Relationship between Big Five Personality and Depression Index of High School Students

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ABSTRACT

This research topic is about the Big Five personality and depression index, and the research question is the Relationship Between the Big Five Personality and Depression Index of High School Students. All the participants are high school students from Grade 10, Grade 11 and Grade 12, regardless of gender. The research method of this research is to first hypothesize, then collect and analyze data through GFFS and PHQ-9 questionnaire surveys, and finally overturn and confirm the hypothesis. The results of this research show that there is a certain relationship between the Big Five personality and the depression index of high school students. The data collected in this research has been calculated by SPSS for Descriptive Statistics, Correlation Coefficients, Multiple Regression, T-test and ANOVA tests. This research concludes that low conscientiousness, low extraversion and high neuroticism among the Big Five personality types of high school students have a significant relationship with the depression index.

Keywords: Big Five personality, depression index, high school students

1.INTRODUCTION

Puberty refers to the transitional period in which children gradually develop into adults in physical and psychological aspects, generally between 10 and 17 years old [1-3]. Teenagers in most countries in the world enter high school at the special stage of adolescence, which means that their psychology and physiology have undergone tremendous changes during high school [4]. According to the World Health Organization (September 28, 2020), the damage and burden caused by mental health diseases among people aged 10 to 19 worldwide are as high as 16%, and most cases are not treated because they have not been detected. One of the main causes of illness and disability among people aged 10 to 19 is depression. Due to the growth of white matter, gray matter and connections in the brain and the immature brain regions responsible for pre-planning and risk assessment, adolescence is more likely to be accompanied by emotional disorders. Among the causes of illness and disability among children aged 10 to 14, depression ranks 15th. What is even more frightening is that among teenagers aged 15 to 19, depression has become the fourth leading cause of illness and disability. Depression seriously affects the daily life and study of high school students. It is extremely sorrowed that suicide is the fourth leading cause of death for children aged 15 to 19, and severe depression may lead to suicide[5].Therefore, depression in high school students has become a problem that cannot be ignored. I checked the literature on the Big Five personality and depression index through Google Scholar. Many scholars found that there is a certain relationship between the two, but no scholar specifically explored whether this relationship is equally applicable to high school students in adolescence, so I decided to study the Relationship Between the Big Five Personality and Depression Index of High School Students. Allport's personality theory believes that personality traits are some enduring personality characteristics based on each person's physiology and that changes will not deviate from the most basic personality types [6]. Based on Allport's personality theory, the assumption that some high school students with specific personality types may have a higher depression index than others is made. If this hypothesis is proved, it can be used to screen high school students for psychological problems, to increase the attention to depression index of high school students with specific personality types, to prevent and intervene in the occurrence of depression in time, and to help them pass adolescence smoothly and healthily. So the null hypothesis is that high school students with high openness, low conscientiousness, high extraversion, low agreeableness and low neuroticism characteristics have a higher depression index, and the alternative hypothesis is

low openness, high conscientiousness, low extraversion, high agreeableness and high neuroticism characteristic high school students have a higher depression index.

2.METHODS

2.1. Participants

The 42 participants are from the Grade Department and International Department of the Hefei No. 1 High School, Hefei No. 6 High School and Hefei No. 8 High School of Anhui Province in China. The number of participants varied from Grade 10, Grade 11 and Grade 12. Among all the participants, 9 are males, 33 are females and no other gender. An online tool Wenjuanxing® (www.wjx.com) was used to administer the questionnaires.

2.2. Questionnaire

The questionnaire comprised previously published and validated measures:

●Demographic questions (age and gender).

●A measure of the five main traits of personality (conscientiousness, agreeableness, neuroticism, openness and extraversion) using the Ten-Item Personality Inventory [7]. There are 2 items for each personality trait on a Ten-Item Personality Inventory scale from 'Disagree strongly' to 'Agree strongly'. So the five Big Five personality traits can be expressed through ten items in total. Participants need to choose one of the seven options that best describes themselves. The score for each item is from 1-7 points, so the highest score of the entire Ten-Item Personality Inventory scale is 70 points, and the lowest score is 7 points. Items comprised statements similar to the following: 'I see myself as

extraverted and enthusiastic' and 'I see myself as critical and quarrelsome' [8].

