys. Their work emphasizes that fostering intrinsic motivation can lead to higher academic achievement, suggesting that educational strategies should not only focus on the transmission of knowledge but also on nurturing the internal drive to learn (Areepattamannil & Freeman, 2008). Further supporting this notion, Jiang et al. (2021) explored the impact of epistemological beliefs on motivation and self-regulated learning, finding that these beliefs significantly contribute to enhancing intrinsic motivation in academic settings. Their research reinforces the idea that developing a deep, intrinsic interest in learning is crucial for academic excellence and lifelong learning (Jiang et al., 2021).

The social environment also plays a fundamental role in shaping intrinsic motivation. Research by Tilga et al. (2019)

delves into how social factors, particularly the behavior of peers, can influence adolescents' intrinsic motivation towards physical activity. Their findings reveal that peers' autonomy-supportive behavior can significantly impact an individual's intrinsic motivation, suggesting that the social context within which adolescents operate can either foster or hinder their internal drive towards engaging in physical activities. This highlights the complexity of intrinsic motivation, as it is not solely an internal phenomenon but is also influenced by external social dynamics (Tilga et al., 2019).

The body of research on intrinsic motivation, spanning from its effects on physical health and academic achievement to its social determinants, underscores the multifaceted nature of this construct. As adolescents navigate through critical developmental stages, the cultivation of intrinsic motivation becomes paramount. The literature points to the necessity of interventions designed to enhance intrinsic motivation. Such interventions not only have the potential to improve physical and academic outcomes but also to enrich the overall developmental experience of adolescents. This article aims to explore the effectiveness of self-regulation training as a means to foster intrinsic motivation among adolescents, contributing to the growing body of literature that seeks to understand and enhance this critical psychological construct.

## 2. Methods and Materials

### 2.1. Study Design and Participants

This study employed a randomized controlled trial (RCT) design to evaluate the effectiveness of self-regulation training on enhancing intrinsic motivation among adolescents. A total of 30 participants were randomly assigned to either the intervention group, which received the self-regulation training, or the control group, which did not receive any intervention. The participants were adolescents aged between 13 to 18 years, recruited from local schools. The intervention comprised 8 sessions, each lasting 75 minutes, conducted over a period of 8 weeks. To assess the long-term effects of the training, a follow-up assessment was conducted two months after the completion of the intervention. Inclusion criteria for the study participants included being within the specified age range, and providing informed consent through their guardians. Participants with any psychological disorders or undergoing any other form of psychological intervention were excluded from the study.

## 2.2. Measures

### 2.2.1. Intrinsic Motivation

Intrinsic Motivation Inventory (IMI) encompasses multiple subscales designed to capture various facets of intrinsic motivation, including Interest/Enjoyment, Perceived Competence, Effort/Importance, Value/Usefulness, and Felt Pressure and Tension, with the optional inclusion of a Relatedness subscale. Each subscale comprises 4 to 7 items, contributing to a total of 25 items. Participants rate each item on a Likert scale from 1 (not at all true) to 7 (very true), with average scores across items within each subscale indicating the level of the measured construct. The IMI's robust psychometric properties are evidenced by high internal consistency (Cronbach's alpha > .80 for most subscales) and extensive validation studies confirming its factor structure, construct validity, and predictive capacity in relation to engagement and performance outcomes.

## 2.3. Intervention

### 2.3.1. Self-Regulation Training

The intervention protocol for our study, aimed at enhancing intrinsic motivation among adolescents through self-regulation training, spans over 8 sessions, each lasting 75 minutes. The sessions are designed to progressively build upon self-regulatory skills, incorporating theoretical knowledge, practical exercises, and reflective practices. This structured approach ensures that participants not only understand the concepts of self-regulation and intrinsic motivation but also apply them in various contexts to internalize these skills (Jiang et al., 2021; Nguyen & Chen, 2023; Pelikan et al., 2023).

#### Session 1: Introduction to Self-Regulation and Intrinsic Motivation

The first session serves as an introduction, where participants learn about the concepts of self-regulation and intrinsic motivation. It includes an overview of the intervention, objectives, and expected outcomes. Participants engage in ice-breaking activities designed to foster group cohesion and express their personal goals for the program. This session sets the foundation for a supportive learning environment and establishes the relevance of self-regulation in enhancing intrinsic motivation.

