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Investigating High School Students' Personality Traits and Academic Procrastination with Cluster Analysis

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Abstract: In this study, a cluster analysis was performed by creating a data set from students' personality traits and academic procrastination behaviours. Correlation analysis was done to examine the relationship between the variables, and the characteristics of the formed clusters and the association of the clusters with the perceived socioeconomic status were examined. Cluster analysis is a simple and practical method for classifying a set of complex data based on certain variables and making them more meaningful and using the results as an aid to decision-making. Clustering algorithms handle such data effectively, making it more meaningful. Following the analysis, it was revealed that two clusters had formed. The first of the clusters includes 65.2 % of the sample population; the level of procrastination and the mean score of neurotic personality traits were calculated higher than the other cluster. The remaining part of the sample population (34.8 %) constitutes the second cluster. The mean scores of studying systematically habits and extroversion, agreeableness, conscientiousness, and openness to experience personality traits of the students forming this cluster are higher than the other cluster. No association was observed between the clusters and the perceived socioeconomic levels of the students. The distributions of socioeconomic levels within the clusters are similar to each other. When the correlations of these variables are examined; positive relationships were found between the level of procrastination and neurotic personality traits. Procrastination behaviour and neurotic personality traits were also negatively correlated with other variables.

Keywords: *Academic procrastination, big five personality traits, cluster analysis.*

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Introduction

The term personality, which reveals the individuality of people and makes them different from other people, refers to the distinct, unchanging, and consistent characteristics of individuals. Personality theory has been researched for decades by various researchers such as Tupes and Christal (1992), Guilford (1975), Goldberg (1982, 1993), and McCrae and Costa (1987), and nowadays there is an emerging consensus on the structure of personality in five main factors generally defined extroversion, agreeableness, conscientiousness, neuroticism, and openness to experience (McCrae & John, 1992). These widely accepted theoretical frameworks of personality are called Big 5 or OCEAN. Regardless of what society views as favourable personality traits, there is nothing good or bad about the big five personality ranking. Each feature and its combination have obvious benefits and can be used in a variety of situations. In this way, all dimensions of the big five can be valuable for interpersonal communication and task completion (McCrae & Costa, 2003).

Research has shown that personality may be predictive of many aspects of life, including career success (Judge et al., 1999; Semeijn et al., 2020), academic success (Malykh, 2017; Sobowale et al., 2018), job performance and satisfaction (Chandrasekara, 2019; Paleczek et al., 2018; Sartori et al., 2017), social status and relationships (Anderson et al., 2001; Louvet et al., 2019; Swaminathan & Kubat Dokumaci, 2021), health (Nikčević et al., 2021), political attitudes (Gerber et al., 2010), subjective well-being (Han, 2020; Stead & Bibby, 2017), and online behaviours (Azucar et al., 2018). However, these aspects of life, which are affected by these personality traits, play a role in transforming personalities, along with genetic factors that affect the formation of our personality. The interaction of innate genetic features and environmental factors reveals a unique personality in a long growth-development process. Many development theorists have stated that the basic characteristics of personality are determined in the first years of life.

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If the five-factor personality traits are briefly identified; *Extroversion:* The extroverted personality dimension represents a more sociable and friendly level of the individual. Friendliness, sociability, assertiveness, excitement seeking, and a greater proclivity to experience positive emotions are the main characteristics of extraversion. People who score high on extroversion are energetic, friendly, and open to establishing new social relationships and they have more friends and spend more time in social settings than introverts (Matthews, 2020; Nielsen et al., 2017). In short, extroverts are fun, talkative, funny, social, and affectionate people. Introverts, on the other hand, are calm, aloof, shy, passive, and prefer solitude (McCrae & Costa, 2003). *Agreeableness:* Agreeableness personality traits are more closely related to interpersonal connections. The individual's engagement in interpersonal collaboration and the degree to which he approves of this cooperation is referred to as agreeableness (Graziano & Tobin, 2002). Agreeableness people tend to be friendly, kind, warm, sociable, and trustworthy with others, while noncomplying people are less agreeable, argumentative, rude, and harsh with others (Robinson, 2010). *Conscientiousness:* The conscientiousness personality dimension refers to the degree of planning, attention and self-control shown by the individual. A person with self-control is someone who can control his impulses, work hard, devote himself to work, organize and strive to achieve goals. This personality trait is directly linked to responsibility, organization, and a desire for achievement. People with high degrees of conscientiousness are motivated, ambitious, and goal-oriented; those with low levels are viewed as unorganized, procrastinating, and lacking in responsibility and discipline (Costa & McCrae, 1995). *Neuroticism*: It refers to whether the individual has emotional balance. In other words, neuroticism refers to being more likely to experience negative emotions such as emotional instability, anxiety, depression, and anger. The characteristic of neurotic individuals is that they are more likely to experience anxiety. Negative emotions such as guilt, irritation, melancholy, and fear are common among neurotic persons. Highly neurotic people can be worried, insecure, withdrawn, and furious in this way. People with low neuroticism, on the other hand, are at ease, self-assured, balanced, patient, and have effective stress management abilities (Costa & McCrae, 1995; Özdemir & Dalkiran, 2017). *Openness to experience:* The inclination to participate in intellectual activities and be open to new sensations and ideas is defined as openness to experience. The openness to experience entails characteristics of the personality such as scientific and artistic creativity, divergent thinking, imagination, originality, complexity, and a high degree of curiosity. People with a high degree of openness are innovative, adventurous, original, creative, curious, and self-reflective, whereas those with a low degree of openness are conventional, conservative, and consider themselves indifferent (Costa & McCrae, 1995).

