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Research Article

The mediating role of emotion regulation in the relationship between executive functions and self-regulations of gifted and nongifted students

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Abstract

The main purpose of this study is to examine the mediating role of emotion regulation difficulties in the relationship between executive functions and self-regulation of students with and without in the Science and Art Center (SaC) (called BILSEM in Turkish) which trained gifted students at Turkey. The study is a descriptive study in which predictive correlational research, one of the types of correlational research model, is used. The study group of the research consisted of the students studying in the province of Istanbul in the 2020-2021 academic year. In the sample, 6,7 and 8th grade students who are gifted in SaC (59 females, 64 males in total 123) and those who are not in SaCs (89 males 95 females, 184) 6, 7th and 8th grade students are included. Appropriate sampling method was used for participation in the study. In the study, Behavioral Rating Inventory of Executive Function (BRIEF) Parent Form, Difficulties in Emotion Regulation Scale (DERS) and The Adolescent Self-Regulatory Inventory (ASRI) were used. In the research, the data were analyzed using the PROCESS macro plug-in of Hayes with the SPSS 20 package program.For the mediation model created in line with the results, Bootstrap method was used to see the indirect effects. In the study, also the moderated mediation effect model analysis was used to. İn result, the direct, indirect and total effects of emotion regulation difficulties were found to be statistically significant in the relationship between executive functions and self-regulation skills of secondary school students with and without in SaC. It has been observed that the moderated variable with and without in SaC or not a significant effect on the indirect effect.

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Introduction

In recent years, it has been observed that there has been an increase in studies on executive functions, self-regulation and emotion regulation in the field of social sciences, educational sciences and psychology (Sinatra, Broughton & Lombardi, 2014). In the studies, each of these concepts are used with many different names and this situation makes it difficult to understand the concepts. It can also be said that these concepts are used interchangeably and that meaning shifts are experienced (Jones, Bailey, Barnes & Partee, 2016; Jones, Bailey, Meland & Brion-Meisels, 2019). In addition, while indicating the diverging aspects of these concepts, the relationships between them should also be looked at through direct and indirect effects (Hofmann, Schmeichel & Baddeley, 2012; Eisenberg, Hernández & Spinrad, 2017).

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These concepts have been included in studies that address diverse groups such as autism, learning difficulties, special abilities, and poor children (Ekşi-Sınır, 2020; Jones et al. 2016,2019; Leana-Taşcılar & Cinan, 2012; Nathalia, 2011; Rocha, Almeida & Perales, 2020; Tercanlı-Metin, Harma, Gökçay & Bahçivan-Saydam, 2017). In the literature respectively executive functions, self-regulation and emotion regulation have been associated with concepts such as intelligence and success (Best, Miller & Naglieri 2011; Finders et al. 2021). It is also said that executive functions are associated with fluent intelligence especially rather than crystallized intelligence, which expresses more learned knowledge (Diamond, 2013; Diamond, 2013; Zelazo, Blair & Willoughby, 2016). In order to observe these relationships, it is stated that studies comparing executive functions between gifted and normal individuals should be increased (Leana-Taşcılar & Cinan, 2012).

If we give information about the variables of the study, executive functions are seen as skills that enable people to control their thoughts and actions and to direct their behaviors to long-term goals. It is also argued that the executive function is a collect of neurocognitive skills within high cognitive processes (Carlson, Zelazo & Faja, 2013; Hendry, Jones & Charman, 2016). Cognitive neuroscientists often define executive functions as a set of mental processes located in the frontal cortex region of the brain used for targeted behavior (Fuster, 2008; Miyake et al. 2000). According to this definition, it is seen that there are many components in executive functions. In the literature these components are: shifting/flexibility, response inhibition, working memory (Bayliss & Roodenrys, 2010; Hughes, 2002), speed / arousal, sustainable attention, planning, serial ordering and sequencing, initiation and self-generation, set-shifting and cognitive flexibility (Brocki & Bohlin, 2004; Hanna-Pladdy, 2007).