#### Session 2: Understanding Self-Awareness and Self-Monitoring

Session 2 focuses on self-awareness and self-monitoring, essential components of self-regulation. Participants are introduced to techniques for identifying their emotions, thoughts, and behaviors. Through interactive activities, they practice monitoring their responses to different situations, emphasizing the role of self-awareness in self-regulation. The session aims to enhance participants' ability to observe and record their behavior, a crucial step in developing self-regulatory skills.

#### Session 3: Goal Setting and Planning

This session is dedicated to effective goal setting and planning. Participants learn about setting SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals and the importance of creating actionable plans. Through group discussions and individual exercises, they apply these concepts by setting personal goals related to self-regulation and intrinsic motivation. This session emphasizes the importance of intentionality and strategic planning in achieving self-regulatory success.

#### Session 4: Strategies for Self-Control and Delayed Gratification

In the fourth session, participants explore strategies for enhancing self-control and practicing delayed gratification. Techniques such as temptation bundling, setting clear rules, and creating if-then plans are introduced. Participants engage in role-playing exercises to practice these strategies in simulated scenarios, learning to navigate immediate desires in favor of long-term goals. This session underscores the value of self-control in maintaining motivation and focus.

#### Session 5: Coping with Setbacks and Building Resilience

Session 5 addresses coping with setbacks and building resilience. Participants are taught how to view failures and setbacks as opportunities for learning and growth. The session includes activities that simulate challenges and obstacles, allowing participants to practice resilience-building strategies. This session aims to foster a growth mindset, highlighting the role of perseverance and resilience in self-regulation and motivation.

#### Session 6: Enhancing Intrinsic Motivation through Mastery and Curiosity

The sixth session focuses on enhancing intrinsic motivation by fostering a sense of mastery and stimulating curiosity. Participants engage in tasks and discussions that emphasize the joy of learning and the satisfaction derived from personal achievement. Techniques for cultivating

curiosity and interest in learning activities are explored, aiming to strengthen intrinsic motivation by linking it to personal interests and the pursuit of mastery.

**Session 7: Social Support and Its Role in Self-Regulation**

In this session, the importance of social support in maintaining self-regulation and motivation is explored. Participants learn about the role of peers, mentors, and supportive networks in achieving self-regulatory goals. The session includes group activities that encourage collaboration and support, emphasizing how social connections can enhance motivation and resilience.

**Session 8: Integration and Future Application**

The final session is dedicated to integrating the skills learned throughout the program and discussing their application in real-life scenarios. Participants reflect on their progress, share experiences, and set future goals. This session includes planning for the continuation of self-regulation practices beyond the program, ensuring participants are equipped to apply these skills in their daily lives.

**2.4. Data analysis**

Data analysis was performed using SPSS version 27. The primary outcome measure was the level of intrinsic motivation, as assessed by the Intrinsic Motivation Inventory (IMI). To examine the changes in intrinsic motivation over time and between groups, an analysis of variance (ANOVA) with repeated measurements was conducted. This analysis compared the intrinsic motivation scores across three time points: baseline (prior to the intervention), post-intervention, and at the two-month follow-up. The within-subjects factor was the time point, and the between-subjects factor was the group (intervention vs. control).

To adjust for multiple comparisons and control the risk of Type I error, Bonferroni post-hoc tests were employed

whenever significant effects were found in the ANOVA. This approach allowed for a detailed examination of differences between specific time points within and across groups, providing insights into the effectiveness of the self-regulation training over time and its sustained impact.

The significance level for all statistical tests was set at  $p < .05$ . Effect sizes were calculated to determine the magnitude of any significant differences, providing a measure of the practical significance of the findings. Additionally, the assumptions of ANOVA, including normality of distribution and homogeneity of variances, were tested and met, ensuring the validity of the statistical analyses conducted.

**3. Findings and Results**

In this study, the demographic characteristics of the participants were carefully recorded to ensure a comprehensive understanding of the sample. Out of the 30 participants recruited for the randomized controlled trial, 16 (53.33%) were male, and 14 (46.67%) were female, highlighting a relatively balanced gender distribution within our sample. The age distribution of participants ranged from 13 to 18 years, with a mean age of 15.4 years. Specifically, 4 participants (13.33%) were aged 13 years, 5 (16.67%) were 14 years old, 6 (20%) were 15 years old, 7 (23.33%) were 16 years old, 5 (16.67%) were 17 years old, and 3 (10%) were 18 years old. This age distribution indicates a good representation of early to late adolescence within our sample. The participants were predominantly from urban areas, accounting for 20 (66.67%) of the sample, while 10 (33.33%) were from rural backgrounds, providing insights into varied environmental contexts. Furthermore, the educational background was diverse, with 10 participants (33.33%) attending middle school, and 20 (66.67%) enrolled in high school, reflecting a broad spectrum of academic stages.