Procrastination has been labelled as a dysfunctional behaviour or an unreasonable delay in an activity that is connected with undesired results (Ellis & Knaus, 1979). Academic procrastination, a type of procrastination, has been recognized as a self-regulation failure (Pintrich, 2004) and produces an increase in psychological problems, as well as a loss of self-esteem and happiness, reduced academic success or achievement in students (Ferrari & Scher, 2000; Rothblum, et al., 1986; Schouwenburg, 1992; Solomon & Rothblum, 1984). Academic procrastination can be observed as being stressful, casualness, poor time-management, failure of task accomplishment, fear of failure and unwillingness to complete assignments (Ferrari, 1991; Rakes & Dunn, 2010; Schouwenburg, 1995).

Empirical studies show that various factors cause academic procrastination, and academic procrastination also reveals different results (Ferrari, 2010, 2017). Steel (2007) grouped causes and correlates of procrastination under four headings; task characteristics (task aversiveness, and the timing of rewards and punishments), individual differences (neuroticism, openness to experience: intelligence/aptitude, agreeableness, extraversion, conscientiousness), outcomes (mood, performance), and demographics (age, gender, year). Eisenbeck et al. (2019) states psychological inflexibility as an underlying mechanism of procrastination. Likewise fear of failure, negative experiences, lack of commitment and guidance, problematic social life, failure on effort regulation and lack of motivation has a negative effect on procrastination behaviour (Cheng & Xie, 2021; Özer & Altun, 2011; Rothblum, et al., 1986; Solomon & Rothblum, 1984; Ziegler & Opdenakker, 2018).

High school students are in the adolescence period by age group. The sense of self, which is redefined in adolescence, consists of personality traits that emerge from the first years of life. As individuals gain cognitive capacity for abstract thinking during adolescence, the continuity of their selves increases. Identity formations are the most prominent feature of this period (Klimstra, 2013). For this reason, it is critical to examine the personality, to determine the behaviors that occur together with the personality traits and to reveal the environmental factors that cause them.

The relations between academic procrastination, one of the factors affecting the educational activities of high school students whose identity development continues, and personality traits were investigated in this study. It is important to highlight that there have already been a substantial number of studies in a similar direction, but most of them focus on higher education. Based on the considerations, the study focused on "What personality traits were correlated with academic procrastination in high school students?" and "How can we classify students with these characteristics?". For this purpose, the following research questions will be answered:

- ✓ What are the personality profiles of the students according to the dimensions of personality?
- ✓ What is the rate of academic procrastination behaviour among students?
- ✓ Is there a significant relationship between students' personality profiles and their academic procrastination levels?

- ✓ How is the determination of the students' profiles according to their personality traits and academic procrastination levels?
- ✓ Is there an association between the profiles formed and the perceived socioeconomic level?

Methodology

This research is a correlational survey, a type of descriptive research that seeks to define existing correlations between variables. When two or more variables are combined, correlational survey models attempt to assess the existence or degree of change in them (Karasar, 2013). The correlation between high school students' personality traits and academic procrastination behaviours will be investigated in this study.

Participants and procedure

The participants of this study included 624 high school students located in a midsize province in the northwestern part of Turkey. Students were chosen at random and handed questionnaires. After invalid surveys were removed, a total of 580 questionnaires were analyzed. The population was made up of 55% female (N = 318) and 45% male (N = 262) volunteers.

The ethical approval for the research was obtained from the Provincial Directorate of National Education of the province where the schools are located. Two inventories were used while collecting the data of the study. In addition, the researcher asked questions (gender, class) to identify the demographic characteristics of the respondents. When the data was gathered, participants were told about the study's objective, importance, and methods. In addition, the rationale for selecting the issue was elucidated. Participants were also made aware that their participation was entirely optional. Furthermore, participants were informed that their comments and personal information would be kept anonymous and protected. They were promised that the survey information would be used solely for research purposes.