●Assessment of depression index using the Patient Health Questionnaire [9]. There are 9 items in the PHQ-9 scale, and each item has four options: Not at all, several days, More than half the days, and Nearly every day, representing 0 to 3 points, so the range of the entire PHQ-9 scale is 0 to 27. Higher scores represent greater severity of depression [10].

2.3. Design

The design was a mixed model with Big Five personality traits and depression index. Each trait in Big Five Model and the depression index were the within-subjects' factors.

2.4. Data Analysis

Data were analyzed using SPSS Statistics for Windows, version 21.0 (2012, Armonk, NY: IBM Corp). In this experiment, all data is nominal. NEO-FFI and depression index were calculated by Descriptive Statistics, one-sample *t*-test, multiple linear regression and correlations.

In Descriptive Statistics, the number of participants is 42. Openness, conscientiousness, extraversion, agreeableness, neuroticism and depression index range, minimum, maximum, mean, standard deviation and variance were calculated. The data shows that the depression index is the least discrete, while the extraversion is the most dispersed. Among them, agreeableness has the smallest deviation from the average, and the depression index has the largest deviation from the average. Table 1 below shows the descriptive statistics of tested items.

Table 1 Descriptive Statistics Descriptive Statistics

	N	Range	Minimun	Maximum	Mean	Std. Devitation	Variance
openness	42	8	6	14	9.29	1.942	3.770
conscientiousness	42	12	2	14	7.93	2.473	6.117
extraversion	42	8	4	12	8.31	2.332	5.438
agreeableness	42	6	8	14	10.79	1.855	3.441
neuroticsim	42	11	3	14	7.95	2.337	5.416
depression index	42	18	1	19	7.57	3.623	13.129
Valid N (listwise)	42						

One-sample *t*-tests were used to compare mean NEO-FFI scores with the depression index of high school students. In one-sample *t*-tests, openness, conscientiousness, extraversion, agreeableness,

neuroticism and depression index all have a significant difference ($p < .001$). The One-Sample Test is shown in Table 2.

Table 2 One-Sample Test One-Sample Test Test Value = 0

| | t | df | Significance | | Mean Difference | 95% Confidence Interval of the Difference | |
			One-Sided p	Two-Sided p		Lower	Upper
openness	30.993	41	<.001	<.001	9.286	8.68	9.89
conscientiousness	20.776	41	<.001	<.001	7.929	7.16	8.70
extraversion	23.092	41	<.001	<.001	8.310	7.58	9.04
agreeableness	37.683	41	<.001	<.001	10.786	10.21	11.36
neuroticsim	22.054	41	<.001	<.001	7.952	7.22	8.68
depression index	13.542	41	<.001	<.001	7.571	6.44	8.70

Multiple regression analysis was used to test if the personality traits significantly predicted participants' depression index. In the Model Summary of Regression, R^2 was .567, adjusted R^2 was .506, and the standard error of the estimate was 2.546. The predictors above are openness, conscientiousness, extraversion, agreeableness and neuroticism. In the ANOVA test (F=0.410), the regressive degree of freedom is 5, and the residual degree of freedom is 36, so the total degree of freedom is 41. At the same time, $p < .001^b$, so there is obvious significance, which represents reject the null hypothesis and confirms the alternative hypothesis that low openness, high conscientiousness, low extraversion, high agreeableness and high neuroticism characteristic high school students have a higher depression index. Table 3 and Table 4 illustrate Model Summary and Anova Test respectively.

