



## Investigating the Relationship between Self-regulation and Self-control in Adolescents with Attention Deficit Hyperactivity Disorder

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**Abstract:** Attention deficit hyperactivity disorder (ADHD) is a mental health situation that can lead to unusual levels of hyperactivity and impulsive behaviors. ADHD children suffer from self-regulation problems that lead to inattention, impulsivity, hyperactivity and inability in concentrate on tasks. The purpose of this research was to investigate the relationship between self-regulation and self-control in 13-17-year-old adolescents with ADHD. The method of the present research was descriptive-correlational type. The statistical population included all adolescents aged 13 to 17 years with ADHD who referred to counseling centers in Shiraz city, (Iran) in 2020 (N=273). The sample size was estimated to be 159 using Morgan's table and sample selected via accessible sampling. Data were collected using Bouffard self-regulation questionnaire and Tangney et al. Brief Self-Control Scale (2018). For data analysis, Pearson correlation and multiple regression were used. According to the results, the research model accounted for 33% of the variance in self-control. Also, the research results indicated that there is a positive and significant correlation between self-regulation and its components with self-control. The findings suggest that teachers would use effective interventions to increase self-regulation and self-control in adolescents and reduce symptoms of hyperactivity and attention deficit in them.

**Keywords:** Self-regulation, Self-control, Attention-deficit/hyperactivity disorder, Adolescents

## Introduction

Attention Deficit/Hyperactivity Disorder is characterized by symptoms such as inattention, distress, impulsive behaviors, anxiety, hyperactivity, and carelessness ([Jensen et al., 1997](#)). This disorder is mainly associated with aggression and poor academic performance ([Miller et al., 2006](#)). The necessary rule to diagnose attention deficit/hyperactivity disorder is that at least six of the nine symptoms mentioned in attention deficit/hyperactivity disorder appear in a person for at least six months. These symptoms should lead to problems in more than one situation (home and school) ([Bell, 2011](#)). It is estimated that 3 to 12 percent of school-aged children are affected by this disorder, and its prevalence is higher in boys than in girls ([Polanczyk et al., 2007](#)). In a study in Iran, the prevalence of hyperactivity and attention deficit was estimated at 3.16%, that it was more in boys (5.19%) than girls (0.13%). ([Akhavan Karbasi et al., 2008](#)).

The usual treatment for these children is the use of stimulant drugs such as methylphenidate and dextroamphetamine. Of course, patients using these drugs may experience side effects such as loss of

appetite, insomnia, and abdominal pain, but despite the evidence that these stimulant treatments are sufficient, many parents are looking for alternative treatments, as some parents have reported that the behavior of these children has changed after taking these drugs ([Weber & Newmark, 2007](#)).

According to [Weber and Newmark \(2007\)](#), the drug to cure this disorder is associated with side effects that will not please the parents and teachers of these children and teenagers. It is obvious that educational and instructive methods (intervention) are a more favorable method of treatment. In the field of determining the cause of this disorder, research is being carried out, which includes the study of genetic risk factors, environmental risk factors, and structural and physiological changes in brain function ([Sharma & Couture, 2014](#)). Researchers agree that the etiology of attention deficit/hyperactivity disorder is a complex problem ([Nigg et al., 2020](#)).

Some studies have shown that a significant number of ADHD children have self-regulation and self-control problems ([Gifford Jr, 2002](#); [Sanabra et al., 2022](#); [Sarkis et al., 2005](#)). There are many differences of opinion in the definition of self-regulation. [Zimmerman and Martinez-Pons \(1990\)](#) consider self-regulated learning as a process in which learners continuously initiate and maintain their knowledge to achieve their learning goals. Self-regulated learning is also considered as a factor that increases calculation skills and insistence on homework ([Schunk, 2008](#)).