Data Collection Tools

The Big Five Personality Traits Scale and the Academic Procrastination Scale were utilized to collect data in the study. Rammstedt and John (2007) developed the Big Five Personality Traits Scale, which was adapted to Turkish culture by Horzum et al. (2017). The scale consists of ten items; five of them are negative. Responses to this measure were graded on a five-item Likert scale ranging from "Never" to "Always". The scale's Cronbach alpha reliability coefficient for this study was found to be .87. Cronbach alpha coefficients for the subscales scores were .79 for extroversion, .83 for agreeableness, .85 for conscientiousness, .81 for neuroticism, and .76 for openness to experience.

Cakici (2003) developed the Academic Procrastination Scale, which was employed in the study. The scale was created as part of a study involving university and high school students. The scale consists of 19 statements and two variables, 12 of which are negative about procrastination and 7 of which are positive about students taking responsibility for their learning. Responses on this scale were graded on a five-point Likert scale: from (1) "Very untrue of me" to (5)"Very true of me". The scale's high scores were considered an indicator of academic procrastinating behaviour. The scale's Cronbach alpha reliability coefficient was found to be .89. The reliability coefficient of the procrastination sub-dimension is .83 and the studying systematically sub-dimension is .76 were found.

Data analysis

Students' personality traits and academic procrastinating tendencies were examined in five phases. (1) The assumption of normality of the data was checked. Also, common method bias was checked. Harman's single-factor test was applied because the collected data were in self-report form and two scales were applied simultaneously. Harman's single-factor test one of the most used techniques that has been used widely by researchers to address the issue of common method variance (Podsakoff et al., 2003). (2) Variable descriptive statics were computed. (3) Pearson correlation coefficients were computed, and levels were found. Positive correlations have a low level if the correlation coefficient is between .01 and .29, a moderate level if it is between .30 and .49, and a high level if it is greater than .50. If the correlation is between -.01 and -.29, it is considered low; if it is between -.30 and .49, it is considered moderate; and if it is less than -.50, it is considered high (Cohen, 2013). (4) Two-Step Cluster analysis was used to reveal clusters of high school students with similar personality traits and procrastination behaviours in the dataset. Cluster analysis is a statistical method for profiling participants who have similar patterns of responses, and the results can give either instant insights or a framework for future analyses (Kettenring, 2006). (5) Cramer's V calculated for the association between profiles and perceived income level. Cramer's V is a measure for the association of two nominal variables and can be used to measure the strength of association (Acock, & Stavig, 1979).

Findings

First, the data's normality assumptions were verified. For this aim, mean, standard deviation, mode, median, skewness, and kurtosis values were explored. The determining mean, median, and mode values were all quite close, and the Z scores

for kurtosis and skewness were all between 1.96, suggesting that the normality assumption was fulfilled (Field, 2016). In addition, the common method bias was checked and the threshold value after Harman's single factor test was found to be .378. The calculated threshold value is less than 0.5, indicating that there is no common method bias (Kock, 2021). Table 1 presents students' personality traits and academic procrastination scores.

Table 1. Descriptive Statistics and Test of Normality

	Mean	SD.	Mode	Median	$Z_{skewness}$	$Z_{kurtosis}$
Procrastinating	30.31	9.65	29.00	29.01	1.63	-1.66
Studying Systematically	24.68	4.92	24.00	24.01	-1.32	.28
Extroversion	6.65	1.85	7.00	7.00	-1.48	-.70
Agreeableness	7.86	1.36	8.00	8.00	-1.79	-.89
Conscientiousness	7.21	1.58	7.00	7.02	-1.82	-1.20
Neuroticism	5.86	1.75	6.00	6.00	-1.03	-1.85
Openness to experience	7.06	1.83	7.00	7.00	-.98	-1.80

In the 5-factor personality scale, scores for personality traits can range from 2 to 10 points. According to Table 1, while agreeableness scores have the highest mean score ($\overline{X}_{\text{Agreeableness}}$ = 7.86), neuroticism has the lowest mean score ($\overline{X}_{\text{Neuroticism}}$ = 5.86). The agreeableness personality trait is followed by conscientiousness, openness to experience, extroversion and finally neuroticism. While the students defined their personalities more as agreeableness and conscientiousness in their answers, they emphasized the neuroticism personality trait less. According to the procrastination scale used, the highest scores for procrastinating behaviours can be 60, and the scores for studying systematically behaviours can be 35. While the average the scores of the students participating in the research on procrastination behaviours is $\overline{X}_{\text{Procrastinating}}$ = 30.31, their studying systematically scores are $\overline{X}_{\text{Studying Systematically}}$ = 24.68. When the average scores of procrastination and studying systematically behaviours are compared, the students' studying systematically scores are relatively higher.

