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Abstract

Adolescence is a critical period in life, marked by profound shifts in physical, psychological, and social aspects. This phase exposes adolescents to heightened vulnerability to mental health problems, such as depression and anxiety, which can have long-term consequences on their overall wellbeing. This study aims to investigate the impact of gender, race, and personality traits on mental health outcomes, specifically depression and anxiety, among adolescents. The study, utilizing a cross-sectional design and data from the Depression Anxiety Stress Scales (DASS) dataset, examines relationships between these variables, with responses from an online questionnaire from 28,599 adolescents aged 13 to 24 from 132 countries. Welch's *t*-test reveals significant gender differences, with females exhibiting higher levels of depression and anxiety compared to males. Additionally, Welch's one-way ANOVA found significant variations in depression and anxiety scores among different racial groups, emphasizing the need for culturally sensitive interventions. Personality traits, particularly high neuroticism and low extraversion, openness, conscientiousness and agreeableness, are consistently associated with elevated levels of depression and anxiety as shown in the multiple regression analysis. The overall models incorporating predictors of gender, race, and personality traits collectively have an impact on predicting the levels of depression and anxiety. Limitations include unequal variances of different variables, the use of self-report measures and the cross-sectional design, suggesting cautious interpretation of the findings. These results underscore the critical need for continued exploration into the nuanced interplay of gender, race, and personality traits in shaping adolescent mental health outcomes.

Keywords: Mental health outcomes; depression disorder; anxiety disorder; DASS; gender; race; personality traits.

Layman's Abstract

Adolescence is a crucial period marked by physical, psychological, and social changes. During this period, adolescents are vulnerable to mental health problems such as anxiety and depression, which can give problems throughout adulthood. This study explores how gender, race, and personality traits affect the mental health of adolescents. We have studied almost 30,000 adolescents between 13 and 24 years old from all around the world who filled in an online survey. We have found that girls report more depression and anxiety complaints than boys. This means that we need to pay attention to differences in gender when providing help to young people. Also this study has found that different racial groups experienced more depression and anxiety problems than other racial groups. Since this varied, we take away that we need to keep in mind racial differences when helping young people with their mental health. We have also found that personality traits, such as conventional, disorganized, quiet, critical or anxious, are related to more depression and anxiety complaints. Together, gender, race, and personality traits helped predict how much adolescents suffered from depression and anxiety. Although these findings are important for the mental health of young people, we need to be cautious when drawing conclusions. There are limitations to our study such as relying on the self-reporting of people, differences in how the factors varied and only looking at things at one point in time instead of over a period of time. These limitations are learning points for the future. With this in mind, we should keep trying to explore how to help every unique adolescent to have good mental health.

Exploring the Interplay of Gender, Race, and Personality Traits in Adolescent Depression and Anxiety

The field of psychology has long been interested in understanding the intricate interplay between personality traits and mental health outcomes, particularly among adolescents (Kotov et al., 2010). Adolescence is a critical period in development, characterized by significant changes in physical, psychological, and social aspects of an individual's life (Krueger, 1999; Özdemir et al., 2016; Sawyer et al., 2012). Adolescence is defined as a period in life from the age of 10 until 24 (Krueger, 1999; Sawyer et al., 2018). However, the specific onset and conclusion of this developmental period can vary among different societies (Sawyer et al., 2018). During this time, adolescents are more susceptible to mental health problems, such as depression and anxiety, which can have long-term consequences on their overall wellbeing (Kessler et al., 2005). Personality traits, which encompass enduring patterns of thoughts, emotions, and behaviours (Costa & McCrae, 1992), have been theorized to play a pivotal role in shaping an individual's vulnerability to mental health issues such as depression and anxiety (Karsten et al., 2012; Prince et al., 2020). The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) recognizes that personality traits can influence the onset, course, and severity of these conditions (Kotov et al., 2010; Prince et al., 2020).