Self-regulated learning means that the student acquires skills to design, control and directs his learning process and has a desire to learn and is able to evaluate and think about his entire learning process ([Berry & Mason, 2012](#)). Self-regulation has the ability to control people's impulses, movements and actions in such a way that it enables a person to stop doing something or, on the contrary, makes him do an activity ([Zimmerman & Schunk, 2011](#)). Self-regulation means the capacity of a person to adjust his behavior according to the conditions and changes of the external and internal environment. He explains that self-regulation also includes the ability of a person to organize his behavior to achieve goals and self-manage various learning processes. In general, based on different theories and definitions, it can be said that self-regulated learning includes strategies such as cognitive, metacognitive and resource management strategies through which people use the available facilities and resources to target, plan, manage and monitor the learning process ([Ejubovic & Puska, 2019](#)).

Weakness in self-control is another important characteristic of ADHD children. The symptoms of ADHD correspond to impairments in various dimensions of self-control, such as inhibitory control, delayed gratification, and temporal discounting. As a result, [Barkley \(1997\)](#) has characterized ADHD as a disorder of self-control. According to [Barkley \(2001\)](#), a neurodevelopmental impairment of the executive functions causes the persistent self-control difficulties characteristic of ADHD.

The self-control of individuals with ADHD is subject to individual variance. Some individuals with ADHD seem to succeed in tasks, careers and projects that place robust demands on their self-control, lending support to portrayals of ADHD as a strong point ([Schoepfer et al., 2019](#)).

In numerous studies, the relationship between self-regulation and self-control has been studied.

[Shiels and Hawk Jr \(2010\)](#) examined and integrated the emerging literature on error-processing and adaptive control as mechanisms of self-regulation into the noticeable etiological theories of ADHD. Accessible data on error-processing, as replicated in event-related potentials and behavioral performance, recommend that both early error detection and later error-evaluation may be moderated in ADHD, thereby interfering with adaptive control processes. Although, inconsistency in results limits extensive conclusions, particularly for early error detection, a range of methodological issues, including ERP parameters and sample and task characteristics, likely contribute to this variability, and recommendations for future work are presented. The emerging literature on error-processing and adaptive control informs etiological theories of ADHD in general and may provide a method for testing self-regulation models in particular.

According to [Douglas \(2005\)](#), poor self-regulation is responsible for diminished performance of children with ADHD on cognitive, information-processing and neuropsychological tasks. [Douglas \(1999\)](#) highlighted that a passable conceptualization of cognitive impairments in ADHD must account for attentional and inhibitory deficits, lessened regulation of arousal-activation levels to meet situational demands, an abnormal incentive response, and increased behavioral variability. The self-regulation model postulated by Douglas was among the first to shift focus from a definite cognitive deficit such as sustained attention, response inhibition, or working memory, to processes that may impact all of these constructs.

[Barkley \(1997\)](#) provides a shift of perspective on attention deficit hyperactivity disorder (ADHD), arguing that the disorder is fundamentally a developmental problem of self-control, and that a deficit of attention is a secondary, and not universal, characteristic. He demonstrates how ADHD disrupts the developmental process by which behavior becomes internalized, resulting in an inability to regulate and direct behavior towards the future.

In another study, [Schoepfer et al. \(2019\)](#) analyzed the association between low self-control and ADHD in predicting a range of criminal and deviant behaviors. Findings revealed a relationship between the two concepts and that they predicted offending in similar ways, but that the precise nature of the relationship between low self-control and ADHD remains uncertain.

[Rosen et al. \(2014\)](#) in a project examined the role of externalizing behavior as a mediator of the relationship between social self-control and peer liking among children with attention-deficit/hyperactivity disorder-combined type (ADHD-CT). A model was proposed whereby

externalizing behavior would fully statistically account for the direct relation of social self-control to peer liking. One hundred seventy-two children aged 7.0–9.9 years with ADHD-CT were rated by their teachers regarding their social self-control and by their parents and teachers regarding their rates of externalizing behavior. Same-sex classmates provided ratings of overall liking. Structural equation modeling was used to assess the proposed model. Results indicated that the proposed model of externalizing behavior as fully statistically accounting for the relationship of social self-control to peer liking. This study confirmed the crucial role that externalizing behaviors play in the social impairment commonly seen among children with ADHD-CT.

