

Academic self-regulation and its relationship with Sternberg's thinking styles, academic achievement, and course of disease in adolescents with cancer

Mohammad Mehdi Mohammadi¹, Roghayeh Poursaberi²

¹Students Research Committee, Kermanshah University of Medical Sciences, Kermanshah, Iran, ²Department of Education, Payame Noor University (PNU), Iran

Abstract

Context: Adolescents with cancer are involved with a disabling disease that affects their various educational dimensions.

Aim: The present study aimed at determining academic self-regulation and its relationship with Sternberg's thinking styles, academic achievement, and course of disease in adolescents with cancer.

Setting and Design: The current study is a cross-sectional study. Indeed, the participants were selected via simple random sampling method in the academic year of 2016–2017.

Material and Methods: This study was carried out on 269 adolescents with cancer who were covered by Mahak Hospital and Rehabilitation Complex.

Statistical Analysis: Data analysis was performed by descriptive statistics (frequency, percentage, and mean with standard deviation) and analytical statistics (multiple regression coefficients and path analysis approach).

Results: From the thinking styles, the legislative thinking style ($b = 0.301$, $P = 0.001$) made the highest contribution to the prediction of academic self-regulation. With regard to the other research variables, the grade point average could significantly predict academic self-regulation ($b = 0.301$, $P = 0.001$). However, the duration of cancer could not predict academic self-regulation ($P > 0.05$).

Conclusion: The adolescent cancer patients with the legislative thinking style were more talented in learning self-regulation than the other students. In this regard, it is possible to take measures with regard to the identification of such students in schools and other educational centers in order to lay higher emphasis on the teaching of academic self-regulation to them.

Keywords: Cancer, Educational status, Self-regulation, Students, Thinking

Address for correspondence: Ms. Roghayeh Poursaberi, Department of Education, Payame Noor University (PNU), Iran.

E-mail: roghayeh.poursaberi@gmail.com

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INTRODUCTION

Academic self-regulation entails an active and organized process based on which the learner embarks on the

self-organization and self-management of his/her own behavior in order to achieve various learning goals.^[1,2] Self-regulation in learning is one of the concepts available

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in Bandura's social cognitive theory. This concept refers to a process by means of which learning is considered to be so controllable in learners that the learner is viewed as an agent who controls and regulates his/her learning process and is responsible for his/her personal development.^[2] The self-regulation skill enables individuals to control and monitor their own behaviors, measure these behaviors according to their own criteria, and apply them in order to strengthen or unstrengthen their individual actions.^[3]

One of the most concerning issues with regard to adolescents with which parents and educators are constantly faced is the drop in academic achievement. In this regard, school dropout, smoking tendency, and a disorder in psychological evolution during the sensitive period of adolescence, which may even lead to suicide, are only some of the problems that result in academic failure. In many cases, academic retrogression and school failure are considered among the initial symptoms of newer problems.^[4,5] The mentioned problems were the characteristics that may provide the conditions for many school-based problems in a healthy adolescent. However, an adolescent with cancer, in addition to placement in the sensitive age of adolescence, is dealing with a debilitating illness. In fact, the coincidence of this disease with the sensitive age of adolescence makes the adolescent patient exposed to the risk of a decline in academic achievement or even school dropout more than ever.^[6,7] Since the consequences of school dropout are very costly for the society and lead a child or adolescent with cancer to be desperately restrained from continuing education and academic achievement, it appears necessary to explore the causes influencing it and also propose the necessary strategies and solutions for the academic achievement of these adolescents.^[8]

The development of thinking skills in educational systems is considered among the important educational issues. In this regard, students learn how to lead a suitable life by using their thinking. Understanding the thinking styles (as a model and preferential method in the individual for reasoning, assessment, and judgment) and their application in adolescents' academic achievement can be enlightening. Sternberg refers to thinking styles as different processing strategies in people;^[9] in his view, the thinking style is a privileged way of thinking and is not an ability, but it refers to the way one uses his/her abilities.^[3] The thinking styles developed by Sternberg are based on the self-regulation theory, which include legislative, executive, and judicial styles. The individuals with the legislative thinking style enjoy working on the tasks that require creative strategies.^[10,11] On the other hand, the individuals with the judicial thinking style

prefer the situations wherein there is no need to evaluate, analyze, compare, and judge the existing ideas, strategies, and projects; however, the individuals with the executive thinking style are more interested in doing the tasks that have explicit and clear structures.^[11]