Emotion regulation explains what emotions we have, when and how. It also deals with the process of how we experience and express emotions. It is also said that emotion regulation may involve maintaining, increasing or decreasing negative or positive emotions. It is explained that emotions are not good or bad by nature (Gross, 2002). In emotion regulation, people try to reroute the spontaneous flow of their emotions. Emotions are understood here as valuable (positive or negative) responses to events that people perceive about their ongoing anxiety. Emotions in this understanding include multiple components, including behavioral and physiological responses, as well as specific thoughts and feelings (Cacioppo et al. 1992; Frijda, 2006; Mauss et al. 2005). It is stated that emotion regulation is also based on cognitive resources that constitute executive functions as a process. It is said that the emotion regulation process will be disrupted in problems experienced in areas related to executive functions (Şahin, 2020).

Self-regulation is defined as the process of deliberately directing one's actions, thoughts and feelings towards a goal (Carver & Scheier, 2011). It requires a range of skills, including self-regulation, planning, and other executive functions. However, these skills are not limited to. Successful self-regulation also includes the capacity for motivation, such as wanting and enjoying behaviors that match the goal (Berkman, 2016). When people self-regulate, they often face potentially emotional situations. Self-regulation processes are therefore closely related to emotion regulation processes (Koole & Aldao, 2016). When the place of emotions in learning is investigated, it is suggested that regulating one's emotions is as important as regulating cognition, metacognition and motivation. In fact, given that focusing on emotions is new in the educational psychology literature, current definitions of self-regulation now include emotion regulation as one of the key components of self-regulated learning (Usher & Schunk, 2018)

Learning how self-regulation interacts with emotion regulation will likely generate important new insights for both processes. This will lead to a deeper understanding of how people can successfully express themselves in their environment. It is also stated that the relationship between emotions and self-regulation is by no means one-sided. It is said that too much self-regulation over a period of time can increase emotional responsiveness and this may impair the individual's ability to regulate their emotions (Wagner & Heatherton, 2014). For this reason, self-regulation research can shed light on how people are actively involved in managing their emotional lives. Conversely, emotion regulation research can shed light on how people navigate their actions in emotional contexts (Koole & Aldao, 2016). At this point, it is thought that paying more attention to moderation and mediation processes will clarify the relationship between self-regulation, executive functions and internalization problems (Eisenberg et al. 2017). Jones et al. (2016) They developed a model called "An Integrated Model of Regulation" in their work on executive functions, effortful control and self-regulation skills. According to this model, executive functions are in the cognitive domain, including simple and complex cognitive skills. Effortful Control refers to the ability to deliberately manage thoughts, attention, emotions and behaviour (Lengua, 2008). And these skills are stated to be in the area of emotion, which is the more complex skills (Jones et al. 2016). Self-regulation is defined as an umbrella term that reflects other regulatory structures such as impulsivity, conscientiousness, self-control, delayed pleasure, carelessness-hyperactivity, executive function, and willpower (Moffitt et al. 2011). Jones et al. (2016) states that new models are needed especially to

understand executive functions, self-regulation and other concepts and to better explain the relationships between them.

Here, it is thought that working models can be created in order to see the effects of these variables on SaC students. SaC's are private education institutions that serve specially talented students, affiliated to the Ministry of National Education, General Directorate of Special Education and Guidance Services. Students are recruited to SaCs in the fields of general mental ability and special ability (Visual Arts and Music) through diagnosis. In the study, students studying in the field of general mental ability were included in order to see the interactions of the related concepts with the concept of giftedness. Students in the field of general mental ability are determined at the Guidance and Research Centers by expert staff with intelligence test practitioner certificate. Students who score 130 and above in the intelligence test register to SaC in the field of general mental ability (MEB, 2016). Studies indicate that these variables have different effects according to developmental stages. For example, it is said that more complex skills such as organization, self-regulation and emotion regulation skills are acquired more quickly in late childhood (11-13) and adolescence than in early and middle childhood (Bailey & Jones, 2019). Considering late childhood and adolescence, models that address executive functions, self-regulation and emotion regulation skills are needed on different groups. In this way, children will be helped to fulfill the tasks that they need to realise due to their developmental periods (Jones et al. 2016, 2019).

