



Investigation of the Relationship between Cognitive Flexibility Levels and Personal Features of University Students

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ABSTRACT

The purpose of this study was to examine the relationship between cognitive flexibility levels and personality traits of university students and whether these variables differ according to gender, education department, cigarette and alcohol use. The research was carried out with 151 students studying in the English language education, physical education and sports, science education, public relations and advertising departments of Karadeniz Technical University. "Cognitive Flexibility Scale" was used to measure the level of cognitive flexibility, "Eysenck Personality Questionnaire Short Form" to measure personality characteristics and "Personal Information Form" created by the researcher was used for personal information. Independent Sample T-Test, One Way Variance Analysis (ANOVA) and Pearson Correlation Coefficient were used in the analysis of the data. The analyses were carried out in SPSS 22.0 program. The results of the research showed that there was a negative relationship between cognitive flexibility and neuroticism and a positive relationship between cognitive flexibility and extraversion. According to another result only extraversion scores differ by gender. Women's extraversion scores were higher than men's scores. The variables don't differ according to the education department. Cognitive flexibility and psychoticism scores differ between smokers and non-smokers. In addition neuroticism and psychoticism scores differ between individuals who consume alcohol and do not consume alcohol. The findings were discussed based on the literature and suggestions for future research were presented.

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Keywords:

Cognitive flexibility, personality traits, neuroticism, psychoticism, extraversion

1. Introduction

The introduction to social life starts with the birth by which the individual become a member of the family. This small community originally composed of mother, father and siblings and gradually becomes a society with the participation of new individuals. The individual has many different roles in his experience during this process. There are a number of responsibilities imposed by social life for these roles. One of them is to live in harmony with the society. In order to adapt to society, individuals should be able to respond to some unexpected demands of their roles. This situation is inevitable for the individual who enters new environments, meets new people and learns new things. Individuals should properly adapt their intellectual abilities to adapt to new and unfamiliar situations they face. The way to this is to carry out healthy and positive cognitive processes. A harmonious life is possible only when individuals can move away from the abrasive and consumer effects caused by the inflexible perspective. Reducing this flexibility can lead to emotional deprivations that are difficult to compensate (Eşiyok, 2016). Flexibility allows individuals to evaluate problems differently from ordinary perspectives and to see components in a universal and multi-faceted way. Resolving the problem, defining it and producing new solutions are other possibilities provided by flexibility (Martin and Rubin, 1995).

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According to Canas et al (2003), cognitive flexibility is the ability of individuals to develop mental strategies in the face of unexpected situations and to use these strategies to suit the situation. Cognitive flexibility can be expressed as the presence of more than one and several alternative strategies in the individual's cognitive repertoire and the ability to choose one or more of these alternatives to suit the situation when needed. Cognitive flexibility is a requirement for individuals to develop new expressions and actions in the face of expected or unexpected situations and to organize their cognition creatively (Deak, 2003). Cognitive flexibility can be considered a high level skill as it involves simultaneous control of multiple factors -such as time, space and context. Martin and Anderson (1998) stated that individuals who evaluate more than one option in case of situations are more flexible than individuals who think that one option is correct. Being aggressive, careful, perceptual, responsible, rational and sensitive are characteristics of individuals with high cognitive flexibility (Cagela, 1981). In addition, they are individuals who can make sense of their lives and who are confident in communication power (Martin and Anderson, 1998). A study revealed that cognitive flexibility is also associated with individuals' positive mood (Murray et al., 1990). Considering the relevant definitions and features, cognitive flexibility can be defined as the self-confidence and willingness of individuals to organize their knowledge and skills appropriately in the face of new and different situations, awareness of all options and selection and application of the appropriate option.

The characteristics of having high cognitive flexibility include some parts of the personality of individuals. Personality is the lifestyle of the individual. This lifestyle includes different characteristics such as talent, intelligence, emotion, joy, grief, anger, friendship, traditions. Baymür (1993) has defined personality as a harmonious and holistic structure that contains many human characteristics in a personal way. Starting with fertilization, personality continues continuously until death and includes everything that concerns people. Individuals' attitudes and behaviors toward events, ways of dealing with events differ according to their traits (Türküm, 2000; Mete, 2006).

