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The Relation Between Cognitive Flexibility and Academic, Social and Emotional Self-Efficacy Beliefs Among Adolescents

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Abstract

The aim of this study is to examine the relation between cognitive flexibility and the academic, social, and emotional self-efficacy beliefs of adolescents. For this purpose, data was collected from 270 high school student adolescents (163 female, 107 male, $\overline{X}_{age}$=16.00, ss=1.11). The cognitive flexibility scale and the adolescent self-efficacy expectation scale were used. According to the first finding obtained, while the cognitive flexibility, academic self-efficacy, and social self-efficacy beliefs did not differentiate according to sex, the emotional self-efficacy scores differentiated in favour of males. Second, significant relations in positive terms were obtained between cognitive flexibility and academic, social, and emotional self-efficacy beliefs. Lastly, emotional and social self-efficacy beliefs were found to predict cognitive flexibility scores in a significant way.

Keywords

Cognitive flexibility
Academic self-efficacy
Emotional self-efficacy
Social self-efficacy

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Introduction

Individuals play many roles in their daily lives. New roles require being in new environments, meeting new people, learning new things, and therefore rising to new and unexpected demands. As for adolescents, bio-psycho-social changes constitute the source of process. Adolescents have to cope with biological changes related to maturing, developing a successful identity across many fields, entering new environments, and meeting new people while at the same time achieving academic success. To meet such an intense demand successfully requires cognitive flexibility. Flexible cognition requires acting in a dynamic way in response to changing demands and cognitive processes (Deák, 2003). This brings along the result of fulfilling the demands successfully.

Cognitive flexibility refers to when an individual is aware of the fact that there are options and accessible alternatives to every situation, and has the ability to adapt to various situations (Martin & Anderson, 1998; 2001). It also refers to the ability to change one's cognition according to changing environmental conditions (Dennis & Vander, 2010). Individuals who have this ability can replace compelling and maladaptive thoughts with balanced and adaptive thoughts, create alternatives, and evaluate hard situations so as to make them easier to cope with (Gülüm & Dağ, 2012). According to Cañas et al. (2003), cognitive flexibility refers to the ability to develop cognitive process strategies for new and unexpected situations in one's environment. This definition includes three further facets: first, cognitive flexibility is a skill that involves a learning process that can be obtained with experience. Second, cognitive flexibility involves the adaptation of cognitive process strategies. In this regard, cognitive flexibility implies a change in complicated behaviours, not individual reactions.

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Lastly, cognitive flexibility involves adaptation to new and unexpected environmental changes based on experience. Therefore, it can be said that cognitive flexibility is a learnable trait.

Individuals have to make decisions about how they will react to new situations that they enter or encounter. In doing so, they carry out a cognitive process in which they realize options. In this process, individuals who perform self-regulation based on the factors are cognitively more flexible than individuals who find only one appropriate or correct behavioural reaction to a situation (Martin, Anderson & Thweatt, 1998). Being cognitively flexible allows one to see the cognitive, behavioural, and affective options of a situation and possibly create new solutions for it.

Although cognitive flexibility involves an individual's capacity to adapt (Payne, Bettman & Johnson, 1933), this adaptation may not always happen. Even if a person who can act flexibly fails in a given situation, cognitive flexibility still plays a part of regardless. According to Martin, Anderson, & Thweatt (1998), individuals who show flexibility in their daily lives are not merely flexible in a certain situation or at a single time. This shows that cognitive flexibility can be a general condition.

Individuals who consider themselves cognitively flexible are also stated to be incredibly self-confident, good at repartee, careful, and understanding (Martin & Anderson, 1996, 1998). These individuals also have higher beliefs in their own self-efficacy and self-observation skills than individuals who have low cognitive flexibility (Martin & Rubin, 1995).

Cognitive Flexibility and Self-Efficacy Beliefs

A self-efficacy belief, one of the most researched topics in social learning theory, is defined by Bandura (1986) an individual's judgements about his or her capacity to successfully perform various actions. Individuals' beliefs about their capacities can affect their lives in many ways (Bandura, 1988a). For instance, such beliefs have an effect on what kind of choices people make, how much effort they put into a decision they make, how long they will struggle against an obstacle or hardship, how resilient they are after a failure, and whether their future mentality will be self-preventing or self-supporting (Bandura, 1988b).