Table 2. Correlations Between Personal Traits and Procrastination Levels

	1	2	3	4	5	6	7
Procrastinating (1)	-						
Studying Systematically (2)	-.539**	-					
Extroversion (3)	-.036	.151**	-				
Agreeableness (4)	-.357**	.304**	.089*	-			
Conscientiousness (5)	-.350**	.345**	.239**	.204**	-		
Neuroticism (6)	.140**	-.019	-.123**	-.116**	-.151**	-	
Openness to experience (7)	-.001	.082*	.159**	-.037	.198**	-.069	-

**Significant at the .01 level. *Significant at the .05 level.

Table 2 establish that there were a significant and negative correlation with procrastination behaviour and studying systematically (r = -.539, p < .01), agreeableness (r = -.357, p < .01), conscientiousness (r = -.350, p < .01). However, significant and positive correlation found with neuroticism (r = .140, p < .01). Table 2 also shows that there were a significant and positive correlation with studying systematically and extroversion (r = .151, p < .01), agreeableness (r = .304, p < .01), conscientiousness (r = .345, p < .01), and openness to experience (r = .082, p < .05). Although the correlations between the variables were medium and low, these correlations were effective in the formation of clusters. A two-step cluster analysis was chosen since it allows for the handling of scale variables as well as the automated selection of the number of clusters. This approach identifies groups using a fast cluster algorithm (pre-clustering) before running hierarchical cluster models in a subsequent stage. The algorithm for the two steps of the Two-Step Cluster Analysis technique is as follows: The first step in the technique is to create a Cluster Features (CF) Tree. The tree starts with the first case, which is placed in a leaf node at the tree's root and provides variable information about that instance. Based on its similarity to existing nodes and using the distance measure as the similarity criterion, each subsequent example is then added to an existing node or establishes a new node. A summary of variable information about several cases is contained in a node that contains multiple cases. As a result, the CF tree serves as a concise summary of the data file. In the second step; an agglomerative clustering technique is used to group the CF tree's leaf nodes. A variety of solutions can be created using agglomerative clustering. Each of these cluster solutions is compared using Schwarz's Bayesian Criterion (BIC) or the Akaike Information Criterion (AIC) as the clustering criterion to determine which number of clusters is "best." The Euclidian distance measure approach was selected for measuring distances and Schwarz's Bayesian Criterion (BIC) is preferred as a clustering criterion because the variables are continuous. Furthermore, because continuous variables' ranges differ, the variables were standardized. The variables' values were scaled into scores with a mean of 0 and a standard deviation of 1. Continuous variables can be automatically scaled in SPSS 21.

When the personality traits and academic procrastination behaviours of the students were examined by the two-step clustering analysis method, the students were gathered under 2 clusters (Figure 1). The first cluster is 65.2% (n = 378)

of all participants. Participants in the first cluster have higher academic procrastination and neurotic personality trait mean scores than the participants in the second cluster. The students in the second cluster had higher mean scores of studying systematically, extroversion, agreeableness, conscientiousness, and openness to experience. Second cluster is 34.8 % (n= 202) of participants. As seen in Table 3, academic procrastination, studying systematically, conscientiousness, agreeableness, extroversion, openness to experience and neurotic personality traits were predictors of clusters, respectively.