Usually, the experiences of individuals until the university years are limited to a familiar environment and do not exhibit much difference. The university years are the first times when these limits are exceeded and not witnessed anymore. Besides, these are the first years when the individual leaves the environment which he is accustomed to. In addition, new environments and first contacts with new people appear. These contacts, which are effective in individuals' future lifestyles, are clarified towards the end of their university years. University years are not only periods in which decisions are taken in line with the professional career, but also those in which the personality traits take a serious shape. Personality traits also play an important role in shaping the behavior of individuals (Eşiyok, 2016). It has been suggested that the personality traits of the individual have an effect on how to deal with the difficulties that one encounters in life. Individuals show behaviors such as escaping or fighting according to their personality traits (Çatal, 2014). Considering that personality traits are in the back-ground of individuals' attitudes and behaviors, it is thought that there may be a relationship between cognitive flexibility and personality traits. Accordingly, the aim of the study is to examine the personality traits and cognitive flexibility levels of university students.

2. Method

2.1. Research Model

This study is a relational study conducted to examine the relationship between cognitive flexibility levels and personality traits of university students studying in different departments according to some variables. In the research, exploratory correlational research model, one of the correlational research models, was used. Exploratory correlational research aims to investigate relationships between variables (Büyüköztürk et al. 2015).

2.2. Participants

The universe of the research consists of 151 students studying at Karadeniz Technical University English language education, physical education and sports, science education, public relations and advertising departments in the spring term of 2016-2017 academic year. Students who can be reached and agree to participate in the research are included in the sample. The type of sampling taking into account the ease of access and suitability is called the appropriate sampling (Demir, 2017). The distribution of the participants by gender is 89 women (%58,9) and 62 men (%41,1). The ages of the participants vary between 18 and 36, the

average age is 21,24. The distribution of the participants according to their department is 39 English language education (%25,8), 41 physical education ve sports (27,2), 36 science education (23,8) and 35 public relations and advertising (23,2). The majority of the participants reside at home (%60,3), secondly in the dormitory (24,5). The distribution of participants according to the level of education received is 38 in the 1st grade (%25,2), 75 in the 2nd grade (%49,7), 11 in the 3rd grade (%7,3) and 27 in the 4th grade (%17,9). The mothers of 150 participants are alive (%99,3) and the father of 142 participants is alive (%94). Most of the participants reported that their parents were mostly primary school graduates compared to other levels (mother:%40,4 and father:%31,1). Also the parents of most of the participants are married (%90,7). 130 participants stated that their mothers were housewives (%86,1). The distribution of the fathers of the participants by profession is 29 civil servants (%19,2), 44 self-employed (%29,1), 33 workers (%21,9), 34 retirees (%22,5) and 11 others (%7,3). 116 participants stated that they didn't smoke (%76,8), 35 participants stated that they smoked (%23,2). 120 participants stated that they didn't consumed alcohol (%79,5) and 31 participants stated that they consumed alcohol (20,5).

2.3. Instruments

2.3.1. Personal Information Form: The personal information form was created by the researcher. The purpose of the form was to gather information about the demographic characteristics of the participants (gender, age, department and degree of education, place of residence, life status of parents, education level and profession of parents, marital status of parents, income level, cigarette and alcohol consumption).

2.3.2. Cognitive Flexibility Scale: The Cognitive Flexibility Scale (CFS) was developed by Martin and Rubin (1995) and adapted to Turkish by Çelikkaleli (2014). The scale consists of 12 items and one dimension. CFS is a 6-point Likert-type scale. The items of the scale are 1 "absolutely disagree", 2 "" disagree ", 3" partially disagree ", 4" partially agree ", 5" "agree", 6 "absolutely agree". Items 2, 3, 6 and 10 are reversed, and the scores that can be obtained from the scale vary between 10 and 60. The high scores indicate the high level of cognitive flexibility. Confirmatory factor analysis and internal consistency coefficient were calculated for validity and reliability studies of the scale. The scale was found to have a single-factor structure that explained the variance of the total group by 43%. The internal consistency coefficient of the scale was calculated as .74.