Importance of Research

In the study, in line with both the information in the literature and the "An Integrated Model of Regulation", a new model was created in which executive functions are the independent variable, emotion regulation difficulties are the mediator variable and dependent variable's self-regulation. It has been considered to examine the model created according to both SaC students and 6,7 and 8th grade students who are not in SaC. When the literature is reviewed, it is seen that there are studies on executive functions, self-regulation and emotion regulation variables. However, there isn't found study examining all of these variables in the direction of a model. Here, it will be checked whether the model has a significant effect for both groups. The direct, indirect and total effects of the model will be examined for both groups. It will has been also look at the moderated mediation model. With these aspects of the study, it is thought that it can be an example in terms of method. The purpose and sub-problems of the research are given below.

The Study Problem

The main purpose of this study is to examine the mediating role of emotion regulation difficulties in the relationship between executive functions and self-regulation of students with and without in the SaC. Also, the moderated mediation effect of with and without in SaC will be looked at.In line with the stated purpose, answers were sought for the following problems:

- Are the direct, indirect and total effects of emotion regulation difficulties in the relationship between executive functions and self-regulation of secondary school students with SaC statistically significant?
- Are the direct, indirect and total effects of emotion regulation difficulties statistically significant in the relationship between executive functions and self-regulation of secondary school students without in SaC?
- In the relationship between executive functions and self-regulation, is there a regulatory effect of being in the science and art center in the indirect effect of emotion regulation difficulties?

Method

In this section, the titles of research model, study group, data collection tools, data collection and analysis are included.

Research Model

The study is a descriptive study in which predictive correlational research, one of the types of correlational research model, is used. Predictive correlational studies are approaches that focus on indirect-mediating effects besides direct effects (Büyüköztürk et al. 2020). In the study, the mediating role of emotion regulation difficulties in the relationship between executive functions and self-regulation skills of SaC and non-SaC students was examined through the Process Macro Model-4 diagram of Hayes (2018). In addition, Model-14 was used to test the regulatory effect of with and without in SaC or not on the indirect effect. Model diagrams are given below.

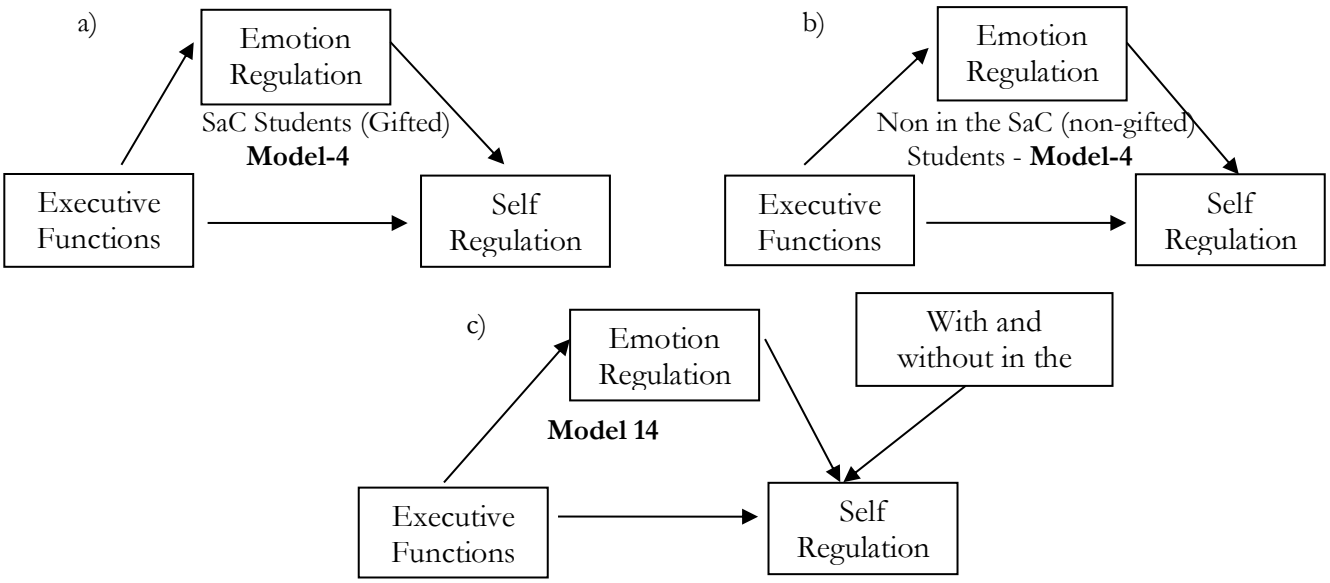

Figure 1.
Model-4 Diagrams Created for Secondary School Students with and without SaC and Model-14 Diagram Created for the Regulatory Mediator Effect of with and without In SaC

With and without in SaC (moderator), executive functions (independent variable), difficulty in emotion regulation (mediator) and self-regulation (dependent variable) in Figure-1 are.