Adolescence represents a significant phase of life by marking the transition from childhood to adulthood (Krueger, 1999; Sawyer et al., 2018). With over a quarter of the global population being adolescents, this demographic holds immense significance (Sawyer et al., 2012). This life phase involves changes in physical, psychological and social development, that is affected by interactions between genetic and environmental factors (Özdemir et al., 2016). Adolescence marks a stressful period where adolescents have to meet expectations from society, family, and themselves (Özdemir et al., 2016). Not meeting these expectations can result in a negative effect on their mental health (Altemus et al., 2014; Özdemir et al., 2016). Adolescence marks the period when the incidence of depression and anxiety is most prominent (Altemus et al., 2014; Krueger, 1999; Sawyer et al., 2012). Kessler et al. (2005) showed that 75% of mental disorders were existing before the age of 24, and thus before the end of adolescence. Depression and anxiety have a high comorbidity in adults, but also in adolescents, where the overlap numbers might even be higher (Melton et al., 2016). The severity of the coexisting mental health disorders is higher in adolescents than in adults (Melton et al., 2016). The high comorbidity of depression and anxiety during the adolescence suggests that they share a construct (Matsudaira & Kitamura, 2005; Melton et al., 2016). Depression shows low levels of positive affect and anxiety shows elevated levels of negative affect (Matsudaira & Kitamura, 2005). Both also share generalized distress and an overlapping neuro(bio)logical component, influenced by genetics (Bienvenu, 2007; Matsudaira & Kitamura, 2005). Because of the comorbidity, prevalence, and age-of-onset of these mental health outcomes, the adolescence remains a big focus in research of depression and anxiety (Melton et al., 2016; Sawyer et al., 2018).

Furthermore, empirical research consistently links certain Big Five personality traits and mental health outcomes in adolescents (Alizadeh et al., 2018; Bienvenu, 2007; Costa & McCrae, 1992; Karsten et al., 2012; Kendler et al., 2006; Kotov et al., 2010; Prince et al., 2020). Neuroticism, characterized by a tendency for negative emotions such as anxiety and depression, has been linked with heightened susceptibility to these conditions in both young adults and adults (Alizadeh et al., 2018; Bienvenu, 2007; Costa & McCrae, 1992; Karsten et al., 2012; Kendler et al., 2006; Kotov et al., 2010; Prince et al., 2020). Conversely, adults high in extraversion, marked by sociability, assertiveness, and passion, tend to exhibit lower levels of depression and anxiety (Costa & McCrae, 1992; Kotov et al., 2010). However, the influence on depression and anxiety of the other three Big Five personality traits – openness, conscientiousness, and agreeableness – is less clearly defined compared to neuroticism and extraversion (Karsten et al., 2012). Openness encompasses characteristics related to imagination, creativity, and curiosity (Costa & McCrae, 1992). Conscientiousness involves qualities such as organization, responsibility, and self-discipline. Agreeableness pertains to attributes such as kindness, empathy, and cooperation (Costa & McCrae, 1992). This study will investigate all five personality traits to comprehensively assess their influence on mental health outcomes in adolescents.

Additionally, demographic factors such as gender and race have been implicated in the manifestation of mental health outcomes. For instance, studies have revealed gender differences in the prevalence and presentation of depression and anxiety (Weisberg et al., 2011). Females often show more symptoms of depression and anxiety than males (Altemus et al., 2014). Also, females experience double the lifetime rates of depression and the majority of anxiety disorders (Altemus et al., 2014; McLean et al., 2011). There are also racial differences in mental health. For instance, American research shows that depression scores are highest among Black and Hispanic (Latin) people, compared to White people (Blue Cross Blue Shield (BCBS), 2022; Dunlop et al., 2003). This might be because of lack of access to health care and insurance, which might cause greater health challenges for minority groups (Dunlop et al., 2003). Anxiety in different races has been less studied than depression, but research appears to conclude that White adolescents are more likely to receive anxiety diagnoses than non-White adolescents (Hispanic, Black, and other races than Native American and Asian), but White adolescents experience less anxiety symptoms (Vanderminden & Esala, 2018; Williams & Earl, 2007). These disparities, particularly in receiving diagnoses with fewer reported symptoms among White adolescents compared to other racial groups, may stem from various factors. These factors include potential biases in diagnosing by healthcare professionals, stigmatization from both professionals and non-White individuals, individuals with non-White backgrounds experiencing financial barriers limiting help-seeking, and restricted access to mental health services (Harris et al., 2005; Vanderminden & Esala, 2018; Williams & Earl, 2007). It is important to take into account that some studies examine diagnoses while others focus on self-reported symptoms. Moreover, research about race and mental health is mostly done in the United States of America and mostly with adults, so it remains unclear how this relates to adolescents worldwide.