2.3.3. Eysenck Personality Survey: The Revised Eysenck Personality Questionnaire-Abbreviated Form by Francis et al. (1992) was adapted to Turkish by Karancı, Dirik and Yorulmaz (2007). The questionnaire consisting of 24 items measures personality in 3 sub-dimensions: neuroticism, extraversion and psychoticism. In addition, it was aimed to prevent bias during the application of the questionnaire and to check the validity with the lie scale. Items of the scale are scored as Yes (1) - No (0), but items 3, 5, 7, 10, 15, 16, 17, 19, 20, and 22 are reversed. The scores that can be obtained for each sub-dimension vary between 0 and 6. The internal consistency coefficient of the scale was found to be .78, .65, .42, .64, respectively, for extraversion, neuroticism, psychoticism and lie dimensions.

2.4. Data Collection and Analysis Procedures

Data collection was carried out in the classroom and in groups. The scales were applied by the researcher himself during the lesson hours by appointment from the academic staff. The data obtained as a result of the research were evaluated in computer environment and statistical analyzes were done with SPSS 22.0 program. The normality of the distribution was examined by looking at the skewness - kurtosis values and kolmogorov-simirnov test significance levels.

Table 1. Skewness-Kurtosis Values and Kolmogorov-Simirnov Test Significance Levels of Points

	N	Skewness	Kurtosis	p
Cognitive Flexibility Scale	151	-.322	-.320	.08
Neuroticism	151	-.315	-.828	.17
Extraversion	151	-.548	-.856	.17
Psychoticism	151	.483	-.413	.22

When the kurtosis-skewness scores shown in Table 1 are examined, it is seen that the scores are in the appropriate range and show normal distribution (Pallant, 2001). Looking at homogeneity, values were found to be greater than .05, the homogeneity assumption was considered for variance analysis. As a result of the normality and homogeneity analyzes, in the analysis of the data it was decided to use t test and variance analysis which are parametric measurements. Pearson Correlation Analysis was performed to examine the relationship between variables.

3. Results

The mean and standard deviations of the students' scores from the scales used in the research, the lowest and the highest scores are shown in Table 2.

Table 2. Averages, Standard Deviations, Lowest and Highest Scores of the Participants' Scores on the Cognitive Flexibility Scale, Neuroticism, Extraversion and Psychoticism Subscales

	N	Min	Max	\bar{X}	ss
Cognitive Flexibility Scale	151	35	70	54.62	7.59
Neuroticism	151	0	6	3.37	1.75
Extraversion	151	0	6	3.82	1.93
Psychoticism	151	0	5	1.62	1.19

Independent Sample T-Test was applied to determine whether there was a significant difference between the cognitive flexibility, neuroticism, extraversion, psychoticism levels and gender variable of university students and the results are shown in Table 3.

Table 3. Independent Sample T-Test Findings Regarding the Relationship Between University Students' Cognitive Flexibility, Neuroticism, Extraversion, Psychotic Levels and Gender Variable

Gender	N	Mean	sd	t	p	
Cognitive Flexibility	Female	89	55.02	6.90	.762	.447
	Male	62	54.06	8.51	.734	
Neuroticism	Female	89	3.61	1.73	1.942	.054
	Male	62	3.05	1.75	1.938	
Extraversion	Female	89	4.10	1.82	2.103	.03*
	Male	62	3.44	2.05	2.059	
Psychoticism	Female	89	1.63	1.11	.082	.935
	Male	62	1.61	1.32	.079	

*P<.05

When Table 3 is analyzed, it can be seen that cognitive flexibility, neuroticism and psychoticism levels of university students do not differ significantly by gender. Extroversion levels of university students differ according to gender and this difference is statistically significant (P<.05). Women's extraversion scores (\bar{x} =4.10) were higher than men's extraversion scores (\bar{x} =3.44).