Participitans

The study group of the research consisted of the students studying in the province of Istanbul in the 2020-2021 academic year. In the sample, 6,7 and 8th grade students who are gifted in SaC (59 females, 64 males in total 123) and those who are not in SaC (89 males 95 females, 184) 6, 7th and 8th grade students are included. Appropriate sampling method was used for participation in the study. Information about the working group is shared in Table 1 below.

Table 1.
Socio-demographic Characteristics of the Study Group

Variable	SaC		Normal		Total	
	n	%	n	%	n	%
Gender						
Male	59	48	89	48.4	148	48.2
Female	64	52	95	51.6	159	51.8
Class						
6th	80	65	83	45.1	163	53.1
7th	29	23.6	61	33.2	90	29.3
8th	14	11.4	40	21.7	54	17.6
Mother Education						
Primary School	20	16.3	58	31.5	78	25.4
Secondary School	9	7.3	32	17.4	41	13.4
High School	31	25.2	60	32.6	91	29.6
Undergraduate	51	41.5	34	18.5	85	27.7
Graduate	12	9.8	0	0.0	12	3.9
Father Education						
Primary School	11	8.9	50	27.2	61	19.9
Secondary School	18	14.6	24	13.0	42	13.7
High School	32	26.0	77	41.8	109	35.5
Undergraduate	42	34.1	30	16.3	72	23.5
Graduate	20	16.3	3	1.6	23	7.5
Total	123	40.1	184	59.9	307	100

Data Collection Tools

Behavioral Rating Inventory Of Executive Function (BRIEF) Parent Form

BRIEF Parent Form, It is a 3-point Likert-type inventory consisting of 86 items in total in which parents with children aged 5-18 evaluate the behaviors of their children regarding their executive functions. The inventory has 2 comprehensive indexes and 8 subscales. In addition, there is a total index score in which 72 items are included in the assessment. Developed by Gioia, Isquith, Guy & Kenworthy (2000) the internal consistency of the parent form of the scale was found between .80 and .97 in a healthy sample. The adaptation of the scale to Turkish and its validity and reliability studies were carried out by Nazlı-Köylü (2010). The internal consistency of the parent form of the scale was between .60 and .94 in the healthy sample. Within the scope of this research, the internal consistency coefficient for the total score was found to be .96.1. High scores on the scale indicate a high level of dysfunction.

Difficulties in Emotion Regulation Scale (DERS)

It is a 5-point Likert-type scale developed by Gratz & Roemer (2004) consisting of 36 items and 6 factors. The internal consistency coefficient of the original form varies between .93, and the values of the sub-dimensions vary between .88 - .89. Test-retest reliability was found to be .88. Adaptation study to Turkish was done by Rugancı & Gençöz (2010). In this study, it was found that the 6-factor structure of the scale explained 62.4% of the total variance. Also, the Cronbach Alpha was found to be .94. It was observed that the internal consistency coefficients of the subscales varied between .90 and .75. Test-retest reliability was found to be .83. The study for adolescents was conducted by Sarıtaş & Gençöz (2011). The overall internal consistency coefficient of the scale was found to be .93, similar to the original scale, and the test-retest reliability was found to be .83. Within the scope of this study, the internal consistency coefficient for the total score of the Difficulty in Emotion Regulation was found to be .92.5.

The Adolescent Self-Regulatory Inventory (ASRI)

Moilanen (2005) developed the scale to evaluate self-regulation skills in adolescents. The scale is a 4-point Likert type instrument consisting of 32 items. There are 2 factors, "Self-Regulation Success" and "Self-Regulation Failure". The internal consistency coefficient of the scale was found to be .89. The scale was adapted to Turkish by Harma (2008). The internal consistency of the self-control success subscale was .85, and the self-control failure sub-dimension was .80. Within the scope of this research, the internal consistency coefficient for the total score of the scale was found as .88.8. When both dimensions of the scale are found to be related, the items of failure in self-regulation can be reversed and an evaluation can be made in one dimension under the title of successful self-regulation. In this case, high scores from the scale indicate successful self-regulation skills (Tercanlı-Metin et al. 2017).