The aim of this study is to examine the effect(s) of gender, race, and personality traits on mental health outcomes (i.e., depression and anxiety) among adolescents, using data from the Depression Anxiety Stress Scales (DASS) dataset from the Open-Source Psychometrics Project (https://openpsychometrics.org/_rawdata/). First, the separate differences between gender/race/personality traits and mental health outcomes will be examined in this study. Second, the study will examine the separate relationship of gender, race, and personality traits on mental health outcomes. It is first hypothesised that female adolescents are more likely to show higher depression and anxiety levels than male adolescents (Altemus et al., 2014). Second, it is hypothesised that non-White adolescents are more likely to show higher depression and anxiety levels than White adolescents (Blue Cross Blue Shield (BCBS), 2022; Dunlop et al., 2003; Vanderminden & Esala, 2018; Williams & Earl, 2007). Third, the hypothesis is that adolescents with high neuroticism and low extraversion are more likely to develop depression and anxiety symptoms (Alizadeh et al., 2018; Bienvenu, 2007; Karsten et al., 2012; Kendler et al., 2006; Kotov et al., 2010; Prince et al., 2020). Openness, conscientiousness, and agreeableness have no effect on the development of depression and anxiety symptoms (Karsten et al., 2012). Last, it is hypothesised that gender, race, and personality traits collectively influence mental health outcomes (Altemus et al., 2014; Blue Cross Blue Shield (BCBS), 2022; Dunlop et al., 2003; Harris et al., 2005; Karsten et al., 2012; Vanderminden & Esala, 2018; Williams & Earl, 2007).

While there is substantial research on mental health, particularly in WEIRD (Western, Educated, Industrialized, Rich, and Democratic) countries and among adults, there is a significant gap in understanding how personality traits, gender, and race interact to influence mental health outcomes among adolescents. This study adds to the existing body of research on the complex interplay between personality traits, gender, race, and mental health outcomes among adolescents. This study provides a unique perspective on mental health outcomes by conducting research on a diverse cohort of 28,599 participants focusing specifically on adolescents from 132 different countries. This study's findings could also provide insights into whether and how gender and race modify these associations, thereby contributing to the understanding of mental health disparities. Furthermore, given the ongoing development of healthcare systems in recognizing the significance of adolescence (Özdemir et al., 2016; Sawyer et al., 2018), this study has the potential to inform the development of more targeted interventions and preventive measures tailored to the unique needs of adolescents from diverse backgrounds. By promoting growth and healthy lifestyles, these interventions have the potential to significantly enhance the mental well-being of adolescents across various cultural and societal contexts.

Methods

Design

This study used a cross-sectional design, analysing data obtained from the Depression Anxiety Stress Scales (DASS) dataset from the Open-Source Psychometrics Project (https://openpsychometrics.org/_rawdata/).

Participants

The DASS dataset comprised of 39,775 participants who completed an online questionnaire between 2017 and 2019. From this total sample, 28,599 participants aged 13-24 years were included for analysis in this study. This age range was chosen due to the absence of data on younger participants below the age of 13 years and based on findings from previous research that considered adolescence to include the developmental period between 10 and 24 years old (Sawyer et al., 2018). There were 5769 male participants (20.17%), 22,316 female participants (78.03%), and 460 participants who identified as other (1.61%), potentially indicating gender non-conforming individuals. Moreover, 54 participants answered with "0" (0.19%), which was not an option according to the codebook. This discrepancy suggested that participants may have either chosen not to respond or unintentionally entered this value. The mean age in this sample was 19.43 years old ($SD = 2.79$). The racial composition of the sample was as follows: 17,592 Asian (61.51%), 256 Arab (0.90%), 429 Black (1.5%), 13 Indigenous Australian (0.05%), 179 Native American (0.63%), 6565 White (22.96%), and 3565 other (12.47%). This dataset came from those who agreed to complete the online questionnaire and answered "yes" to the question "Have you given accurate answers and may they be used for research?" at the end.

Measures

This study included a range of variables, such as demographics, personality traits, and mental health outcomes, which made it a valuable resource for studying the relationship between personality traits and mental health outcomes among adolescents.

