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The effectiveness of performance on the academic performance and academic motivation of male students of the second year of high school

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ABSTRACT

Background and Aim: Education is one of the most important institutions of a society that can provide the all-round development of people. In general, the development of individual talents and the consolidation of the foundations of collective life and the creation of understanding between human beings are done in the shadow of education. Therefore, the purpose of this research was to investigate the effectiveness of successful intelligence training on academic motivation and academic performance of boys in the second year of high school. **Methods:** In terms of purpose, the current research was of applied type and the method of conducting it was quasi-experimental with a pre-test and post-test design with an experimental group and a control group and a three-month follow-up period. Therefore, the statistical population of the research included all the male students of the second year of high school who had referred to a private counseling center in the 7th district of Tehran due to academic problems. 30 people were selected by available sampling and randomly assigned to an experimental group (15 people) and a control group (15 people). Then, Sternberg's (2007) successful intelligence training approach was implemented on the test group. In order to collect data, research tools included Harter's performance questionnaire and academic motivation questionnaire (1981). The subjects of both groups completed the questionnaires at the beginning of the research and then the experimental group was trained according to successful intelligence training, while the control group did not receive any intervention. In the descriptive part, frequency distribution tables were used, and in the inferential part of data analysis, mixed variance analysis with repeated measurements and Bonferroni's post hoc test and SPSS software version 26 were used. **Results:** The F value and the significance level of the obtained value were calculated in the variables of academic performance (F = 6.44 and P = 0.002) and academic motivation (F = 7.78 and P = 0.002). Therefore, it can be concluded that the intervention used in this research, i.e. successful intelligence training as an independent variable, significantly caused changes in the dependent variables (academic performance and academic motivation). This means that the changes made in the dependent variables were due to the implementation of successful intelligence training. **Conclusion:** Based on the available findings, it can be concluded that successful intelligence training can be used to improve the academic status of students.

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Introduction

Education is recognized as one of the most crucial institutions in a society, capable of fostering holistic development in individuals. Generally, the nurturing of individual talents and the reinforcement of the foundations of communal life, along with the creation of mutual understanding among humans, are achieved through education (Abdollahi, Darbani, & Parsakia, 2022). Specifically, the school years are critical as they form the habit of studying and strengthen academic foundations. With appropriate choices, a bright educational and professional future can be carved out (Dashti Pour, 2015). Contrary to past beliefs that learning abilities were solely dependent on intelligence and innate talents, recent years have seen a growing consensus among psychologists that, while inherent factors like intelligence and talent play a role in learning, other non-inherent factors are also significant and should not be viewed unidimensionally. In this context, variables such as academic motivation and performance have drawn the attention of educational experts and psychologists (Adolf & Berger, 2015).

The concept of motivation, particularly in educational contexts, has garnered significant interest among experts in recent years. From the perspectives of psychologists and teachers, academic motivation is a key concept used to explain different levels of performance. It accounts for the variance in effort levels for academic task cohesion (Entwistle, 1988). When educational systems encounter issues like academic decline, the learner's motivation is often cited as a critical cause. In educational theories, motivation is also considered a fundamental concept (Ball, 2002). Academic motivation addresses the question, "Why do learners attend school?" (Romas & Habig, 2019), and is a broad term referring to the needs, motivations, and factors that facilitate a student's presence in an educational environment (Arias, Soto-Carballo, & Pino-Juste, 2022). Academic motivation is a vital source that directs the intensity and behavior of students in the learning process (Gokbel & El-Qorashy, 2018) and is crucial in influencing all student activities. A decrease in academic motivation can lead to pessimism, anxiety, and a decline in academic performance (Shank, Pintrich, & Meece, 2012). In any educational system, the level of students' academic motivation is a key indicator of success in scientific activities, signifying the extent of scholastic learning an individual acquires (Abdi & Rostami, 2016). The motivational structure is a significant factor affecting social changes and societal evolution. Motivation refers to the inclination to perform or move towards a specific behavioral application (Abdulrahman, 2020; Fong, 2022). Academic motivation is described as a determinant cognitive, emotional, and behavioral factor in students, shaping investment in education and commitment (Sieverikaia, 2019). It is also defined as the factor with the most significant impact on students' performance among other elements (Cheshm Azar, Tale Pasand, & Setudeh, 2022). Bandura (1980), in his social-cognitive theory, emphasized that academic motivation is not an internal concept or related to personality traits; rather, it is a construct shaped by individual learning processes and experiences, varying from one environment to another (Apoku-Mensa, 2019).