According to Bandura (1986), individuals process different information sources related to their talents, weigh these sources in a particular order, combine them when needed, and practice the appropriate behaviours for this. To carry out these processes requires cognitive flexibility (Bandura (1982; 1989). In addition, Bandura states that self-efficacy is a part of cognitive flexibility, and individuals who have higher self-efficacy beliefs commonly have higher cognitive flexibility (Bandura, 2000). Bandura also states that even if an individual is aware of the fact that he or she has alternatives within in a situation, the individual must also believe in their own self-efficacy in order to practice a desired action. Lastly, Bandura (1977) states that cognitively flexible individuals trust in their ability to act efficiently. According to Martin & Rubin (1995), individuals who have high cognitive flexibility levels also typically have higher levels of self-efficacy beliefs and self-observation skills than individuals who have lower cognitive flexibility levels. In previous studies on the relation between cognitive flexibility and self-efficacy beliefs, significant positive relations were obtained (Kim & Omizo, 2005; Brewster, 2011; Shimogori, 2013). In other words, it can be said that there is a positive relation of mutual causality between self-efficacy beliefs and cognitive flexibility.

The aim of this study is to compare the cognitive flexibility and self-efficacy beliefs of adolescents according to their sex, to examine the relation between cognitive flexibility and self-efficacy beliefs, and to reveal if self-efficacy predicts cognitive flexibility or not.

Method

Study Group

This study was carried out with 270 adolescents (163 female, 10 male) in different high schools throughout the Muğla Province Center. The age range of the group was between 14 and 19 years old, with an average age of 16.00 (ss=1.11). This working group, the 140's (52%) from Anatolian high schools and 130 (48%) were selected from the vocational school. The working groups, creating a readily available sampling (convenience sampling) method was used (Erkuş, 2013).

Data Collecting Tools

Cognitive Flexibility Scale (CFS): Validity and reliability studies of the CFS, which was developed by Martin & Rubin (1995), were performed in the first part of this research. According to these studies, the single dimension structure of the 11-item Turkish form (based on an original with 12 items) obtained after EFA was found to be in accordance with the structure obtained from CFA. The CFS included a 6-point Likert-type measuring tool, with 1 representative of "strongly disagree" and 6 representative of "strongly agree". In reliability study, the internal consistency coefficient of the scale was found to be as .74. The coefficient obtained for the split-half reliability of the scale was .77. A correlation of .98 was obtained for the two applications in the test-retest study. A correlation of .88 was obtained between the English form and the Turkish form in the language validity study. In the criterion dependant validity study, there was a significant positive relation between the CFS and belief in problem-solving and self-control of problem-solving inventory, and a significant negative relation with approach-avoidance. The internal consistency coefficient of the measuring tool was calculated as .73 from the data obtained within the study.

Adolescent Self-Efficacy Expectation Scale (ASEES): In order to determine the academic, social, and emotional self-efficacy beliefs of adolescents, the ASEES, which was developed by Muris (2001) and adapted into Turkish by Çelikkaleli, Gündoğdu, & Kıran-Esen (2006), was used. The ASEES is a 5-point Likert-type scale that consists of 23 items, with 1 representative of "Never", 2 as "Rarely", 3 as "Sometimes", 4 as "Often", and 5 as "Always". As for the reliability studies of the scale, the internal consistency coefficient was found to be .78 for the entire measuring tool, and .64, .69, and .71 for the academic self-efficacy expectation, emotional self-efficacy expectation, and social self-efficacy expectation sub-scales, respectively. The test-retest reliability coefficient of ASEES was .85. The test-retest correlation coefficients of the scale for the ASEE, ESEE, and SSEE sub-scales were .77, .73, and .65, respectively. As for the validity test study, the correlation between ASEES with sub-scales and the children depression scale were calculated as -.12, the correlations between the ASEE and SSEE were calculated as -.14 and r= -.12, respectively. A negative correlation was observed between the CDS and the ESEE sub-scale scores (-.02), but this relation was not found to be statistically significant. In the ASEES, all items are graded straight, with high scores representative of high self-efficacy.

Analysis of the Data

In the analysis of the data, a t-test was used for the independent groups in order to test if the cognitive flexibility and self-efficacy beliefs differed depending on sex or not. The Pearson Product-Moment Correlation Coefficient (r) was used so as to be able to present the relations between the variables. Stepwise multiple regression analysis was used to examine whether academic, social, and emotional self-efficacy and total self-efficacy beliefs predict cognitive flexibility scores or not. Before the analysis of the data, the data was tested for whether it was suitable for stepwise multiple regression analysis or not. Whether autocorrelation existed between the variables examined with Durbon-Watson (D-W) statistic and obtained as D-W= 1.81 was also tested. As this value showed an alteration between 1.5 and 2.5, it can be said that there was not autocorrelation between the variables. Lastly, the Mahalonabis Distances (D^2) statistic was used to determine the outliers, and, based on the obtained value, it was seen that there were no outliers in the given values. SPSS 20 program was used for the analysis.