[Rosen et al. \(2014\)](#) examined the relationship of regulation and emotionality on behavior problems in children with ADHD and the relationship between ADHD symptoms and emotional regulation and emotionality. Mothers of 32 male children between the ages of 6 and 11 diagnosed as ADHD combined type or predominantly hyperactive-impulsive type completed questionnaires assessing self-control and emotionality. Results indicated that ADHD boys who showed greater emotionality in terms of anger/frustration and less self-control and inhibition were rated as having more behavioral difficulties. Children with symptoms of hyperactivity and impulsivity were rated as lower in self-control and inhibition and higher in emotionality. Results of the study are discussed with respect to current theoretical models of ADHD.

Based on the findings of previous studies and the crucial role of self-regulation and self-control in the education and treatment of ADHD adolescents, the present study investigated the relationship between self-regulation and self-control in adolescents aged 13 to 17 in Shiraz (Iran).

## **Material and Methods**

The research method was descriptive correlation type. The statistical population was all adolescents aged 13 to 17 with attention deficit/hyperactivity disorder who referred to counseling centers in Shiraz in 2020. The number of hyperactive clients between the ages of 13 and 17 was estimated to be 273 by calling counseling centers active in the city. Determining the sample size using Morgan's table was estimated to be 159 people. Due to the unavailability of clients who have completed their treatment and also the refusal of some other clients to participate in the research, accessible sampling method was used. All participants completed the informed consent form before starting the study. The data collection tools were two questionnaires as follows:

Self-regulation scale: [Bouffard et al. \(1995\)](#) self-regulation questionnaire is a 14-question questionnaire to measure self-regulation, which is designed based on Bandura's social-cognitive theory. The questions of this questionnaire are on a Likert scale and measure the two factors of cognitive strategies and metacognitive strategies of self-regulation. The overall reliability coefficient

of the questionnaire was obtained based on Cronbach's alpha of 0.71 (Bouffard et al., 1995). The reliability of cognitive strategies subscale is 0.70 and metacognitive subscale is 0.68 (Bouffard et al., 1995). In the present study, the reliability of this scale was estimated at 0.84 using Cronbach's alpha method.

**Brief Self-Control Scale:** The original version of the 13-item BSCS (Tangney et al., 2018) was administered to participants. The 13-item BSCS is a short-form of the full 36-item SCS developed by the same authors. The benefit of using the short-form version is the reduction in participant burden (Morean et al., 2014). Additionally, in previous research, the short-form achieved reliability very similar to the full version. Tangney et al. (2018) reported coefficient alphas for the BSCS of .83 and .85 for their first and second samples, respectively. These values were very close to the reliability of the SCS ( $\alpha = .89$ ) which suggests similar performance between short and long forms. The 13 items of the BSCS all consist of a 5-point rating scale anchored by 1 (not at all like me) and 5 (very much like me). Negatively phrased items were recoded so that higher scores indicated higher levels of self-control.

The range of scores of this scale is between 13 and 65 variables, and a higher score indicates more self-control. In the present study, the reliability of this scale was estimated at 0.81 using Cronbach's alpha method. To analyze the data, Pearson's correlation and regression tests were used. SPSS-21 was used for statistical analysis.

## Results

Mean, standard deviation, skewness and kurtosis of the variables were provided in Table 1. According to Table 1, the skewness and kurtosis indices of the variables are between  $\pm 2$ , which indicates the normality of the data.

**Table 1.** Descriptive indices of research variables

Variable	Mean	SD	Min.	Max.	Skewness	Kurtosis
Cognitive strategies	18.78	2.33	7	33	1.16	1.27
Metacognitive strategies	19.23	4.21	8	34	0.11	0.22
Self-regulation	19.07	5.12	15	68	0.90	0.26
Self-control	38.87	5.61	15	63	0.22	0.14

Multiple regression was used to test the hypotheses. Before the analysis, the regression assumptions were checked and confirmed. Table 2 shows the correlation matrix of the variables and Table 3 shows the results of the regression analysis. The regression results show that self-regulation and its components positively and significantly predict self-control in ADHD adolescents. According to the results, the research model accounted for 33% of the variance in self-control.