Academic performance, encompassing all educational and research efforts students demonstrate in pursuit of knowledge at universities, has always been a focal point for policymakers and decision-makers in higher education (Razeghi, Salehi Amran, & Kazemi, 2019). Students' academic performance is not only of interest to parents and higher education stakeholders but is also crucial for anyone interested in the development and progress of society. Various definitions and measurement methods for academic performance exist, primarily falling into objective and subjective domains (Parsakia et al., 2022). In research on academic performance evaluation, course grades or academic period scores have been considered the definitive criterion (Ghaffari, Hajloo, & Bayrami, 2014). One of the efficiency criteria for any country's higher education system is the academic progress of learners. Therefore, every educational system seeks to identify factors influencing academic progress to develop and improve its objectives and strategies (Ghare Bigloo & Ab Cher, 2019).

In the field of intelligence, various theories have been proposed. Just as definitions of intelligence vary, so do theories of intelligence, ranging from learning, biological, psychometric, Piaget, cognitive-processing, cultural-environmental, to multiple intelligences theories. The foundational theory of this research, the successful human intelligence theory, closely relates to various

intelligence theories but is presented as a distinct theory due to significant theoretical differences. Sternberg (1997) argues that existing perceptions of intelligence are limited, covering only a small portion of intelligence. They fail to demonstrate successful intelligence capabilities, including adaptability, shaping, and selecting environments to achieve personal goals within a socio-cultural context (Sternberg, 1997). In essence, the successful intelligence theory is one of the comprehensive and effective theories in human intelligence, offering numerous advantages over traditional theories. This theory posits that being intelligent is more than just being studious; an intelligent person knows how to use their intelligence in different situations. According to this theory, intelligence encompasses concepts like critical thinking, metacognition, conventional understanding, practical intelligence, creativity, and logic (Sternberg et al., 2008). Sternberg's Successful Intelligence Program, recently introduced for students' academic success, is a set of analytical, creative, and practical abilities that help individuals adapt, shape, and choose environments to achieve their goals, considering the socio-cultural context. Analytical ability is used when analyzing, evaluating, and comparing; creative ability when creating, inventing, and discovering; and practical ability when acting, applying, or utilizing learned knowledge. Individuals with successful intelligence adapt to environments using analytical, creative, and practical abilities (Sternberg, 2010).

Considering the limited studies on the effectiveness of intelligence in academic performance and motivation, this research aimed to assess the impact of Sternberg's Successful Intelligence Program on the academic performance and motivation of male high school students.

Method

The present study was applied in its objective and employed a quasi-experimental design with a pre-test, post-test, and a three-month follow-up, including one experimental group and one control group. The population consisted of all male high school students who visited a private counseling center in Tehran's District 7 due to academic problems. Thirty students were selected through convenience sampling and randomly assigned to an experimental group (15 students) and a control group (15 students). The experimental group received Sternberg's (2007) Successful Intelligence training program. Data collection tools included Harter's (1981) Academic Performance and Academic Motivation Questionnaires. Both groups completed these questionnaires at the beginning of the study, followed by the experimental group receiving the Successful Intelligence training, while the control group received no intervention.

Materials

1. Harter's (1981) Academic Motivation Questionnaire: This questionnaire, serving as the tool for measuring students' academic motivation, consists of 33 items assessing academic achievement motivation. It uses bipolar questions measuring intrinsic and extrinsic motivation. The scoring is based on a Likert scale (Never, 1; Rarely, 2; Sometimes, 3; Often, 4; Almost Always, 5). Reverse scoring is applied for items 3, 4, 5, 9, 10, 15, 16, 19, 21, 27, and 31. Scores range from 33 to 165, with 33-66 indicating weak, 66-99 moderate, and above 99 high motivation. Bahrami (2008) reported a factor analysis reliability of 0.78. Zehiri Nav and Rajabi (2008) found a Cronbach's alpha reliability of 0.92 (Raisi Sarteshnizi et al., 2022).

2. Academic Performance Questionnaire: This questionnaire simply asked for the students' average grades from the last examination period.

3. Sternberg's (2007) Successful Intelligence Training Program: The content of the training sessions was based on Sternberg's (2007) protocol, conducted over 12 sessions of 70 minutes each for the 15 members of the experimental group. The summary of the session content is as follows:

Table 1: Summary of Sternberg's (2007) Performance Session Content

Session	Content
1	Pre-test, rapport establishment, and problem conceptualization.
2	Introduction of Successful Intelligence and Its Abilities
3	Training and introducing students to the abilities of successful intelligence
4	Training and introducing problem-solving skills (first three analytical skills)
5	Training and introducing problem-solving skills (other next three analytical skills)
6	Training and introducing creative thinking skills (first four creative thinking skills)

7	Training and introducing creative thinking skills (next four creative thinking skills)
8	Training and introducing creative thinking skills (final four creative thinking skills)
9	Training and introducing scientific thinking skills (first four practical thinking skills)
10	Training and introducing scientific thinking skills (next four practical thinking skills)
11	Training and introducing scientific thinking skills (final four practical thinking skills)
12	Summary and review of the previous sessions, conducting a post-test, and thanking and appreciating the participants.