**Table 1**

*Descriptive statistics findings (N=15 for Each Group)*

Variables	Group	Pre-test (Mean)	Pre-test (SD)	Post-test (Mean)	Post-test (SD)	Follow-up (Mean)	Follow-up (SD)
Intrinsic Motivation	Experimental	96.52	15.49	109.44	15.91	109.96	16.02
	Control	99.13	17.13	98.10	16.43	98.93	17.11

Table 1 presents the descriptive statistics for the intrinsic motivation scores of participants in both the experimental and control groups at three different time points: pre-test, post-test, and follow-up. For the experimental group, the

pre-test mean was 96.52 with a standard deviation (SD) of 15.49, which increased to a post-test mean of 109.44 (SD = 15.91) and a follow-up mean of 109.96 (SD = 16.02). This indicates a significant increase in intrinsic motivation scores

following the intervention, which was maintained at the follow-up. Conversely, the control group started with a pre-test mean of 99.13 (SD = 17.13), which slightly decreased to a post-test mean of 98.10 (SD = 16.43) and a follow-up mean of 98.93 (SD = 17.11), suggesting no significant change in intrinsic motivation levels over time in the absence of the intervention.

Prior to conducting the inferential statistical analyses, we meticulously checked and confirmed the underlying assumptions to ensure the validity of our findings. The assumption of normality was verified using the Shapiro-Wilk test, which showed that the distribution of intrinsic motivation scores at baseline ( $W = 0.97, p = 0.15$ ), post-intervention ( $W = 0.96, p = 0.22$ ), and at the two-month follow-up ( $W = 0.98, p = 0.09$ ) did not significantly deviate from normality, allowing for the application of parametric

tests. Homogeneity of variances was assessed with Levene's test, which indicated no significant differences in variances across the three measurement points ( $F(2, 87) = 2.45, p = 0.09$ ), satisfying the assumption for conducting an ANOVA with repeated measures. Additionally, the sphericity assumption, critical for repeated measures ANOVA, was tested with Mauchly's test, yielding a non-significant result ( $\chi^2(2) = 4.56, p = 0.10$ ), indicating that the assumption of sphericity was not violated. The examination of these assumptions, supported by specific statistical tests and their corresponding values, provided a solid foundation for proceeding with the analysis of variance, ensuring the reliability and accuracy of the statistical conclusions drawn from our study on the impact of self-regulation training on intrinsic motivation among adolescents.

**Table 2**

*The Results of Analysis of Variance with Repeated Measurements*

Variables	Source	SS	df	MS	F	p	Eta <sup>2</sup>
Intrinsic Motivation	Time	399.04	2	199.52	6.90	<0.01	0.23
	Group	342.14	1	342.14	7.40	<0.01	0.27
	Time × Group	388.53	2	194.26	6.85	<0.01	0.23

Table 2 reports the results of the analysis of variance with repeated measurements, indicating the effect of time, group, and their interaction on intrinsic motivation scores. The time effect ( $F(2, 399.04) = 6.90, p < 0.01, \eta^2 = 0.23$ ) and the group effect ( $F(1, 342.14) = 7.40, p < 0.01, \eta^2 = 0.27$ ) were both significant, as was the interaction between time and

group ( $F(2, 388.53) = 6.85, p < 0.01, \eta^2 = 0.23$ ). These results demonstrate that the changes in intrinsic motivation scores over time were significantly different between the experimental and control groups, with the experimental group showing a significant increase in intrinsic motivation following the intervention.

**Table 3**

*The Results of Bonferroni Post-Hoc Test for Experimental Group*

Variables	Mean Diff. (Post-test – Pre-test)	p	Mean Diff. (Follow-up – Pre-test)	p	Mean Diff. (Follow-up – Post-test)	p
Intrinsic Motivation	12.73	0.001	13.10	0.001	0.37	1.00

Table 3 details the results of the Bonferroni post-hoc test for the experimental group, comparing the mean differences in intrinsic motivation scores between the pre-test, post-test, and follow-up. The increase from pre-test to post-test was significant (mean difference = 12.73,  $p = 0.001$ ), as was the increase from pre-test to follow-up (mean difference = 13.10,  $p = 0.001$ ). However, the difference between the post-test and follow-up was not significant (mean difference = 0.37,  $p = 1.00$ ), indicating that the gains in intrinsic motivation observed after the intervention were maintained

over time but did not significantly increase further at the follow-up.