Data Collection and Analysis

The data were collected online through measurement tools created on Google form. Informed consent forms were prepared for parents and young people to participate in the study. After the necessary consents were obtained, the stage of collecting data was initiated. In the research, the data were analyzed using the PROCESS macro plug-in of Hayes with the SPSS 20 package program (Hayes, 2018). In analyzing the data, descriptive statistics were calculated and Pearson Product Moment Correlation Coefficient was examined to calculate the correlation between continuous variables. Before the mediation analysis, the relationships between variables were examined using stepwise linear regression and multivariate regression analysis methods. For the mediation model created in line with the results, Bootstrap method was used to see the indirect effects. In contemporary statistical approaches, much more attention is paid to whether the indirect effect (a.b) is significant or not. Contemporary approachs; In the Baron and Kenny method, they do not look for conditions related to the steps required to be carried out and they criticize these conditions. Contemporary approaches argue that even if these conditions are not fulfilled, the mediating effect (indirect effect = a.b) may occur. In the contemporary approach, it is recommended to test the indirect effect with the Bootstrap technique, which produces stronger and valid results than the Sobel test. (Hayes, 2018). In order to have meaningful results in this method, the lower and upper limits of the confidence interval should not include the "0" value. If the result does not contain a value of zero, it is concluded that mediations, direct and indirect effects are significant (Gürbüz, 2019). In the study, the moderated mediation effect model analysis was used to examine whether the moderated variable has an effect on the indirect effect. The effect model that shows in which situations the indirect effect of the independent variable "X" on the dependent variable "Y" through the (mediation variable) "M" is called "moderated mediation effect model" (Gürbüz, 2019).

Results

In this section, firstly, descriptive statistics, assumptions and relationships regarding research variables are presented. According to the research diagram, direct, indirect and total impact results are shared. Finally, in order to show the effect of the moderated effect on the indirect effect, the moderated mediator effect model was tested and the findings were presented.

Table 2.

Descriptive Statistics, Correlations and Assumptions Regarding Variables

Variable	Descriptive Statistics				Correlations(r)			
	Mean	Ss	Skewness	Kurtosis	1.	2.	3.	Cronbach's α
SaC								
1. EF	124,86	27,189	,561	-,254	1	,408**	-,535**	,96.6
2. ER	78,59	22,690	,436	-,474	,408	1	-,610**	,92.6
3. SR	86,71	14,205	,207	-,271	-,535**	-,610**	1	,88.5
Normal								
1. EF	123,49	24,192	,082	-,452	1	,492**	-,639**	,95.7
2. ER	81,79	23,016	,379	-,373	,492**	1	-,723**	,92.4
3. SR	84,88	15,215	,250	-,472	-,639**	-,723**	1	,89.0

** p<0.001; Note: **EF**: Execautive Functions, **ER**: Emotion Regulation, **SR:** Self Regulation, S**aC**: Gifted Students' School, Normal: Nongifted students or not enrolled SaC