Implementation

Both groups completed the questionnaires at the beginning of the study. The experimental group then received the Successful Intelligence training, while the control group did not receive any intervention. After the intervention, both groups completed the questionnaires again, and a three-month follow-up was conducted. Data were analyzed both descriptively (mean and standard deviation) and inferentially. Descriptive analysis used frequency distribution tables, and inferential analysis employed mixed ANOVA with repeated measures and the Bonferroni post hoc test, utilizing SPSS software version 26.

Results

The present study's demographic findings showed that the mean (standard deviation) age of the control group members was 15.55 (1.71) years and that of the experimental group was 15.86 (2.03) years.

Table 2. Descriptive statistics findings

Variable	Group	Stage	Mean	SD
Academic performance	Experimental	Pre-test	13.81	2.09
		Post-test	15.52	2.17
		Follow-up	15.44	1.99
	Control	Pre-test	13.76	2.15
		Post-test	13.80	2.14
		Follow-up	13.65	2.00
Academic motivation	Experimental	Pre-test	64.71	11.15
		Post-test	74.03	10.91
		Follow-up	74.98	11.23
	Control	Pre-test	65.03	10.88
		Post-test	64.91	12.01
		Follow-up	65.21	11.75

According to the results reported in the above table, no noticeable change was observed in the scores of the research variables in the control group, while in the experimental group, there was an intuitive decrease in the mean scores of academic performance and academic motivation. To test the significance of the effectiveness of the Successful Intelligence training on the experimental group, a three-stage repeated measures multivariate analysis of variance was used. First, the necessary assumptions had to be checked.

The results indicate that the Shapiro-Wilk test shows the normality of the data. Also, based on the results of the Levene's test, the condition of homogeneity of variance is established, and finally, Box's M test also confirms the covariance matrix. Therefore, a three-stage repeated measures multivariate analysis of variance can be used.

Table 3. The results of analysis of variance with repeated measurements

Variable	Source	SS	df	MS	F	p	Effect size
Academic performance	Intervention	15231.43	1	15231.43	140.89	0.000	0.71
	Group	182.76	1	182.76	6.44	0.002	0.37
	Error	301.91	30	10.06			
Academic motivation	Intervention	23462.81	1	23462.81	180.49	0.000	0.74
	Group	165.99	1	165.99	7.78	0.002	0.43
	Error	342.41	30	11.41			

According to the results reported in the table above, considering the F-value and the significance level obtained for the variable of academic performance ($F = 6.44$, $p = 0.002$) and

academic motivation (F = 7.78, p = 0.002), it can be concluded that the intervention used in this study, namely Successful Intelligence training, as an independent variable, significantly caused changes in the dependent variables (academic performance and academic motivation). This means that the changes in the dependent variables were due to the implementation of Successful Intelligence training.

Table 4. Bonferroni's posthoc test

Variable	Post-test – Follow-up			Pre-test – Follow-up			Pre-test – Post-test		
	Mean diff.	SD	p	Mean diff.	SD	p	Mean diff.	SD	p
Academic performance	0.55	1.66	0.82	1.51	1.66	0.00	1.62	1.66	0.00
Academic motivation	1.02	7.78	0.92	9.96	7.78	0.00	8.75	7.78	0.00

The results of the above table indicate that the difference between the follow-up and post-test mean scores was not significant, while both these stages significantly differed from the pre-test scores. Therefore, it can be concluded that the Successful Intelligence training significantly affected academic performance and academic motivation in the post-test phase, and this impact was sustained in the experimental group's variables during the follow-up stage.

Conclusion

The current study aimed to investigate the effectiveness of Successful Intelligence training on academic motivation and performance of male high school students. The statistical analysis results using repeated measures analysis of variance showed that Successful Intelligence training significantly impacted academic motivation and performance in the experimental group of this study. Additionally, based on the results of the Bonferroni post hoc test, this effect showed good stability in the follow-up phase. These findings are consistent with studies by Shokouhi, Rostami, and Rostami (2021), Ali Babaei et al. (2016), Ghazi Asgar et al. (2022), Mansouri and Abedi (2022), Kalibar, Farid, and Mesrabad (2021), Dolati et al. (2021), Kamil and Rashid (2022), Al-Azzawi (2022), Sow and Han (2021), Hamdi Fouad (2021), and Mysore (2020).