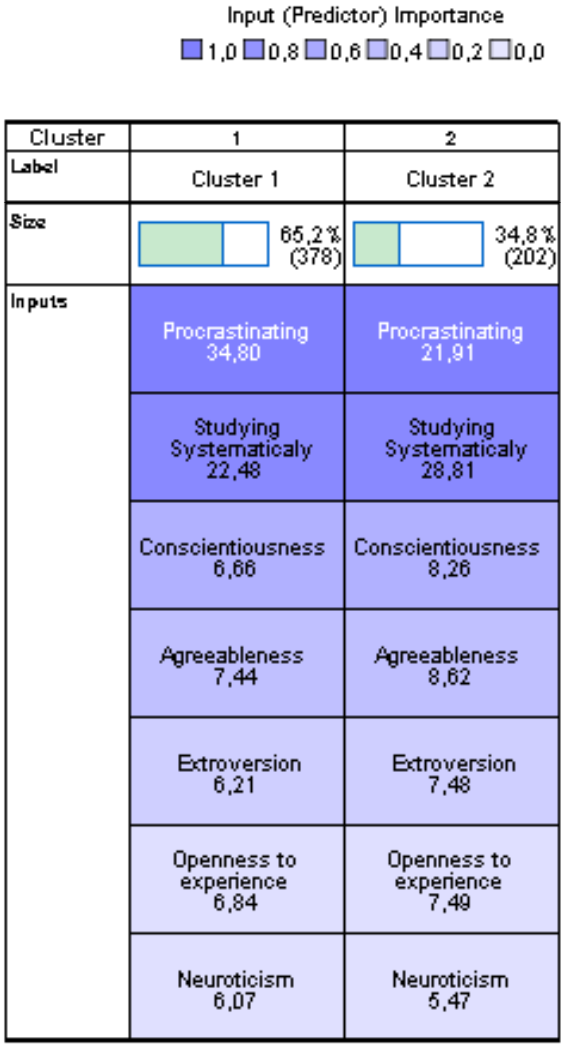
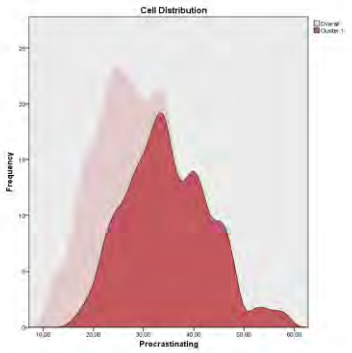
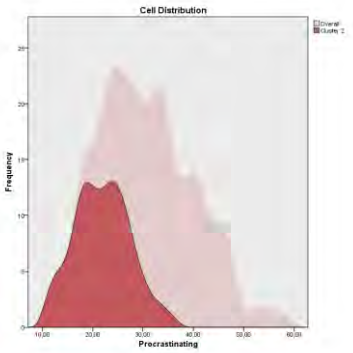
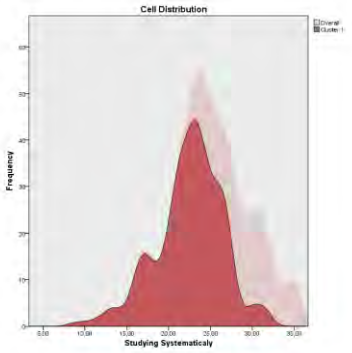
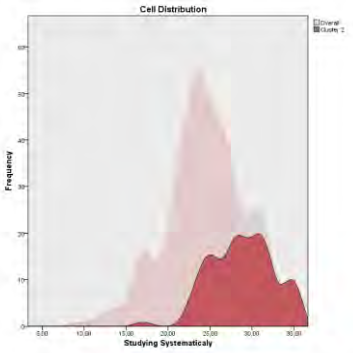
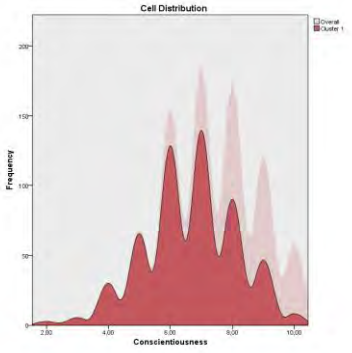
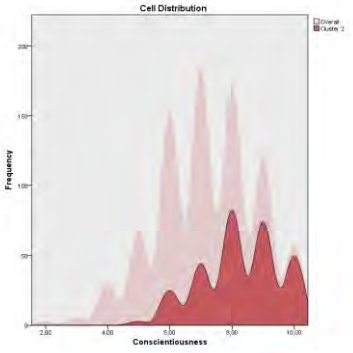
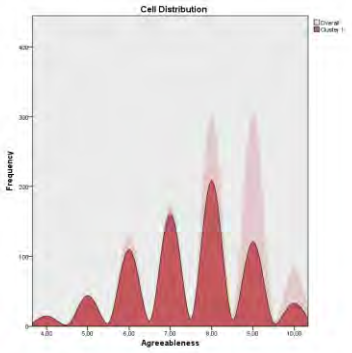
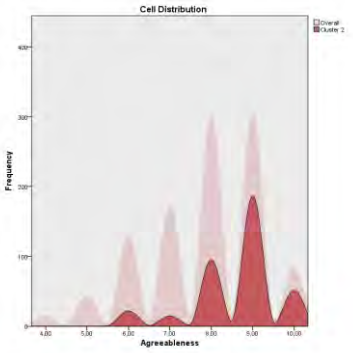
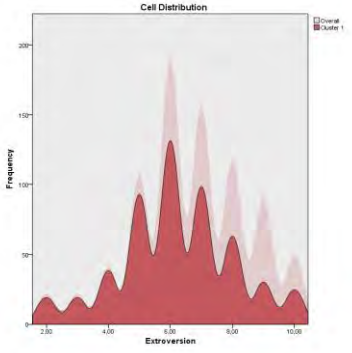
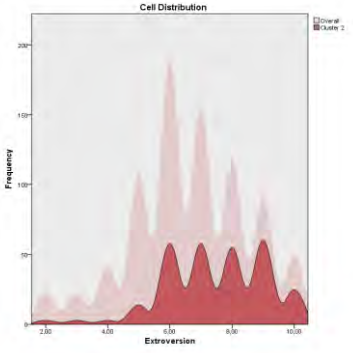


Figure 1. Clusters

In Figure 2, the frequencies of the variables in the clusters were shown with a histogram graph. In the first cluster, academic procrastination and neurotic personality traits were located to the right of the distribution of all participants, while in the second cluster, other variables (studying systematically, extroversion, agreeableness, conscientiousness, and openness to experience) were located to the right of the group distribution.