In this study, secondary school students' who are in the SaC and secondary school students' who are not in the SaC were examined the scores of in terms of executive functions, emotion regulation difficulties and self-regulation skills. According to Table 2, The average scores of secondary school students educated in the field of general ability in SaC are as seen in executive functions ($\bar{X}$ = 123.49), self-regulation ($\bar{X}$ = 84.88) and emotion regulation difficulties ($\bar{X}$= 81.79). The average scores of secondary school students not in BİLSEM are as seen in executive functions ($\bar{X}$= 123.49), self-regulation ($\bar{X}$= 84.88) and emotion regulation difficulties ($\bar{X}$= 81.79). It was observed that the skewness and kurtosis values of the variables for both groups were between the -1 and +1 points accepted for normality. In addition, the linearities between variables are examined through scatter diagrams. It has been observed that the variables show an elliptical linear distribution. In this case, it is seen that normality and linearity are met (Büyüköztürk, Şekercioğlu & Çokluk, 2018; Karagöz, 2019). The extreme values were examined taking into account the z values and mahalanobis values and no extreme values that could be deduced from the study were found. The VIF values are 1,320 and the tolerance values are 758 for the group whose multiple connectivity and singularity between variables are not in SaC. For the group with in SaC, VIF values were found to be 1.199 and tolerance values were found to be 834. It is desirable that the tolerance values should not be smaller than 0.333 and VIF values should not be greater than 3. (Tabachnick & Fidell, 2013). Autocorrelation was checked with Durbin Watson value and for the group not in SaC (dw: 1931); The value (dw: 2.123) was found for the group with SaC. These values are stated to be within normal ranges (Küçüksille, 2014). According to Tabachnick and Fidell (2013), the number of participants in the regression analysis was given as N≥104 + m. "m" is used for the number of variables. Since there are 3 variables in the study, there should be at least N ≥ 107 people in two groups. 123 in SaC in the research; Since there are 184 secondary school students who are not in SaC, it is seen that this condition is met. In this case, it can be said that the assumptions required for multivariate statistics are met. Correlation values were also examined in the study. In Table 2, for the group in SaC, it was found that there was a moderately positive significant relationship between the scores of executive functions and emotion regulation difficulties (r = .408, p <.01). It was found that executive functions scores had a moderately negative significant relationship with self-regulation(r = -.535, p <.01). It was found that emotion regulation difficulties scores had a moderately negative significant relationship with self-regulation scores (r = -.610, p <.01). For the group not in SaC, the scores of executive functions scores were found to be positively moderate with emotion regulation difficulties scores (r = .492, p <.01) and moderately negative with self-regulation (r = -.639, p <.01) It was found to have a significant relationship. It was found that emotion regulation difficulties scores had a highly level negative significant relationship with self-regulation scores (r = -.723, p <.01).