It seems that the learning of academic self-regulation is associated with different individual characteristics, including thinking styles.^[12] The thinking developments in adolescence create a background of changes and the adolescents with cancer, consistent with their illness, undergo a period of mental development that is associated with a variety of changes in various areas of physical, mental, affective, and social aspects. In addition, the academic achievement of this group of adolescents is of paramount importance, but it is sometimes overlooked.

In some studies, there is a significant relationship between the thinking styles with academic achievement;^[12,13] however, in this area, the studies are conducted on healthy students and there is an insufficiency of studies in adolescent cancer students. In cancer adolescents, the style of thinking and the factors that are related to the academic achievement could be different which is because these patients are grappling with a deliberating disease that can affect their thinking styles and academic achievement; therefore, the current study aimed at determining academic self-regulation and its relationship with Sternberg's thinking styles, academic achievement, and course of disease in adolescents with cancer.

MATERIALS AND METHODS

The present study was a cross-sectional study that was conducted in the academic year of 2016–2017. The research sample consisted of 269 adolescents with cancer who were supported by the Mahak charity in Kermanshah city of Iran. In fact, the sampling was performed via convenience sampling method. Indeed, from among the total of 900 adolescents under the coverage of Mahak charity, 269 adolescents with cancer were selected using Krejcie and Morgan sample size determination table.^[14]

The criteria for the inclusion of participants in the study were the definitive diagnosis of cancer in the adolescents (ranging in age from 11 to 17 years), not suffering any other chronic diseases, and the passage of at least 6 months from the definitive diagnosis of cancer. On the other hand, the exclusion criteria were the faulty completion of questionnaires by the research units. The main instruments for data collection in this study included three questionnaires, which have been described below.

- a. The first part of the data collection instruments constituted the demographic form of the sample units that included questions about age, gender, duration of disease, and the grade point average (GPA)
- b. Sternberg and Wagner's Thinking Styles Questionnaire—The complete form of this questionnaire consists of 104 questions that measure the different levels of thinking styles.^[15] Among the questions in this questionnaire, 24 questions pertain to the functions section of thinking styles. The questionnaire used in this research is the 24-item instrument that measures three thinking styles, namely executive, legislative, and judicial styles, and the items are scored based on a 7-point Likert scale (ranging from 1 to 7). The first eight questions are related to the legislative domain. The second eight questions of the questionnaire pertain to the executive domain and the last eight questions determine the judicial domain. The subscale scores can be obtained by summing across relevant items (the score range for each style is between 8 and 56), a higher subscale score indicating greater use of a specific style.^[16] The Cronbach's coefficient alpha of the subscales resulted 0.66 (for the executive thinking style), 0.65 (for the judicial thinking style), and 0.60 (for legislative thinking style), and it equaled 0.72 for the whole three subscales (24 questions), which indicated an acceptable internal consistency coefficient for the questionnaire and the content validity was determined by reviewing experts' evaluations.^[17] In addition, the test-retest reliability coefficient of the subscales was obtained within the range of 0.43–0.87^[18]
- c. Ryan and Connell's self-regulatory inventory – This inventory consists of 32 questions, which are categorized into four subscales, including external, introjected, identified, and intrinsic regulation dominions. The questionnaire items are scored based on a 4-point Likert scale (ranging from 1 to 4), thereby the total score can be obtained by summing the item scores ranging from 32 to 128, higher scores indicated higher self-regulation.^[19,20] The reliability of the questionnaire has been calculated using internal consistency coefficient where the Cronbach's alpha coefficients for the subscales have been obtained in the range of 0.69–0.75.^[20] In another study, the test-retest method found the external consistency and coefficient of stability to be 0.82.^[19]

In order to obtain the verbal informed consent of both parents and the children with cancer, the researcher first introduced himself to the families of adolescents referring to the Mahak charity, then the aim of the study was explained to the adolescents and their parents, and

they were assured that their information would be kept confidential.