Table 2. Correlation matrix of variables

Variable	1	2	3
1.Cognitive strategies	1		
2.Metacognitive strategies	0.54**	1	
3.Self-regulation	0.76**	0.64**	1
4.Self-control	0.48**	0.61**	0.51**

\*\*P < 0.1

Table 3. Results of regression analysis

Model	B	Beta	T value	p	R	R <sup>2</sup>	F	p
Constant	95.41	-	9.47	0.001	0.57	0.33	11.95	0.001
Cognitive strategies	0.41	0.54	4.60	0.001				
Metacognitive strategies	0.51	0.43	2.33	0.001				
Self-regulation	0.43	0.56	3.11	0.001				

Discussion

The purpose of this study was to investigate the relationship between self-regulation and its components with self-control in 13-17-year-old adolescents with attention deficit hyperactivity disorder. The findings showed that self-regulation and its components positively and significantly predict self-control in ADHD adolescents. The obtained findings are consistent with previous studies (Ejubovic & Puska, 2019; Rosen et al., 2014; Sarkis et al., 2005).

For instance, Muraven et al. (1999) studied the results of repeated exercises of self-control in relation to self-regulatory strength over time. A sample of 69 U.S. college students spent 2 weeks doing 1 of 3 self-control exercises: monitoring and improving posture, regulating mood, or monitoring and recording eating. Compared with a no-exercise control group, the participants who performed the self-control exercises showed significant improvement in self-regulatory capacity as measured by quitting faster on a hand-grip exercise task following a thought-suppression exercise.

In line with our findings, Muraven et al. (1999) examined the self-efficacy for self-regulated learning (SESRL) beliefs of male and female youth with and without Attention-Deficit/Hyperactivity Disorder (ADHD) and explored the contribution of youth self-reports of inattention, internalizing symptoms, and academic achievement to SESRL beliefs. A multiple mediation analysis with the full sample revealed that internalizing symptoms and academic achievement did not mediate the relationship between self-reported inattention symptoms and SESRL beliefs. The findings suggest a need for ongoing research into the SESRL beliefs of youth with ADHD.

According to a leading theoretical model of ADHD (Barkley, 1997), individuals with ADHD display a significant injury in self-regulation due to insufficiencies in core executive functions (EFs). These core



EFs include self-regulation of affect/motivation, inhibitory control, working memory, forethought and planning, and problem-solving ([Barkley, 2001](#)).

The results of two studies recommend perceptions of competence on tasks that need self-regulation may be low in individuals with ADHD ([Norwalk et al., 2009](#)). These studies indicated that youth and college students with high symptoms of ADHD reported lower levels of confidence than those with fewer ADHD symptoms in their ability to effectively make decisions about and plan for their careers and education. There is also evidence showing that students with ADHD and a comorbid LD report less positive academic self-efficacy beliefs than typically functioning students, but comparable levels of beliefs as those with an LD alone. Totally, these findings suggest that youth with ADHD may report less positive SESRL beliefs than their peers without ADHD.

In conclusion, this study of adolescent with ADHD found a significant relationship between self-regulation and self-control. The results suggest that both self-regulation and self-control have the vital role in the treatment of ADHD symptoms in ADHD adolescents. The current study results have some implications for psychologists and counselors who work in the field of treatment and education of ADHD adolescents. Further research is needed to better understand how emotion regulation influences the ADHD symptoms in the short and long term among ADHD adolescents.

In addition to the obtained findings, the present study also had some limitations. The use of self-report questionnaires and conducting the study on adolescents in Shiraz has been the most important limitations that should be considered in the generalization of the findings.

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