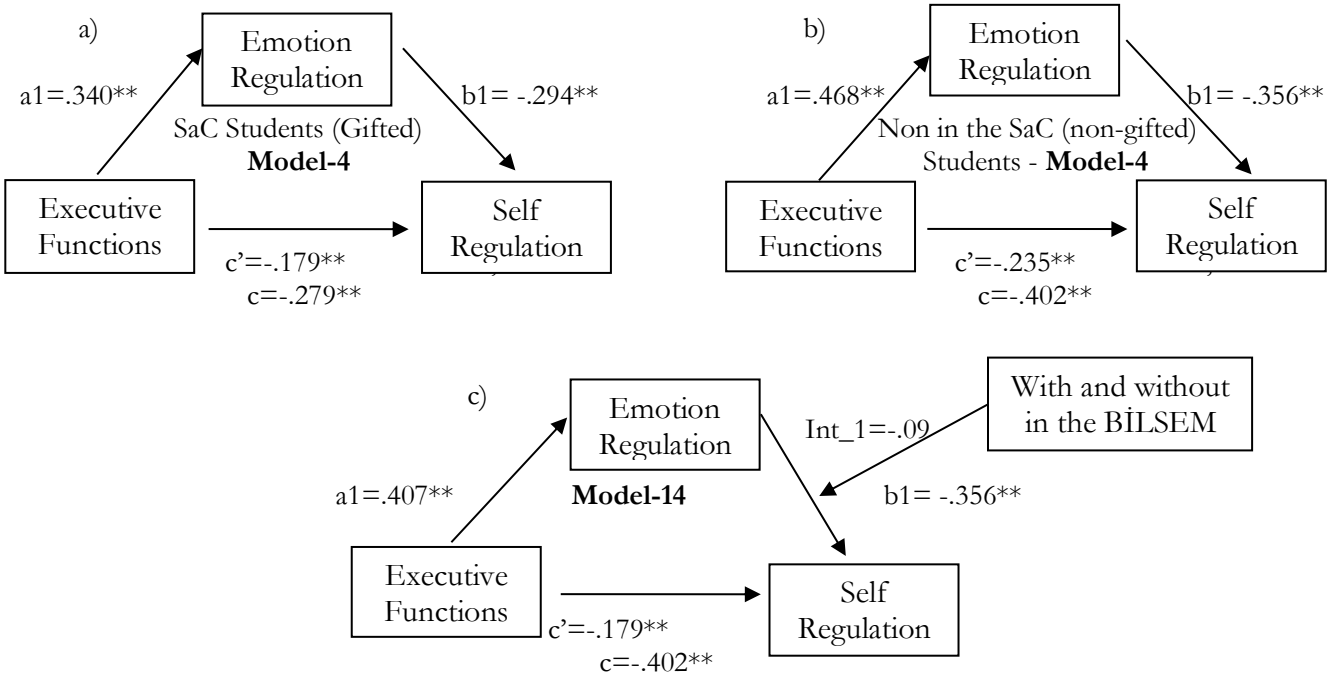

Figure 2.
Model-4 and Model-14 Mediation Analysis Results for Gifted and Nongifted Students Enroled Secondary School Level

In Figure-2a and 2b, the a, b, c and c 'ways of emotion regulation difficulties in the relationship between executive functions and self-regulation skills and regression coefficients related to these paths are given. Considering the findings of middle school students both in with and without SaC in Figure-2a and 2b, it is seen that the executive functions, which are the predictor variables, significantly affect the emotion regulation difficulties, which are the mediator variable (SaC, b=.340, %95 CI [.2032,.4775], p<0.001; Not in SaC, b=.468, %95 CI [.3472,.5894], p<0.001). In the next section, the combined effects of emotion regulation difficulties (b-path) and preditors executive functions (c 'path), which are the mediator variables for both groups, on self-regulation skills, which are the dependent variable have been examined. According to this; Emotion regulation difficulties were observed to significantly and negatively level affect self-regulation skills for both groups. (SaC, b=-.294, %95 CI [-.3846, -.2042], p<0.001 ; Not in SaC, b=-356., %95 CI [-.4244,-.2888], p<0.001). In addition, it is seen that executive functions significantly and negatively affect self-regulation skills for both groups (SaC, b=-.179, %95 CI [-.2545, -.1040] p<0.001; Not in SaC b=-235., %95 CI [-.2996,-.1706], p<0.001). In Figure-2c, PROCESS macro Model-14 is used to see whether the indirect effect depends on the moderated variable. Here, the analyzes were carried out over data set of 307 people. Moderated was examined through the variable of with and without at SaC. According to the results, the significance level of the "b" value of the Int_1 variable, which consists of the interaction of emotion regulation difficulties and the moderator variable, was examined. Accordingly, it was seen that the moderated effect of the variable was not significant (b=-.090, %95 CI [-.1888, .0083], p>.05).

Table 3.
Mediation Analysis Results: Direct, Indirect, Total And Moderated Mediation Effects

Effect	B Coefficient	Lower bound[a]	Upper bound[a]
SaC			
Total Effect	-.279**	-.358	-.200
Direct Effect	-.179**	-.254	-.104
Indirect Effect	-.100**	-.153	-.054
Non in the SaC	B Coefficient	Lower bound[a]	Upper bound[a]
Total Effect	-.402**	-.472	-.331
Direct Effect	-.235**	-.299	-.170
Indirect Effect	-.167**	-.227	-.113
SaC- Moderated Mediation Effects	B Coefficient	Lower bound[a]	Upper Bound[a]
Index of Moderated Mediation	-.037**	-.085	.008

**p<0.001; Note= B. Coefficient: bootstraping regression coefficient=5000 bootstrap based on sample., CI, [a] %95 bootstrap confidence interval.

According to Figure-2a, 2b, 2c and Table 3, direct, indirect and total effects were found to be significant for both groups with and without in SaC [(SaC= total effect (b=-.279, %95 CI [-.358, -.200], p<0.001); direct effect (b=-.179, %95 CI [-.254,-.104], p<0.001); indirect effect (b=-.100, %95 CI [-.153, -.054], p<0.001), (Not in SaC= total effect (b=-.402, %95 CI [-.472, -.331], p<0.001); direct effect (b=-.235, %95 CI [-.299,-.170], p<0.001); indirect effect (b=-.167, %95 CI [-.227, -.113], p<0.001)]. That is, it is seen that the mediating effect of emotion regulation difficulties is statistically significant for both groups.

In order to test whether the indirect effect is due to the moderated effect or not, the moderated mediation indexes were examined in the moderated mediator effect model analysis. It has been observed that the moderated variable with and without in SaC or not a significant effect on the indirect effect (b=-.037, %95 CI [-.085, .008]).