One-Way ANOVA test was applied to determine whether the cognitive flexibility, neuroticism, extraversion and psychoticism levels of university students differ according to the program they are studied and the results are shown in Table 4.

Table 4. One-Way ANOVA Test Findings Regarding Cognitive Flexibility and Personality Traits of University Students According to the Training Program

Education Department	Factor	KT	sd	KO	F	p	η^2
Cognitive Flexibility	Between Groups	163.93	3	54.64	.94	.41	.01
	Within Groups	8479.29	147	57.68			
	Total	8643.23	150				
Neuroticism	Between Groups	7.01	3	2.33	.75	.52	.01
	Within Groups	454.47	147	3.09			
	Total	461.48	150				
Extraversion	Between Groups	16.13	3	5.37	1.45	.23	.02
	Within Groups	545.38	147	3.71			
	Total	561.52	150				
Psychoticism	Between Groups	9.79	3	3.26	2.33	.07	.04
	Within Groups	205.69	147	1.39			
	Total	215.48	150				

*p<.05

As a result of the ANOVA test, no statistically significant difference was found between the cognitive flexibility levels of the university students and the program they studied.

Independent Sample T-Test was applied to determine whether the cognitive flexibility, neuroticism, extraversion and psychoticism levels of university students differ according to smoking, and the results are shown in Table 5.

Table 5. Independent Sample T-Test Findings Regarding Cognitive Flexibility and Personality Traits of University Students According to smoking.

Smoking		N	Mean	sd	t	p
Cognitive Flexibility	Yes	35	56,91	8,45	2,054	,042*
	No	116	53,93	7,20		
Neuroticism	Yes	35	3,77	1,62	1,523	,130
	No	116	3,25	1,77		
Estraversion	Yes	35	4,37	1,61	1,913	,058
	No	116	3,66	1,99		
Psychoticism	Yes	35	2,22	1,37	3,118	,003*
	No	116	1,43	1,08		

*p<.05

When Table 5 is analyzed, it is seen that the levels of neuroticism and extraversion of university students do not differ significantly from smoking. Cognitive flexibility level differs statistically significantly according to smoking (t=.042, p<.05). Cognitive flexibility levels of students who smoke (\bar{x} =56,91) were found higher than the students who did not smoke (\bar{x} =53,93). The psychoticism sub-dimension also varies according to

smoking and this difference is statistically significant ($t=.003$, $p<.05$). The scores of students who smoke from the psychoticism sub-dimension ($\bar{x}=2,22$) were higher than those of nonsmokers ($\bar{x}=1,43$).

Independent Sample T-Test was applied to determine whether the cognitive flexibility, neuroticism, extraversion and psychoticism levels of university students differ according to alcohol consumption and the results are shown in Table 6.

Table 6. Independent Sample T-Test Findings Regarding Cognitive Flexibility and Personality Traits of University Students According to Alcohol Consumption

Alcohol		N	Mean	sd	t	p
Cognitive Flexibility	Yes	31	56,80	8,73	1,805	,073
	No	120	54,06	7,19		
Neuroticism	Yes	31	3,96	1,77	2,126	,035*
	No	120	3,22	1,72		
Estraversion	Yes	31	4,38	1,70	1,819	,071
	No	120	3,68	1,97		
Psychoticism	Yes	31	2,22	1,25	3,242	,001*
	No	120	1,46	1,13		

* $p<.05$

When Table 6 is analyzed, it is seen that the cognitive flexibility and extraversion levels of university students do not differ significantly from alcohol consumption. Neuroticism sub-dimension differs according to alcohol use and this difference is statistically significant ($t = ,035$, $p<.05$). The scores of students using alcohol from the sub-dimension of neuroticism ($\bar{x}=3,96$) were higher than those who did not consumption alcohol ($\bar{x}=3,22$). At the same time, the psychoticism sub-dimension differs according to alcohol consumption and this difference is statistically significant ($t = ,001$, $p<.05$). The scores of students using alcohol from the sub-dimension of psychotism ($\bar{x}=2,22$) were found higher than those who did not consumption alcohol ($\bar{x}=1,46$).