The researcher provided the families and adolescents with necessary explanations on how to complete the questionnaires. In this regard, the participants were given enough time to fill out the questionnaires without any time constraints and anxiety.

The collected data were analyzed using SPSS 16 (version 22.0; SPSS Inc., Chicago, IL, USA) and EQS 6 (Multivariate Software, Inc., Encino, CA). Indeed, SPSS 16 was used to estimate each descriptive index (frequency, percentage, mean, and standard deviation) as well as analytical statistics (multiple regression coefficients). In addition, EQS 6 was used to evaluate the relationships existing in the model via the path analysis approach. It should be noted that the significance level of the tests was considered to be 0.05.

RESULTS

From among the total of 269 adolescents participating in this study, 156 participants (58%) were male and 113 (42%) were female. The mean \pm standard deviation of adolescents' age was reported to be 16.32 ± 2.32 years. In this study, 27% of the students were studying in the first grade, 30% were studying in the second grade, and 43% were studying in the third grade. Therefore, the third-grade high school students took up the highest percentage frequency and the first-grade students had the lowest percentage frequency in the sample group. The mean value of adolescents' GPA was estimated to be about 15.06 ± 1.31 . The duration of suffering from cancer in the adolescents was 8.47 ± 2.28 months.

The mean \pm standard deviation of each of the thinking styles was reported as follows: legislative thinking style (34.42 ± 12.15), executive thinking style (29.59 ± 7.84), and judicial thinking style (31.16 ± 10.08). The mean \pm standard deviation of academic self-regulation in adolescents was equal to 90.47 ± 9.57 .

From among the thinking styles, the legislative thinking style, the executive thinking style, and judicial style could predict academic self-regulation, wherein the legislative thinking style made the highest contribution to the prediction of academic self-regulation [Table 1]. With regard to the other research variables, the GPA could significantly predict academic self-regulation ($P < 0.001$). However, the duration of cancer could not predict academic self-regulation ($P > 0.05$).

For the conduct of path analysis, at first, the academic self-regulation was considered as the final dependent variable and multiple regression coefficient was used to do the analysis. According to the obtained results, all the variables inserted into the model, except the duration of cancer ($\beta = -0.089$ and $P = 0.108$), predicted academic self-regulation.

In the next stage, the GPA was considered as the intermediate dependent variable and each of the thinking styles as well as the duration of cancer were considered as independent variables. The results indicated that only two variables out of the independent variables, namely legislative thinking style ($\beta=0.162$, and $P = 0.004$) and the duration of cancer ($\beta = -0.337$, and $P = 0.001$), could predict students' GPA.

According to Figure 1, the legislative thinking style had the highest total effect in order to predict the academic self-regulation from among the effective variables in academic self-regulation.

DISCUSSION

The results of this study showed that there is a relationship between the legislative thinking style and academic

Table 1: Regression coefficients of the dependent variable of academic self-regulation with the independent variables of thinking styles, grade point average, and duration of cancer

Variable	Nonstandard coefficients		Standard coefficients	Significant
	B	SE	Beta	
Legislative thinking style	0.236	0.041	0.301	0.001
Executive thinking style	0.195	0.063	0.161	0.002
Judicial thinking style	0.131	0.049	0.138	0.008
GPA	2.094	0.415	0.285	0.001
Duration of cancer	-0.376	0.233	-0.089	0.108