The independent variable of gender was measured by asking "What is your gender?". Participants could answer with 1 = Male, 2 = Female or 3 = Other. Participants who respond with "0" were excluded from the study, since this answer was invalid. The answer "Other" was not used in this study, since this category has a small sample size relative to the male ($n = 5769$) and female ($n = 22,316$) categories. The independent variable of was measured by asking "What is your race". Participants could answer with 10 = Asian, 20 = Arab, 30 = Black, 40 = Indigenous Australian, 50 = Native American, 60 = White or 70 = Other.

The independent variable of personality traits was assessed using the Ten Item Personality Inventory (TIPI) (Gosling et al., 2003). The TIPI demonstrated substantial test-retest reliability (mean $r = .72$) and construct validity (Gosling et al., 2003). The ten personality traits measured by the TIPI were: 1. Extraverted, enthusiastic, 2. Critical, quarrelsome, 3. Dependable, self-disciplined, 4. Anxious, easily upset, 5. Open to new experiences, complex, 6. Reserved, quiet, 7. Sympathetic, warm, 8.

Disorganized, careless, 9. Calm, emotionally stable, 10. Conventional, uncreative. These traits corresponded to the Big Five-items as shown in Table 1 (Gosling et al., 2003). Participants rated these ten personality items by completing the sentence "I see myself as..." on a seven-point Likert scale: 1 = Disagree strongly, 2 = Disagree moderately, 3 = Disagree a little, 4 = Neither agree nor disagree, 5 = Agree a little, 6 = Agree moderately, 7 = Agree strongly. Five out of ten items for the Big Five personality dimensions were already reverse-scored, as noted in Table 1. This was confirmed by the negative correlation between the corresponding and reversed items (Table 1). Both sets of items, corresponding and reversed, were included separately in the analysis to gather comprehensive insights into the traits associated with depression and anxiety. This approach aimed to avoid assuming identical outcomes for both types of items.

Table 1

Big Five-Items Corresponding With the TIPI-Items

Big Five Traits	Corresponding items	Reversed items	Correlation
Openness to Experience	5. Open to new experiences, complex	10. Conventional, uncreative	-0.11
Conscientiousness	3. Dependable, self-disciplined	8. Disorganized, careless	-0.25
Extraversion	1. Extraverted, enthusiastic	6. Reserved, quiet	-0.34
Agreeableness	7. Sympathetic, warm	2. Critical, quarrelsome	-0.01
Neuroticism	4. Anxious, easily upset	9. Calm, emotionally stable	-0.40

The dependent variables in this study were depression and anxiety. This study used a subset of the 42 questions from the standard Depression Anxiety Stress Scales (DASS42) form to assess depression and anxiety (Lovibond & Lovibond, 1995). The reliability and validity have been tested by the Committee on Testing Affairs in the Netherlands (COTAN), a central committee of the Netherlands Institute of Psychologists (NIP) (Evers et al., 2010). The reliability according to the COTAN was high (Evers et al., 2010). The reliability and validity of the DASS according to Antony et al. (1998) were acceptable to excellent. The DASS could be downloaded from https://www2.psy.unsw.edu.au/dass/. The questions for stress were left out of this study, since they were not part of the research questions. The questions that corresponded with depression were: 3, 5, 10, 13, 16, 17, 21, 24, 26, 31, 34, 37, 38, 42. The questions that corresponded with anxiety were: 2, 4, 7, 9, 15, 19, 20, 23, 25, 28, 30, 36, 40, 41. The participants could answer the questions on a four-point Likert scale; 1 = Did not apply to me at all, 2 = Applied to me to some degree, or some of the time, 3 = Applied to me to a considerable degree, or a good part of the time, 4 = Applied to me very much, or most of the time. These are recoded by subtracting 1 from each scale, so from 1-4 to 0-3. This difference improved interpretation, as "0" commonly indicates absence and simplified comparisons with existing cut-off scores. The scores of the participants were divided into separate total scores for

both depression and anxiety. There were corresponding labels for the total scores of depression and anxiety aligned with the DASS manual (Lovibond & Lovibond, 1995). Although this study did not utilize these specific labels, the cut-off scores for depression were categorized as follows: Normal (0-9), mild (10-13), moderate (14-20), severe (21-27), and extremely severe (28+). The cut-off scores for anxiety were as follows: Normal (0-7), mild (8-9), moderate (10-14), severe (15-19), and extremely severe (20+).