Pearson Correlation Analysis was conducted to determine the relationship between the cognitive flexibility levels of the university students and neuroticism, extraversion, and psychoticism levels and the results are shown in Table 7.

Table 7. Correlation Analysis Findings Regarding the Relationship between Cognitive Flexibility Levels and Personality Traits of University Students.

		Cognitive Flexibility	Neuroticism	Extraversion	Psychoticism
Cognitive Flexibility	r	1	-.200*	.391**	.081
	p		.01	.00	.32
	N	151	151	151	151
Neuroticism	r	-	1	-.116	.033
	p		-	.155	.684
	N		-	151	151

Extraversion	r	-	-	1	.075
	p	-	-	-	.358
	N	-	-	151	151
Psychoticism	r	-	-	-	1
	p	-	-	-	-
	N	-	-	-	151

* .05 level significant

** .01 level significant

When Table 7 is examined, it is seen that there is no significant relationship between cognitive flexibility and psychoticism. Neuroticism and extraversion have a statistically significant relationship with cognitive flexibility. There was found a negative correlation between cognitive flexibility and neuroticism at .05 level and correlation is medium size ($r = -.200$). A significant relation was found between cognitive flexibility and extraversion in the positive direction .01 level and correlation is large size ($r = .391$).

4. Discussion

The aim of this study was to examine the cognitive flexibility and personality characteristics of university students based on various variables. In the search it was firstly examined whether the cognitive flexibility, neuroticism and psychoticism levels of university students differed by gender. Only extraversion differs by gender. Women's extraversion scores were higher than men's scores. Extraversion includes features such as sociability, assertiveness, sincerity, talkativeness, compatibility, leadership, effectiveness, optimism, strong humor and flexibility. In addition extroverted individuals love to work with the society and mostly prefer social work areas (İnanç and Yerlikaya, 2014). Many studies in the literature have found that extraversion does not differ by gender (Karancı et al., 2007; Deniz and Kesicioğlu, 2012; Tunç and Aliyev, 2015; Acet et al., 2016; Shevlin et al., 2002). The information obtained in this research is not compatible with the literature. However the finding that cognitive flexibility does not change by gender has also been found in previous studies (Diril, 2011; Çuhadaroğlu, 2011; Öz, 2012). The finding that cognitive flexibility does not differ by gender is consistent with other research results.

According to one of research findings cognitive flexibility and personality characteristics do not change according to the education department of university students. In her research, Başsu (2016) compared the cognitive flexibility scores of teachers in science and social sciences and obtained the finding that there was no significant difference. In the study of Şahin and Ünüvar (2011) it was found that personality traits did not differ between different departments of the faculty of education. The findings obtained are consistent with these research findings.

It was found that the levels of neuroticism and extraversion of university students did not differ significantly from smoking. According to the findings, the level of psychoticism and cognitive flexibility differs significantly depending on smoking. The average score of the smokers in the psychoticism sub-dimension is higher than the non-smoker individuals. Büyükççek et al. (2014) also found that the level of psychoticism was higher in smokers than non-smokers. Psychoticism includes features such as impulsivity, the desire for easy satisfaction, short response time, and difficulty in conducting long-term work. The findings obtained in the research are in line with these explanations. In addition, cognitive flexibility levels of smokers were higher than those who did not. When the literature on cognitive flexibility is examined, it is seen that it includes skills such as constructive and functional coping. Cognitively flexible people can develop multi-faceted perspectives, they are determined to produce unique solutions and they trust themselves (Çelikkaleli, 2014). For this reason, they evaluate the problems in a positive framework, perceive them as an opportunity for their own development and are confident that they can overcome them. Considering that individuals with high cognitive flexibility have lower perceived stress levels (Turan et al. 2019) and have self-control (Bilgin, 2017), it may be thought that they are less likely to turn to cigarettes that can lead to

addiction outside of their own control. In study of Bedel and Ulubey (2015), it was found that individuals with high cognitive flexibility tend mostly to active coping styles. The higher cognitive flexibility scores of smokers than non-smokers is an inconsistent and remarkable finding with this study. It can be thought that smokers and non-smokers evaluate according to different standards while answering items that measure cognitive flexibility.