Cluster 1	Cluster2
	
	
	
	
	

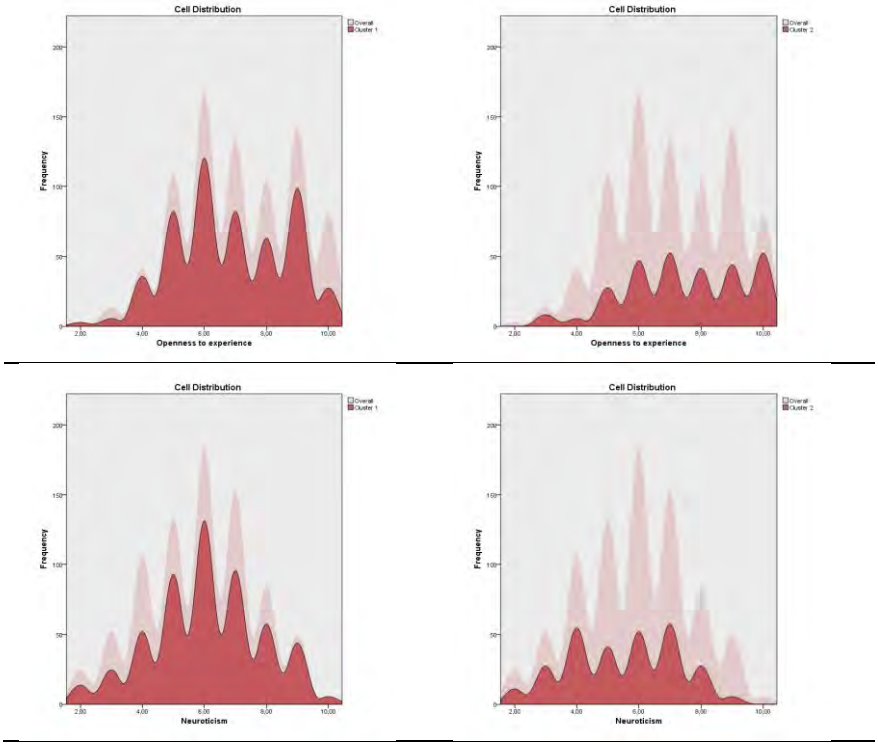


Figure 2. Cell Distribution of Clusters

Figure 3 shows the comparison of clusters with median values. The boxes demonstrate the distribution of the entire group, the blue lines the distribution of the clusters, and the dot above the line indicates the median value of the cluster. While the median value of the participants' academic procrastination scores was 29.01, the median value of the first cluster was 34.04 and the median value of the second cluster was 21.94. Similarly, the median values of studying systematically, and extraversion are far from the median values of the whole group. Although the median value of the conscientiousness and agreeableness scores of the second cluster is higher than the median value of the group, the median values of the first cluster are close to the group median. This is significant in terms of understanding the properties of the clusters.