Procedure

The questionnaire was publicly available and individuals were motivated to participate in order to obtain personalized outcomes. At the end of the test they were given the option to complete a short research survey. The participants gave informed consent by answering with "yes" to the question "Have you given accurate answers and may they be used for research?" at the end. The study was conducted in accordance with the ethical guidelines of the American Psychological Association and the Psychology Research Ethics Committee of Leiden University.

Analyses

To explore the data, verify assumptions, and conduct analyses, the statistical software R (R version 4.2.3, http://www.r-project.org) and RStudio (RStudio version 2023.06.0), were employed. In this study, the alpha level of significance was set at .05. In this study the effect sizes were interpreted as small ($d = 0.20$, $\eta^2 = .01$, adjusted $R^2 = .10$), medium ($d = 0.50$, $\eta^2 = .06$, adjusted $R^2 = .30$), and large ($d = 0.80$, $\eta^2 = .14$, adjusted $R^2 = .50$) (Cohen, 1995; Foster et al., 2018; Richardson, 2011).

To investigate the first research question about the relationship between gender and mental health outcomes, an independent samples *t*-test was used. The means of two independent categorical groups, female and male, were compared with a continuous dependent variable, depression/anxiety scores. To ensure the validity of the analysis, several assumptions were examined. The independence of observations was verified by ensuring that each participant belonged to only one group of the independent variable, either female or male. Additionally, potential outliers were assessed using boxplots to identify any significant deviations from the central tendency of the data. To evaluate the normality of the data distribution within each group, quantile-quantile (Q-Q) plots were inspected, looking for deviations from the diagonal line which would suggest departures from normality. Furthermore, homoscedasticity was tested using Levene's test to ensure that the variance of the data was approximately equal across the female and male group, with a significant *p*-value indicating heteroscedasticity. The first hypothesis would be confirmed if the female adolescents scored significantly higher on depression and anxiety than male adolescents.

For the second research question about race and mental health outcomes, a one-way ANOVA was used. This analysis compared means of depression/anxiety scores from multiple race groups (White vs. Asian, Arab, Black, Indigenous Australian, Native American, and other) and looked at interaction effects between the different races using a post-hoc test. The continuous dependent variable was the depression/anxiety scores and the categorical independent variable was race with independent

groups. The same assumptions of the *t*-test needed to be checked for the one-way ANOVA: Independence of observations (random sampling), no significant outliers (boxplots), approximated normal data distribution in each group (Q-Q plots), and homoscedasticity (nonsignificant Levene's test). The second hypothesis would be confirmed if non-White adolescents scored significantly higher on a depression and anxiety than White adolescents.

To address the third research question concerning the influence of personality traits on mental health outcomes, a multiple regression analysis was conducted. The Ten-Item Personality Inventory (TIPI) items were used as the categorical independent variable and the depression/anxiety scores as the continuous dependent variable. The independence of residuals was evaluated using the Breusch-Godfrey test, which assesses the presence of autocorrelation. Linear relationships were examined through scatterplots, and the absence of outliers was checked using boxplots. The normality of residuals was visually inspected using Q-Q plots, with deviations from the diagonal line suggesting departures from normality. Homoscedasticity was examined using the Breusch-Pagan test, with a significant *p*-value indicating heteroscedasticity. Multicollinearity was assessed using the variance inflation factor (VIF), with a VIF value greater than 10 indicating problematic multicollinearity. The third hypothesis would be confirmed if there was a significant positive coefficient for neuroticism and a significant negative coefficient for extraversion in the depression and the anxiety regression model. Conversely, openness, conscientiousness, and agreeableness were expected to have nonsignificant coefficients in the regression model.

Last, for the final research question regarding gender, race, and personality traits as predictors of mental health outcomes, a multiple regression analysis was used. This analysis examined the predictive value of the independent variables while assessing several assumptions, including independence of residuals (Breusch-Godfrey test), linear relationships (scatterplots), absence of outliers (boxplots), normality of residuals (Q-Q plots), homoscedasticity (Breusch-Pagan test), and absence of multicollinearity (VIF). The last hypothesis would be confirmed if mental health outcomes had a significant relationship with gender, race, and personality traits. In an exploratory analysis, we examined the differences in depression and anxiety scores between males and females for each race by using independent samples *t*-tests.