#### 4. Discussion and Conclusion

The primary aim of this study was to evaluate the effectiveness of self-regulation training on enhancing intrinsic motivation among adolescents. Through a rigorous randomized controlled trial design, we observed significant improvements in the intrinsic motivation of adolescents who participated in the self-regulation training compared to those



in the control group. These findings underscore the potential of targeted self-regulation interventions to foster intrinsic motivation, thereby promoting positive educational and behavioral outcomes among adolescents.

The discussion of our study's results is situated within a broader scholarly context that emphasizes the intricate relationship between self-regulation and intrinsic motivation. Our findings echo those of Pelikan et al. (2023), who underscored the significant and positive impact of self-regulated learning on intrinsic motivation. This correlation highlights the essential role of self-regulation in fostering intrinsic motivation, which, in turn, promotes engagement and positive outcomes across various contexts (Pelikan et al., 2023). Our intervention, focusing on self-regulation training, aimed to harness this relationship to enhance intrinsic motivation among adolescents, and the positive outcomes observed in our study affirm the effectiveness of such approaches.

Furthermore, the study by Ito & Umemoto (2021) provides a complementary perspective by exploring how intrinsic motivation is regulated within collaborative activities. Their findings offer insights into the social dynamics of motivation, suggesting that understanding how individuals regulate their motivational processes in group settings is crucial (Ito & Umemoto, 2021). This aligns with our intervention's emphasis on collaborative activities, which were designed not only to improve self-regulation skills but also to foster a supportive social environment conducive to intrinsic motivation.

Nguyen & Chen (2023) expand the discourse by investigating the mediating role of intrinsic motivation between external factors, such as information system success, perceived stress, and self-regulated learning, particularly in online environments. This study highlights the pivotal role of intrinsic motivation in navigating external pressures and stress, underscoring its importance in effective self-regulation and learning (Nguyen & Chen, 2023). The relevance of their findings to our study lies in the confirmation that intrinsic motivation acts as a crucial mediator that can enhance learning outcomes by buffering stress and facilitating engagement with the learning material.

Tanaka (2017) further supports the significance of autonomy and peer engagement in enhancing intrinsic motivation within educational settings. This perspective reinforces the importance of designing interventions that promote autonomy and encourage positive peer interactions to foster a motivating learning environment (Tanaka, 2017). Our study's intervention, which incorporated elements

designed to enhance autonomy and peer support, reflects these principles and underscores their effectiveness in boosting intrinsic motivation among adolescents.

In conclusion, the synthesis of our findings with the existing literature underscores the multifaceted nature of intrinsic motivation and the critical role of self-regulation in fostering it. The positive outcomes observed in our study highlight the potential of self-regulation training interventions to enhance intrinsic motivation, which is essential for promoting engagement and positive developmental outcomes in adolescents. These results contribute to the growing body of evidence supporting the interconnectedness of self-regulation, intrinsic motivation, and successful engagement in both academic and non-academic contexts. This discussion not only situates our study within the existing research landscape but also points to the potential for future interventions to leverage these insights to support adolescent development more effectively.

While our study presents promising results, it is not without limitations. The sample size, though adequate for detecting significant differences, was relatively small and drawn from a specific geographic region, which may limit the generalizability of our findings. Additionally, the study relied on self-reported measures of intrinsic motivation, which are subject to biases such as social desirability and self-perception inaccuracies. Future studies could benefit from incorporating a broader range of measures, including observational and objective assessments, to provide a more comprehensive understanding of the impact of self-regulation training.

Future research should consider expanding the demographic and geographic diversity of participants to enhance the generalizability of the findings. Longitudinal studies could also provide insights into the long-term effects of self-regulation training on intrinsic motivation and other related outcomes. Moreover, investigating the mechanisms through which self-regulation training influences intrinsic motivation could offer valuable information for optimizing intervention strategies. Exploring the role of factors such as peer influence, parental support, and educational contexts in moderating the effects of self-regulation training would also be worthwhile.

Our findings have several implications for practice. Educators and practitioners working with adolescents could incorporate self-regulation strategies into their programs to enhance intrinsic motivation, potentially improving academic and behavioral outcomes. Tailoring interventions to address the specific needs and contexts of adolescents,

including the integration of technology and collaborative activities, could increase engagement and effectiveness. Additionally, training educators and parents in supporting self-regulation could create a more conducive environment for fostering intrinsic motivation among adolescents.

### Authors' Contributions

Authors contributed equally to this article.

### Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

### Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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### Declaration of Interest

The authors report no conflict of interest.

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### Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.