Table 3 Model Summary Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.753[a]	.567	.506	2.546

a.Predictors: (Constant), neuroticsim, openness, extraversion, agreeableness, conscientiousness

Table 4 ANOVA Test ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	304.952	5	60.990	9.410	<.001[b]
	Residual	233.334	36	6.481		
	Total	538.286	41			

a. Dependent Vatiable: depression index

b. Predictors: (Constant), neuroticsim, openness, extraversion, agreeableness, conscientiousness

Table 5 Coefficients[a] Coefficients[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Correlations | | |
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	5.413	5.157		1.050	.301			
	openness	-.154	.220	-.083	-.700	.488	-.052	-.116	-.077
	conscientiousness	-.518	.190	-.354	-2.731	.010	-.597	-.414	-.300
	extraversion	-.199	.193	-.128	-1.030	.310	-.333	-.169	-.113
	agreeableness	.347	.251	.177	1.382	.176	.200	.224	.152
	neuroticsim	.706	.200	.455	3.523	.001	.600	.506	.387

a. Dependent Variable: depression index

In correlation coefficients, all except for openness and agreeableness are statistically significant. That is to say, they all show significant differences ($p < .001$). Among the 15 Pearson Correlations, 10 are presented as negative, which means that agreeableness and depression index, neuroticism and depression index, extraversion and openness, agreeableness and openness, extraversion and consciousness are positively correlated. And magnitude ranges from zero to large refer to from openness and depression index to neuroticism and depression index. Coefficients and Correlations are demonstrated in Table 5 and Table 6 respectively. Figures 1 and 2 show the Pairs Polts and Overlay Scatter Plot.

Table 6 Correlations Correlations

		depression index	openness	conscientiousness	extraversion	agreeableness	neuroticsim
depression index	Pearson Correlation	1	-.052	-.597***	-.333*	.200	.600**
	Sig. (2-tailed)		.746	<.001	.031	.204	<.001
	N	42	42	42	42	42	42
openness	Pearson Correlation	-.052	1	-.143	.201	.193	-.061
	Sig. (2-tailed)	.746		.367	.202	.220	.699
	N	42	42	42	42	42	42
conscientiousness	Pearson Correlation	-.597**	-.143	1	.182	-.211	-.427**
	Sig. (2-tailed)	<.001	.367		.250	.180	.005
	N	42	42	42	42	42	42
extraversion	Pearson Correlation	-.333*	.201	.182	1	-.328*	-.145
	Sig. (2-tailed)	.031	.202	.250		.034	.360
	N	42	42	42	42	42	42
agreeableness	Pearson Correlation	.200	.193	-.211	-.328*	1	-.171
	Sig. (2-tailed)	.204	.220	.180	.034		.278
	N	42	42	42	42	42	42
neuroticsim	Pearson Correlation	.600**	-.061	-.427**	-.145	-.171	1
	Sig. (2-tailed)	<.001	.699	.005	.360	.278	
	N	42	42	42	42	42	42