Findings

This part of the research sought to discover whether cognitive flexibility, academic, social, and emotional self-efficacy beliefs differ according to adolescents' gender. The relation between the cognitive flexibility scores, the academic, social, and emotional self-efficacy beliefs of adolescents, and the findings with regard to self-efficacy beliefs predicting cognitive flexibility are included. The findings on the cognitive flexibility and self-efficacy beliefs of adolescents according to their gender are given in Table 1.

Table 1. t-Values According to the Descriptive Findings on Cognitive Flexibility, Academic, Social, and Emotional Self-efficacy Beliefs, and Gender

Variables	Gender	$\overline{X}$	Ss	t
Cognitive Flexibility	Female	51.38	6.83	.210
	Male	51.19	7.63	
Academic Self-Efficacy	Female	27.69	6.09	.066
	Male	27.63	8.64	
Social Self-Efficacy	Female	30.33	5.09	-.984
	Male	31.15	8.67	
Emotional Self-Efficacy	Female	22.79	6.45	-2.194*
	Male	24.43	5.29	

*p<.05

As seen in Table 1, the average cognitive flexibility [$t_{(268)}$= .210, p>.05], academic self-efficacy belief [$t_{(268)}$= .066, p>.05], and social self-efficacy belief [$t_{(268)}$= -.984, p>.05] scores of the adolescents do not differ in terms of sex. Alternatively, emotional self-efficacy differs in a significant way [$t_{(268)}$= -2.194, p<.05]. According to this, it can be said that males perceive themselves as more competent compared to females. The descriptive findings and correlation coefficients for the cognitive flexibility and self-efficacy (academic, social, and emotional) of the adolescents are given in Table 2.

Table 2. Descriptive Findings and Correlation Coefficients (r) of Cognitive Flexibility and Self-Efficacy (Academic, Social and Emotional)

Variables	$\overline{X}$	Ss	1	2	3	4
1-Cognitive Flexibility	51.30	7.14	1			
2- Academic Self-Efficacy	27.66	7.19	***.26*****	1		
3- Social Self-Efficacy	30.65	6.74	***.24*****	.55**	1	
4- Emotional Self-Efficacy	23.44	6.06	***.27*****	.46**	.38**	1

**p<.01, n=27

Table 2 reveals a significant positive relation between the cognitive flexibility scores and the academic (r=.26), social (r=.24), and emotional self-efficacy (.27) of the adolescents. This finding is considered in the way that cognitive flexibility and self-efficacy beliefs are variables that show positive changes together. The findings on the academic, social, and emotional self-efficacy beliefs of the adolescents, which predict cognitive flexibility scores, are given in Table 3.

Table 3. Stepwise Multiple Regression Analysis Results for the Self-Efficacy Beliefs (Academic, Social, and Emotional) of Adolescents and the Prediction of the Cognitive Flexibility Scores

Variables	R	ΔR^2	B	SH_B	β	t
Sabit	-----	-----	40.153	2.163		18.565*
Emotional Self-efficacy	.274	.075	.251	.074	.213	3.386*
Social Self-efficacy	.312	.023	.172	.067	.162	2.587*

R^2=.098, $F_{(2\text{-}267)}$= 14.468, p<.01, *p<.05

As can be seen in Table 3, the regression analysis of the self-efficacy beliefs of adolescents' prediction of cognitive flexibility variances was completed in two stages. Emotional self-efficacy and social self-efficacy are significant predictors in terms of their contributions to cognitive flexibility variance. In the first stage, emotional self-efficacy belief, which explains 07.5% of the variance, was included. In the second stage, social self-efficacy belief contributed 02.3% to the variance explained regarding cognitive flexibility. These two variables explain 09.8% of the cognitive flexibility variance of the adolescents together [$F_{(2-267)}$= 14.468, p<.01]. Academic self-efficacy belief contributed significantly to the prediction of cognitive flexibility variance (t=1.554, p>.05).

Conclusion and Discussion

In this research, the relation between the cognitive flexibility levels and self-efficacy beliefs (academic, social, and emotional) of adolescents based on sex, the relation between cognitive flexibility levels and self-efficacy beliefs, and whether self-efficacy beliefs predict flexibility scores or not was examined.

According to the first findings of the research, the cognitive flexibility level of the adolescents did not differ significantly based on sex. This finding runs contrary to the findings of Sapmaz & Doğan (2013), who have stated the cognitive flexibility scores of males to be high. The fact that different findings were obtained with similar variables is quite common in the social sciences, as incidental or systematic errors that get into the processes. When the equalization and extermination probabilities of the probable positive and negative influences cannot be found, it can cause different results to be obtained in similar subjects. According to Özbek (2011), such mistakes can be caused by certain aspects of a measuring tool, the application conditions, objectivity in grading, or the traits of students who react. However, the fact that no significant difference emerged may be due to the fact that males and females form similar cognitive structures as a result of being exposed to sources that feed cognitive flexibility (Cañas et al., 2003). Based on this, it can be said that adolescents have similar cognitive lives in academic, emotional, social, and cultural ways.