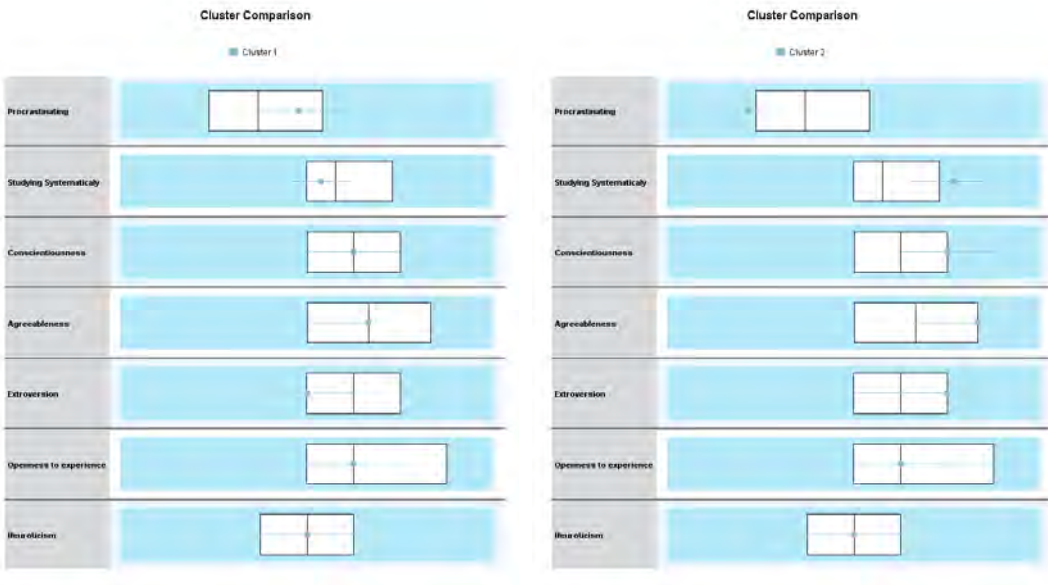


Figure 3. Cluster comparisons by median values

While collecting information on personality traits and academic procrastination habits from students, some demographic information was also collected. One of these information is perceived income status. The students were asked to describe how they evaluated the income of their families and expressed this as low, medium, or high compared to the general population. It was examined whether there is an association between the clusters and the perceived income status (Table 3). There was no statistically significant association between clusters and perceived income status (φ_c= .083 p = 0.133).

Table 3. Cluster x participant crosstabulation and association analysis

		Perceived Income			
		Low	**Medium**	**High**	**Total**
Cluster	1	26	324	28	378
	2	20	174	8	202
Total		46	498	36	580
Cramer's V (φ_c) = .083, p = 0.133					

Discussion

In this article, a cluster analysis was performed by creating a data set from students' personality traits and academic procrastination behaviors, a correlation analysis was conducted to investigate the connection between the variables, and the characteristics of the clusters formed, and the relationship of the clusters with the perceived socioeconomic status were examined. Cluster analysis is a simple and practical method for classifying a set of complex data based on certain variables and making them more meaningful and using the results as an aid to decision-making. Cluster analysis is widely used in various fields to reveal hidden but useful information in data sets. In the clustering process, data containing different features are collected and analyses are carried out. Clustering algorithms handle such data effectively, making it more meaningful and allowing data to be collected in discrete clusters in terms of their similarity to each other according to units or variables (Jain, 2010). The analysis was made by looking at the similarity (closeness) or distance measure of the two variables according to the purpose determined in this study. As a result of the analysis, it was determined that two clusters were formed. The first of the clusters includes 65.2 % of the sample population; the level of procrastination and the mean score of neurotic personality traits were calculated higher than in the other cluster. The remaining part of the sample population (34.8 %) constitutes the second cluster. The mean scores of studying systematically habits and extroversion, agreeableness, conscientiousness, and openness to experience personality traits of the students forming this cluster are higher than the other cluster. The fact that two-thirds of the students are in the group where this procrastination behaviour is dominant is a situation that should be considered for educators, especially if neuroticism is in question. In the literature, there are studies in which personality traits and different variables are examined by cluster analysis. Robins et al. (1996) investigated the relationships between personality traits, school behavior, intelligence, and juvenile delinquency; Mount et al. (2005) inspected personality traits and vocational interests; and Kim, Kim & Kim (2017) investigated the relationships between personality traits and motivation levels with clustering analysis. Pilarska (2018) has conducted a clustering study with university students and examines the relations of Big-Five personality to aspects of self-concept. Study shows that personality traits as predictors of self-control and self-esteem and students are grouped under resilient, over-controlled, and under-controlled clusters. Berkovich and Eyal (2021) conducted a cluster analysis on teachers' personality traits and their emotion regulation patterns and moods and they revealed associations between three personality types of teachers with their emotion regulation and mood. In these studies, it was stated that personality traits play a decisive role in grouping participants with different demographic properties. Similarly, in this study, personality traits played an active role in the clustering analysis to determine the profiles of the students. There are also studies in the literature examining the predictive effect of personality traits on procrastination behavior. Ljubin-Golub et al. (2019) argue that personality was a significant predictor of academic procrastination, and conscientiousness and agreeableness personality traits have an indirect effect on reducing academic procrastination. Doğan et al. (2017) revealed in their study with university students that two personality dimensions namely conscientiousness and neuroticism were the significant predictors of procrastination. Baltacı (2017a, 2017b) concluded in his research with school administrators and classroom teachers that neuroticism, conscientiousness, and agreeableness personality traits are the predictors of procrastination behavior.