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).
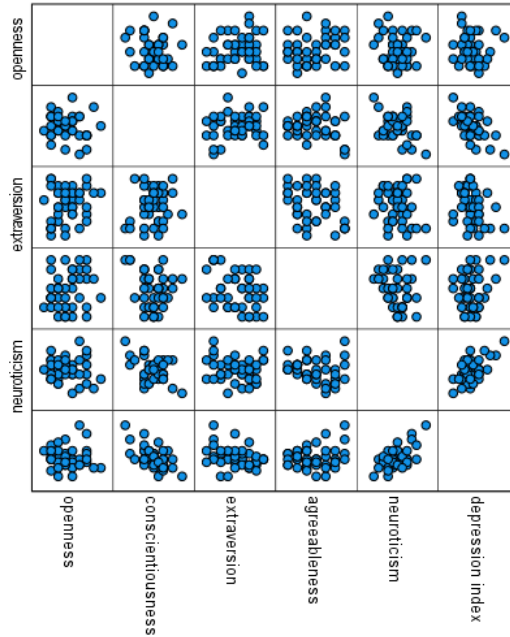
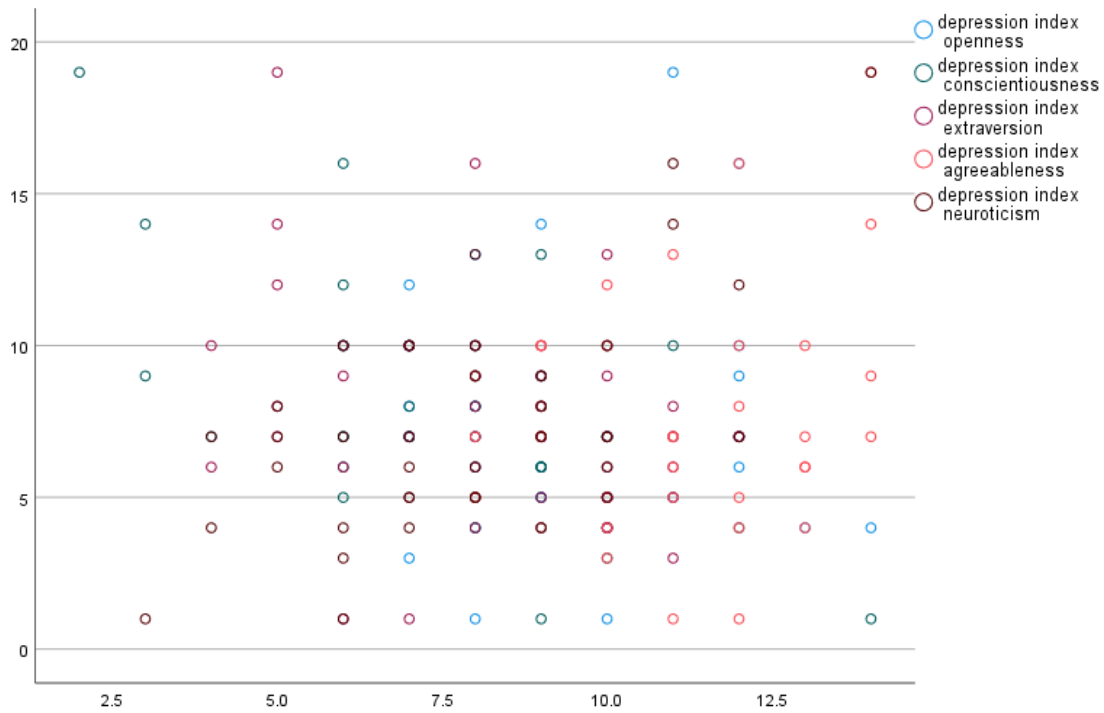**Figure 1** Pairs Polts

Figure 2 Overlay Scatter Plot

3. RESULTS

3.1. Respondents

The demographic details have been summarized earlier. A total of 42 participants participated in this experiment. The participants were all high school students aged 15-18. About 21% of them are males and about 79% are females. All participants are receiving high school education and have no specific majors.

3.2. Openness

Openness is also called openness to experience. Openness refers to the ability to accept and appreciate the novel experience, art, etc. People with high openness scores usually have a high appreciation of art. They often have unusual ideas and creativity and are more receptive to new things, but this kind of people are more willing to pursue exciting things and lack concentration [11]. On the contrary, people with low scores in this trait are usually more conservative, like to follow the rules, have

rules and plans. They are usually regarded as pragmatic and willing to do things. So, they will have a sense of accomplishment through persistence.

3.3. Conscientiousness

Conscientiousness is seen as an attitude of taking responsibility. High conscientiousness people are serious, stubborn, work hard, work and life are organized and punctual. And the most noteworthy point is that they are more inclined to perfectionism. Many people with a high depression index are also perfectionists. It is precisely because of their pathological over-pursuit of perfectionism and their inability to deal with stress well that they are exhausted physically and mentally. On the other hand, people with low conscientiousness show sloppyness, unreliability, and disorganized work and life [12]. According to the "Research Reports on Science from Michigan State University Provide New Insights" survey, the conscientiousness of young people is generally higher than that of the elderly [13], so high school students should have high conscientiousness, but high school students with high depression index are low conscientiousness people.