While the academic and social self-efficacy beliefs of the adolescents do not differ significantly based on sex, their social self-efficacy beliefs differ. This finding runs contrary to Telef & Karaca's (2011) finding that academic and emotional self-efficacy beliefs differ. As a result of males and females having equal chance to participate in academic and social life, above being male or female, individuals can be exposed to similar lives in terms of academic and social self-efficacy, can have similar indirect lives (such as school, social environment), and can be convinced by other important ones for being able to enter academic and social lives. In other words, adolescents can be exposed to the main informative sources of self-efficacy belief in similar conditions and amounts. As a result, this may have caused the adolescents to develop the same level of self-efficacy beliefs regardless of their sex.

However, a significant difference was obtained between the sexes in terms of emotional self-efficacy beliefs. This finding is similar to the findings of Telef & Karaca (2011). In addition, many studies have also stated that males are more emotionally competent than females (Bussey & Bandura, 1999; Çelikkaleli & Gündüz, 2010; Muris, 2001). That many studies have obtained similar results on this subject speaks to the fact that male adolescents are more competent than female adolescents. In our society in which males are usually able to express positive and/or negative feelings comfortably, while dignified and impassive female behaviour is expected, males can be included in emotional life more and thus can have more experience. This speaks to the notion that males are more emotionally competent.

A positive relation was found in this study between the cognitive flexibility levels and self-efficacy beliefs of adolescents. This finding is similar to many other research findings (Gan, Shang & Zhang, 2007; Kim & Omizo, 2005; Martin & Rubin, 1995). According to Bandura (1989; 2000), individuals who have high self-efficacy beliefs have a higher level of cognitive flexibility. As for Martin & Rubin (1995), individuals who state that they are cognitively flexible consider themselves more competent than those who are not flexible. When considered from this angle, it can be said that there is a relation between cognitive flexibility and self-efficacy beliefs at the level of mutual decisiveness. In addition, Martin, Anderson, & Thweatt (1998) state that self-efficacy beliefs are an important component of cognitive flexibility. Therefore, the fact that adolescents who are cognitively flexible know that there are many strategies and methods they can use in order to cope with any academic, social, or emotional situation they face will allow them to cope with these situations successfully. As achieved performances are also the most important source of self-efficacy beliefs (Bandura, 1977; 1986; 1995), adolescents whose have high cognitive flexibility can also improve their self-efficacy beliefs as well.

Lastly, while the emotional and social self-efficacy beliefs of the adolescents were found to predict cognitive flexibility significantly, academic self-efficacy beliefs did not predict cognitive flexibility significantly. The development of social and emotional self-efficacy beliefs in adolescents requires individuals to be in constant relation with others in their environment. The ability to meet new people, to speak before the public, to attend new social environments, to express positive or negative feelings, to control one's feelings in a positive way, and their self-efficacy beliefs along with that. According to Bilgin (2009b), cognitive flexibility is a concept used for interpersonal relations, and self-efficacy beliefs are gained through relations that an individual builds with others (Di-Tomasso et al., 2002). Thus, it can be said that emotional and social self-efficacy beliefs are variables that predict cognitive flexibility. In addition, Martin & Anderson (1998) state that an individual should feel competent only in areas where he or she is flexible. Therefore, individuals who can be flexible when necessary are expected to develop self-efficacy beliefs for desired results.

According to Bandura (1989), individuals need to have self-efficacy so as to help desired results to come about even if they are aware of the fact that they chose the best option in a situation. Bandura (1977) states that individuals who have high self-efficacy beliefs are cognitively exploring, can determine flexible strategies, are influential in their environment, and are motivated toward goals. In other words, self-efficacy beliefs should be considered as important factors in being cognitively flexible.

This study has many limitations. For one, the study is limited by being restricted to the Muğla Province centre, which limits the generalizability of the study's findings. In addition, the fact that the relation between self-efficacy belief and cognitive flexibility was examined with a correlation coefficient is problematic in terms of the direction of the relation. The question of whether cognitive flexibility causes self-efficacy beliefs or if self-efficacy beliefs cause cognitive flexibility can be answered through structural equality models. However, it is suggested to consider self-efficacy beliefs in studies where cognitive flexibility variables are used. It is thought that cognitive flexibility variables can be both a variable that can directly be the cause and can take the role of a mediator variable in considering its nature.

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