In explaining the research findings, according to Sternberg's theory of Successful Intelligence, the role of experience in dealing with various tasks or conditions can be examined from two aspects. The first aspect is the ability to cope with new environmental tasks or conditions; the second aspect is the ability to automate information processing. These abilities are among the most important in intelligent individuals and are closely related to a person's success in the work environment and daily life. Also, in the theory of Successful Intelligence, the role of the environment in defining and shaping intelligent behaviors is emphasized, and intelligence is defined within the environment in which the individual is situated. According to this definition, intelligence is considered a mental activity used in processes of adapting to the environment, changing the environment, and choosing or actual environments (Sternberg et al., 2008). The higher an individual's motivation for knowledge, learning, and education, the more effort and hardship they will endure to achieve their ultimate goal. When an individual has high academic motivation, they pay close attention to academic tasks, take them seriously, and try to learn more than what is taught in class. Moreover, they seek the necessary skills and appropriate strategies for better learning. It is evident that success in learning leads to a greater sense of capability and increased interest in the subject matter. Therefore, performance is influential in academic motivation (Dolati et al., 2021). Additionally, the tendency of educational systems to focus on memory-based and analytical abilities, which largely overlook the creative and practical abilities of learners, needs to be addressed. As a result, learners with suitable abilities in creative and practical thinking cannot fully utilize their potential, potentially affecting their motivation. The best approach to achieving this vital goal of increasing academic achievement motivation is to create a wide range of skills, allowing learners to compete with different models of ability, discover their important and outstanding abilities, and master them. This opportunity can be created by teaching the components of Successful Intelligence and nurturing analytical, creative, and practical abilities in learners (Sow & Han, 2021). Thus, it appears that Successful Intelligence training has been effective in improving academic performance and academic motivation in male high school students.

Further explaining the effectiveness of performance on academic motivation, it can be said that the more an individual's motivation for knowledge, learning, and education, the more effort and hardship they will endure to reach their ultimate goal. When an individual has high academic motivation, they pay close attention to academic tasks, take them seriously, and try to learn more than what is taught in class. They also look for the necessary skills and appropriate strategies for better learning. It is evident that success in learning increases a sense of capability and interest in the learning subject. Therefore, performance is influential in academic motivation (Dolati et al., 2021). Additionally, the tendency of educational systems to focus on memory-based and analytical abilities needs to be addressed, as these often overlook the creative and practical abilities of learners. Consequently, learners with suitable abilities in creative and practical thinking may not be able to fully utilize their potential, potentially affecting their motivation. The best approach to achieving this vital goal of increasing academic achievement motivation is to create a wide range of skills, allowing learners to compete with different models of ability, discover their important and outstanding abilities, and master them. This opportunity can be created by teaching the components of Successful Intelligence and nurturing analytical, creative, and practical abilities in learners (Sow & Han, 2021). Also, in further explaining the effectiveness of performance on academic performance of the experimental group students in the current research, it can be said that teaching based on Successful Intelligence helps these students to flourish their potential abilities. Teaching aimed at developing Successful Intelligence gives students the assurance to strengthen their strengths and rectify or compensate for their weaknesses, thus developing their talents (Sternberg & Grigorenko, 2003). Since students have different goals in life, success also needs to be defined based on the meaning they attribute to it. The question is how teachers can consider a wide range of students' needs in teaching and evaluating effective strategies? They can achieve this by providing numerous examples covering a wide range of applications and using various assessment methods such as projects, assignments, essays, etc., with the best possible format being projects or essays; helping students invest in or strengthen their strengths while simultaneously helping them to rectify or compensate for their weaknesses (Sternberg, Grigorenko, and Jarvin, 2001).

Like all human and social sciences research, the present study has limitations, including: 1) The use of self-report questionnaires as a measurement tool and data collection method. 2) The use of convenience sampling for sampling. 3) The researcher's lack of control over many variables during the research and unawareness of the participants' life events during different stages of the study. Therefore, given that these limitations reduce the generalizability of the study's findings, it is necessary and imperative to exercise caution when generalizing these results. Further research is needed in this area in other populations and with different variables. Finally, considering the results of the present study, it is recommended that counseling and treatment specialists in the field of adolescents and education use the techniques and concepts mentioned in teaching and the theory of Successful Intelligence. Additionally, workshops should be organized to train teachers, school counselors, child and adolescent counselors, educational counselors, and other stakeholders in education on these techniques and concepts.

Conflict of Interest

According to the authors, this article has no financial sponsor or conflict of interest.

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