Discussion and Conclusion

This section is with and without in SaCs in Turkey and executive functions of middle school students and the results of the mediating role of emotion regulation in the relationship between self-regulation skills were discussed.

The direct, indirect and total effects of emotion regulation difficulties were found to be statistically significant in the relationship between executive functions and self-regulation skills of secondary school students with and without in SaC. In addition, it was found that there was a positive and significant relationship between executive functions and emotion regulation difficulties for both groups. We can say that decrease in executive functions will decrease emotion regulation or increase in executive functions will increase emotion regulation. When the literature is reviewed, it is seen that similar results were found in studies on executive functions and emotion regulation (Thompson & Calkins, 1996; Barish, 2012; Öztemür, 2018). In the study, a negative correlation was found between emotion regulation difficulty scores and self-regulation scores in two groups. According to this result, we can say that as the emotion regulation difficulty scores increase, self-regulation scores will decrease, and as the emotion regulation difficulty scores decrease, self-regulation scores will increase. Koole & Aldao (2016) and Wagner & Heatherton (2014) made statements supporting the results in their studies. In the study, a negative relationship was found between executive functions and self-regulation for both groups. We can say that the decrease in executive functions scores will increase the self-regulation scores, while the increase in the scores of executive functions will decrease the self-regulation scores. Hofmann et al. (2012) mentions the existence of a relationship between executive functions and self-regulation.

If we evaluate the model in general, we can say that executive functions predict both emotion regulation and self-regulation. In this case, it is seen that emotion regulation is a mediating variable in the relationship between executive functions and self-regulation skills of secondary school students with and without SaC. That is, part of the effect of executive functions on self-regulation skills is through emotion regulation control. According to the result, it can be said that the studies to be done to develop executive functions may have a positive effect on self-regulation skills, but developing them together with emotion regulation skills can increase this effect. Jones et al. (2016) focused on the relationships between executive functions and inhibitory control in their research, and stated that these two skills were effective on self-regulation skills, similar to the results of the research. There is no study in the literature that examines executive functions, emotion regulation and self-regulation variables together and looks at the relationships between them through a mediation model. It was observed that especially one of the variables in question was considered and there were studies to compare different groups. In studies comparing gifted students and normal groups, executive functions (Leana-Taşcılar & Cinan, 2012), self-regulation skills for scientific learning, self-regulated learning strategies (Kanık, 2017), executive functions (Al-Hmouz & Abu-Hamour, 2017; Rocha et al. 2020) like variables has been found to be used. With the increase in neurocognitive studies, the contents of concepts such as, executive functions, self-regulation and emotion regulation are expanding. However, interest in these concepts has started to increase gradually in different disciplines. However, there may also be confusion about the concepts arising from different uses. Establishing a language unity on the subject can increase the number of studies to be done. In addition, the use of contemporary statistical approaches such as situational mediation analysis, structural equation models, and indirect impact analysis with bootstrap method is newer. This situation may explain the limitations of the studies.

It has been observed that the moderated variable with and without in SaC or not a significant effect on the indirect effect. In this case, we can say that emotion regulation difficulty plays a mediating role in the relationship between executive functions and self-regulation. However, in this relationship, it can not be said that with and without in SaC makes a significant difference in terms of the effect of the model. In summary, it can be concluded that the model created creates statistically similar effects in both groups. There is no found similar study about SaCs in the literature. The research will be an example for the studies to be done in this aspect. In addition, there are different institutions abroad that support gifted students. İt can use working in these institutions as an example. The fact that the model

created for both the gifted group and the group not identified as gifted yielded significant results for both groups is also important for the generalizability of the study.

Recommendations

It may be more effective in terms of student development if teachers, families and experts examine executive functions, emotion regulation and self-regulation studies together. In future studies, researchers can develop new models in which they consider executive functions, emotion regulation and self-regulation variables and components together. The effect of the model can also be examined in different groups (special learning disability, autism, mental disability, etc.).

Limitations of Study

Due to Covid-19 process, parental inventory was used instead of performance tests to determine executive functions. The teacher inventory was not preferred because it consists of 86 items and will be filled in for each student. These situations can be evaluated in future studies.

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