3.4. Extraversion

Compared with the other four Big Five personality traits, the classification of extraversion is relatively clear. High extraversion people are extroverts, and low extraversion people are introverts. Extroverts are usually energetic, enthusiastic, social, the pursue of excitement, and like to get energy from the outside world [14], such as attracting the attention of others to gain affirmation. They always maintain positive emotions, so the score on the depression index is naturally low. The introverts are quite different, the low extraversion crowd. Their dislike of too much contact with the outside world is one of their most notable characteristics. They are quiet, restrained, cautious, and sensitive. They are more willing to be alone than socially [15]. According to the research of researchers, about 70% of introverts are highly sensitive people [16], which means that their mental internal friction is extremely serious, and long-term hypersensitivity is extremely prone to depression.

3.5. Agreeableness

Agreeableness focuses on the overall harmony of the individual with the society [15]. People with high agreeableness can easily show trust and tolerance. They are willing to give to help others and are willing to compromise. On the contrary, people with low agreeableness are mean, ruthless and easy to get angry and impulsive. They often doubt the motives of others, find it difficult to believe in others, and are highly challenging and competitive. Regardless of whether the depression index is high or low, almost all high school

students show high agreeableness. One of the simplest and easy-to-understand examples is group cooperation. They usually try their best to avoid conflicts and disputes with group members. They are easy to follow the crowd and follow the collective decision. But being too pleasant will be regarded as weak, and long-term suppression of one's thoughts will also bring bad emotions.

3.6. Neuroticism

Neuroticism is also called emotional stability. Some unstable negative emotions can be called neuroticism, such as fear, depression, anxiety, etc [17]. People with high neuroticsim are prone to emotions, find troubles, magnify some of their own mistakes, and easily enter negative emotions for a long time. The negative effects of neuroticism make the high neurotic people's ability to resist stress and greatly increase the risk of depression. In contrast, people with low scores are emotionally stable, calm, emotionally indifferent, and do not have long-term negative emotions.

3.7. Depression Index

The PHQ-9 questionnaire used in this experiment is designed to test the existence and severity of depression. Participants with a high depression index realized some of the symptoms of depression, such as falling into negative emotions, pessimism, self-loathing, self-harm, etc. for more than two weeks. People with a low susceptibility index remain in a relatively healthy mental state without serious psychological problems.

4.DISCUSSION

The purpose of this study is to explore the relationship between the Big Five personality and depression index of high school students. Previous studies have studied the relationship between Big Five personality and depression, but this topic has not been studied. By using the Ten-Item Personality Inventory scale test, it is found that extraversion and neuroticism are the two most powerful factors contributing to the depression index. The null hypothesis in this experiment is that high school students with high openness, low conscientiousness, high extraversion, low agreeableness, and low neuroticism characteristics have a higher depression index, and the alternative hypothesis is low openness, high conscientiousness, low extraversion, high agreeableness, and high neuroticism. Characteristic high school students have a higher depression index. The results of the experiment are: the general characteristics of high school students with a depression index greater than 10 are low openness, low conscientiousness, low extraversion, high agreeableness and high neuroticism. There is a discrepancy between the hypothesis and the experimental results in conscientiousness.

One possible explanation for this result is that the

participant has ambiguity about the options of the Ten-Item Personality Inventory scale. Participants once said that the option boundaries were ambiguous and believed that disagree moderately and Agree moderately had the same meaning, so an error occurred during the test, which eventually caused an error in the result.

There are also limitations in this experiment. First, the number of subjects is too small, and the results produced by 42 high school students are difficult to produce precise and significant differences. As the number of subjects increases, the results may change again. Second, the subjects did not provide real data during the test, which caused errors in the results.

5.CONCLUSION

The result of this experiment is that high school students with high depression index are low openness, low conscientiousness, low extraversion, high agreeableness and high neuroticism. Consistent with previous studies, neuroticism can easily cause depression.

If the results of this experiment have reference value, they can be used to screen high school students for psychological problems. Regularly pay attention to high school students with low openness, low conscientiousness, low extraversion, high agreeableness and high neuroticism, and timely intervention and guidance can prevent and reduce the occurrence of psychological problems of high school students to a large extent.

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