It was found that cognitive flexibility and extraversion levels of university students did not differ significantly from alcohol use. According to the findings, the levels of neuroticism and psychoticism differ significantly compared to alcohol use. When the neuroticism levels are examined, it is seen that individuals who use alcohol have a higher average score compared to individuals who do not. Similarly, when looking at the sub-dimension of psychoticism, the mean scores of the individuals using alcohol were found higher than the individuals not using alcohol. It can be thought that personality traits such as cold, insecure, aggressive, guilt, insensitivity in psychoticism are related to the social and impulsive dimension of alcohol use. The high psychoticism subscale scores of individuals using alcohol show that the research findings support the literature. Neuroticism sub-dimension includes personality traits such as anxious, depressed, shy (Bouchard, Lussier and Sabourin, 1999), hypersensitive and low self-esteem with features such as emotional consistency and excessive reactivity. It is stated in the literature that these properties are related to alcohol use (Karancı, Dirik and Yorulmaz, 2007). Herken, Bodur and Kara's (2000) study also found that individuals using substances such as cigarettes or alcohol show a neurotic and psychotic tendency.

No significant correlation was found between the cognitive flexibility levels of university students and psychoticism. Neuroticism and extraversion have a statistically significant relationship with cognitive flexibility. There was a negative .05 level negative relationship between cognitive flexibility and neuroticism. A positive relationship was found between cognitive flexibility and extraversion at a positive level .01. Güvenç (2019) also found a positive relationship between cognitive flexibility and extraversion.

Neuroticism includes features such as difficulty in decision making, restlessness, anxiety, emotionality, easy anger and sadness and excessive reactions (Bouchard, Lussier and Sabourin, 1999). It has been stated in the literature that individuals with low level of neuroticism are emotionally stable and their reactions to events are controlled. On the contrary, the high level of neuroticism makes the individual open to mental discomfort in the face of stressful experiences. Considering the definition of cognitive flexibility, it is seen that it includes being open to extraordinary situations and having the skills to cope with these situations (İnanç and Yerlikaya, 2014).

Extroverted individuals have social, aggressive, friendly, talkative and harmonious features. Being in the community is a preferred situation for these individuals and they tend to be flexible in the face of differences. For this reason, they can easily cope with the situations they face and overcome the problems. They are resistant to differences thanks to their compatible structures and this confirms the claim that they are cognitively flexible (İnanç and Yerlikaya, 2014). The finding that there is a great relationship between extraversion and cognitive flexibility obtained in this research supports this.

In this research, students from Karadeniz Technical University English language education, physical education and sports sciences, science education and public relations and advertising departments were included in this study group. Research findings include students who are trained in these departments. Generalization of findings may be wrong in more or larger samples. The use of available and appropriate sampling method in the selection of the research group may be among the limitations of the research.

Some suggestions can be presented according to the results of the research. The implementations for men to support being extroversion can be added to the content of training programs based on the finding that women are more extroverted than men. Besides, additional implementations can be included to keep neurotic and psychoticism levels, which differ due to smoking and alcohol use, at the usual level and to develop personality characteristics positively. Studies to increase the level of awareness of university students, to use effective ways of coping and to improve their problem solving skills may also enable them to be more cognitively flexible. For future studies on cognitive flexibility; It can be suggested to work with different variables and larger samples. Studies on cognitive flexibility generally include the 17-25 age group.

Future studies can focus on different age groups. Qualitative research methods can be used to obtain in-depth reviews, and the results of quantitative research can be supported by qualitative research data.

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