GPA: Grade point average, SE: Standard error

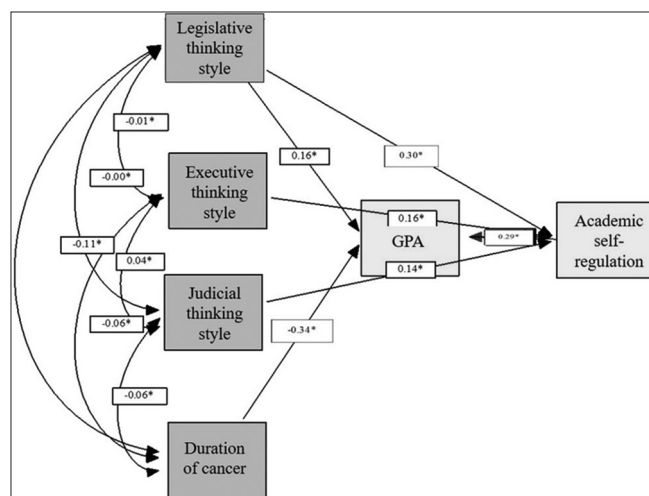


Figure 1: Path analysis of the effective variables in academic self-regulation

self-regulation in cancer adolescents. In this regard, findings of a study are consistent with those of the present study.^[16] However, this study was not performed on the cancer patients. An adolescent with cancer, in addition to placement in the sensitive age of adolescence, is dealing with a debilitating illness and he/she could act in a different way compared to his/her healthy peers. To explain the results, one can argue that cancer patients with the dominant legislative thinking style are more inclined to take individual decisions and provide the solution for performing different activities; on this basis, they make decisions independently on what to do and how to do it. As the term *legislative* in this type of thinking suggests, legislators like to legislate the rules themselves. The job preferences of these people are centered on the jobs through which they can prove their legislative inclinations.^[11] These individuals are interested in innovation and invention and prefer doing individual designs to carry out personal affairs.^[21] Sternberg argues that the owners of the legislative thinking style require sophisticated information processing because they can produce creativity in this way, and this production is of importance up to the point that these individuals tend to be risk-takers and to challenge the norms.^[11] In terms of the relationship revealed in this study between this thinking style and academic self-regulation, it can be noted that, in general, learners emphasize the creation of suitable opportunities for the design and execution of learning tasks while learning academic self-regulation. In academic self-regulation, the learner himself/herself is largely responsible for the management and leadership of his/her learning. In other words, it can be concluded that it is not beyond expectation that the adolescents with the legislative thinking style enjoy high rates of academic self-regulation considering the power of creativity and innovation as well as adherence to the self-constructed principles. Based on our results, the patients with legislative thinking style are more likely to learn academic self-regulation; in this regard, the identification of these cancer patients can help them to have an academic success.

In this study, a significant positive relationship was observed between the executive thinking style and academic self-regulation in adolescent cancer patients. In this regard, the results of some studies were consistent with that of the current study;^[11,21] however, these studies were not conducted on adolescent cancer patients. These patients should be studied more in terms of their educational dimensions. Cancer patients with an executive thinking style are more likely to follow the current rules and practices. In other words, they prefer to follow the previously assigned activities. This category of thinking style guides people toward compliance with the existing norms; hence, one

should not expect any cognitive complexity in this type of thinking style. Since individuals with an executive thinking style attempt to abide by the norms, it is not odd that individuals with this type of thinking be engaged more in the field of academic self-regulation cognitive strategies than in the domain of metacognitive strategies. This can be due to the fact that the learner will learn and make use of a set of thoughts, behaviors, or actions based on academic self-regulation cognitive strategies in order to help with the transfer, categorization, and storage of knowledge and to facilitate the utilization of them in the future.^[3]

The present study indicated that there is a significant positive relationship between the judicial thinking style and academic self-regulation in adolescents. This finding was consistent with a study.^[21] Individuals with the judicial thinking style tend to analyze and evaluate the existing principles and rules, methods, and structures in such a way that they are the assessors of the structure and content and they are willing to critique, judge, and analyze the performance. They like activities such as judging and criticizing others' performance. In terms of the management dimension, it seems that individuals with the judicial thinking style have a better performance in the organizational evaluation as well as monitoring and planning.^[3] Regarding academic self-regulation, it is possible to consider two important dimensions, i.e., curriculum supervision and planning. As far as individuals with the judicial thinking style have the management, supervision, and planning abilities, it is not beyond expectation that they lay an emphasis on the self-management aspects of the curriculum, which is the core of academic self-regulation.