When the correlations between personality traits and procrastination behaviour were examined, positive relationships were found between the level of procrastination and neurotic personality traits. It can be inferred that neurotic people are more prone to putting off making decisions, which can appear as a lack of organization and perseverance in achieving goals (Lee et al., 2006). Procrastination behaviour and neurotic personality traits were also negatively correlated with other variables. When the literature was reviewed, it was observed that the findings obtained from the current correlational research supported the result of this research (Bäulke et al., 2021; Boysan & Kiral, 2017; Kağan et al., 2010; Karataş, 2015; Kim, Fernandez & Terrier, 2017; Ocansey et al., 2020; Schouwenburg & Lay, 1995; Wang et al., 2018). In studies examining different dimensions of procrastination, it was concluded that it is related to personality traits. Zhou (2020) argues that undergraduate students who were more conscientious, extraverted, and open to new experiences but less emotionally unstable or agreeable were more strongly oriented toward active procrastination. Active procrastination (vs. "passive procrastination" which denotes the undesirable aspect of procrastination) can be defined as a functional delay whereby an individual intentionally postpones his action and benefits from it (Howell & Watson, 2007). In addition, Lai et al. (2015) concluded in their study with American university students that there is no correlation between personality traits and procrastination behavior, and they stated that the effect of personality traits on procrastination may depend on culture.

When the association between socio-economic level and clusters was examined, there was no statistically significant difference in the association between the clusters and the students' perceived socio-economic levels. The distributions of socioeconomic levels within the clusters are similar to each other. According to studies conducted, socioeconomic status has a significant impact on the development of young people's personalities (Conger et al., 2021; Deckers et al., 2015; Zhang et al., 2018). Furthermore, despite the rareness, different results have been reported in studies examining the socio-economic status and procrastinating behavior. There are various researches that indicate there is no correlation between socioeconomic status and procrastinating behavior (Ergin et al., 2021; Lu et al., 2021; Pala et al., 2011; Tezer et al., 2020), and others that claim socioeconomic status promotes procrastination (Chow, 2011). According to Chow (2011), the reason for procrastination was worry, which was triggered by socioeconomic level. The results obtained in this study, it is conceivable that there is no association in the distribution of socio-economic levels when it is considered that the primary effective factor in the formation of clusters is procrastination behaviour and then personality traits come.

Conclusions

First, the results reveal that two-thirds of the students are in cluster where academic procrastination behaviour and neurotic personality traits are common, while the rest are in cluster where studying systematically, extroversion, agreeableness, conscientiousness, and openness to experience are common. Second, there is a correlation between personality traits and academic procrastination behaviour, and third, there is no association between socioeconomic differences and the formation of these clusters. Based on these results, some conclusions can be made. Several factors are effective in the formation of personality and the showing of academic procrastination behaviour. Biological structure (hereditary characteristics, health status), socio-cultural environment (family environment and social class), and physical environment (climate, nature, geographical features, and location) are effective in the formation of personality (Allik, & McCrae, 2004; Ayoub, et al., 2018; Geukes, et al., 2018). Fear of failure, task awareness, lack of energy, and poor time management are the reasons for academic procrastination (Milgram, et al., 1993; Solomon & Rothblum, 1984). It has been thought that there are root causes of personality traits and academic procrastination behaviour in the formation of the clusters obtained in the research. In the first cluster, students have procrastination behaviour and had high neurotic personality traits than the others. If so, interventions to these root causes will be meaningful in eliminating the negative effects of neuroticism and procrastination. Interventions to be made at an early age can produce more permanent and appropriate results. Guidance and psychological counseling can be carried out in schools for the neurotic personality traits (anxiety, emotional dysregulation, depression, and anger control) of the students in the first cluster. In guidance and counseling activities, for students to be able to solve their problems, first, it should be ensured that they are aware of their true sense of self and realize their liability in the problems experienced (Kavut, 2018). Likewise, to reduce procrastination in students, self-regulation strategies can be taught (Milgram, et al., 1988). Self-regulation strategies promote students' active learning by assisting them in examining their various failures (Meltzer, 2014). Self-regulated learners can arrange learning processes in response to changing individual and environmental circumstances, such as monitoring and organizing environmental settings, as well as managing and regulating cognitive situations (Börekci & Uyangör, 2019).

Recomendations

So far, a considerable amount of literature has been produced on personality traits and academic procrastination. However, the literature to date has not tended to focus on both. The current study provides preliminary data on clustering personality traits and procrastination behaviours. More research studies are needed to understand personality traits and factors that affect academic performance like academic procrastination. Investigating them might be a key to understanding high school student's academic performance patterns. While personality development continues over time, habits may change. The fact that the participant group of the study was high school students can be considered as an opportunity to eliminate the negativities.

Limitations

This study is not without limitations. First, the big five and academic procrastination measures are self-reports. The second research was carried out with high school students and analyzed only by clustering according to academic procrastination behaviors and personal characteristics. It may not be meaningful in all cases to divide students into groups based on only two characteristics and make judgments. The cluster analysis performed here is to try to determine the intervention areas for the factors affecting the academic success of the students.

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