According to the findings of the present study, the legislative thinking style has the greatest role in the prediction of academic self-regulation among the subscales of thinking styles. This finding is consistent with some studies.^[9,21] To account for this finding, one can claim that, as mentioned above, individuals with the legislative thinking style take advantage of a high degree of initiative, creativity, and self-management. The autonomy of these learners is so dominant that the teacher takes a diminishing role gradually. In this regard, academic self-regulation is definitely in need of one's autonomy in the personal organization, and the learner himself/herself is certainly the main axis of academic self-regulation.^[22] Therefore, it seems that cancer patients with legislative thinking style are more effective in predicting academic self-regulation than those with other thinking styles. This argument assumes importance in that people with legislative thinking style are more inclined to apply the self-regulatory learning intervention. It is possible to make efforts to identify the individuals with this style

and administer an intervention to them so that they can learn academic self-regulation. On the other hand, the legislative thinking style can also predict the students' GPA; in other words, the individuals who take advantage of this type of thinking show a superior academic performance. In addition to directly influencing academic achievement, the legislative thinking style can lead to the improvement of cancer adolescents' academic achievement through the promotion of self-regulation in them.^[12] Taking an accurate glance, one can consider two productive engines for the legislative thinking style in order to improve academic achievement. The first productive factor is the direct impact of this style on academic achievement, which can be considered as an institutional capacity in this style. The second productive engine is the impact of this style on academic self-regulation and subsequently, the academic self-regulation can provide the grounds for the greater improvement of academic achievement.

In this study, there was no direct relationship between the duration of cancer and academic self-regulation, but the duration of cancer disease directly affected the academic achievement. In fact, with the increase of the duration of the cancer period, the students' GPA was reduced. In this regard, a study indicated that cancer patients may experience a decline in verbal working memory and this issue could affect their academic achievement.^[23] The nonsignificant effect of duration of cancer disease on individuals' self-regulation can be attributed to the claim that the self-regulating individuals generally consider this disease to be acceptable. In other words, the individuals' intrinsic belief in the academic self-regulation may influence their responses.

With respect to the limitations of this study, we can refer to the data collection through questionnaires; in this regard, the mental status of each sample unit may have influenced the responses when completing the questionnaires. It is suggested that a qualitative study be also included in some sections of the research and the relationship between the thinking styles and academic self-regulation be explored in depth in addition to controlling each of the research variables through questionnaires. In addition, it is suggested that the relationship between academic self-regulation and students' learning styles be investigated, as well. Another limitation of the study was the nonrandom sampling method which should be considered in the study design of future studies.

CONCLUSION

In general, the present study indicated that there is a relationship between thinking styles and academic self-regulation in adolescent cancer patients and the

legislative thinking style was more strongly correlated with academic self-regulation and made a greater contribution to the prediction of academic self-regulation. The findings of this study are of great importance as applied knowledge in each of the areas of educational consultation, parental training, school authorities, and clinical nurses. Based on the findings of this study, the adolescent cancer patients with the legislative thinking style were more apt to learn academic self-regulation. In this regard, schools and other educational centers can embark on identifying these students and place a higher emphasis on the teaching of academic self-regulation to them. In relation to other cancer adolescents, the identification and change in patterns of thinking could be beneficial. In this regard, cognitive-behavioral approaches can be used in order to affect the responses to learn academic self-regulation.

Conflicts of interest

There are no conflicts of interest.

Authors' contributions

Mohammad Mehdi Mohammadi and Roghayeh Poursaberi designed the study. Mohammad Mehdi Mohammadi collected the data and performed study supervision. Roghayeh Poursaberi analyzed data. Mohammad Mehdi Mohammadi and Roghayeh Poursaberi contributed to drafting the manuscript.

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