Results

First, the relationship between gender and mental health outcomes was investigated. A chi-squared test revealed that the distribution of gender was evenly distributed ($\chi^2(3) = 60{,}762$, $p < .001$). When checking for the assumptions, there were no outliers observed in either depression or anxiety scores and the distribution was approximately normal (see Appendix A). Upon analysing depression scores across male and female groups, Levene's test revealed a significant difference in variances across groups ($F(1, 28083) = 20.74$, $p < .001$), therefore violating the assumption of homogeneity of variances. Consequently, the initially planned independent *t*-test was replaced by Welch's *t*-test, revealing a significant difference between gender groups ($t(8741) = -5.19$, $p < .001$, $d = 0.08$). Notably,

females exhibited higher depression scores, with a mean of 22.04 ($SD = 12.01$) compared to males' 21.09 ($SD = 12.46$). The Cohen's d suggests a small effect size of the difference between depression scores of males and females. Similarly, when assessing anxiety scores by gender, conducting an independent t-test was unfeasible due to unequal variances detected by Levene's test ($F(1, 28083) = 25.94$, $p < .001$). Welch's t-test unveiled a significant difference between gender groups ($t(9200) = -22.06$, $p < .001$, $d = 0.32$). Here, females displayed higher levels of anxiety, with a mean score of 17.99 ($SD = 10.11$) compared to males' 14.78 ($SD = 9.80$), highlighting substantial gender differences in anxiety levels. The Cohen's d suggests a small effect size of the difference between anxiety scores of males and females.

Second, the relationship between race and mental health outcomes was examined. The racial distribution in the sample was evenly distributed according to the chi-squared test ($\chi^2(6) = 78,380$, $p < .001$). A one-way ANOVA was conducted to examine the differences in depression and anxiety scores between White and non-White adolescents. When checking for the assumptions for both depression and anxiety, there were no outliers observed in either depression or anxiety scores and the distribution was approximately normal (see Appendix A). Levene's test of the depression scores revealed a significant difference in variances across groups ($F(6, 28078) = 3.67$, $p = .001$), violating the assumption of homogeneity of variances. Consequently, the initially planned one-way ANOVA was replaced by Welch's one-way ANOVA, revealing a significant difference of depression scores between White and non-White adolescents ($F(6, 142.25) = 34.68$, $p < .001$, $\eta^2 = .039$). The eta-squared value indicates a small effect size for the relationship between race and depression scores. White individuals had a mean depression score of 23.52 ($SD = 12.33$), while individuals of other races showed mean scores ranging from 21.12 to 25.39, with corresponding standard deviations ranging from 12.07 to 12.82 (Table 2).

Table 2

Means and Standard Deviations of Depression Scores by Race

Race	n	$\bar{x}$	SD
Arab	248	25.39	12.23
Asian	17521	21.12	11.93
Black	413	22.54	12.82
Indigenous Australian	11	22.91	12.45
Native American	169	24.95	12.07
Other	3489	22.01	12.14
White	6234	23.52	12.33

Note. n = Number of observations in subgroup, $\bar{x}$ = Mean of the subgroup, SD = Standard deviation of the subgroup.

To further investigate the differences between specific race groups, post hoc comparisons using Games-Howell test were performed. The results indicated significant differences in depression scores between several race groups, as detailed in Table 3. The corresponding effect sizes were displayed in Table 3, with significant results highlighted in bold. White, Native American, and Arab adolescents showed higher depression scores than Asian adolescents and adolescents with "other" races. Also, Asian adolescents showed lower depression scores than adolescents with "other" races.

Table 3

Games-Howell Post Hoc Test of Depression Scores by Race

| Group 1 | Group 2 | Estimate Mean Difference | 95% CI | | Adjusted p-Values | Cohen's d |
			Lower	Upper		
White	Native American	-1.44	-4.24	1.37	.73	0.12
White	Black	0.98	-0.94	2.91	.74	0.08
White	Arab	-1.87	-4.23	0.48	.22	0.15
White	Asian	2.40	1.86	2.93	**< .001**	**0.20**
White	Indigenous Australian	0.61	13.00	14.20	1	0.05
White	Other	-1.51	-2.27	-0.75	**< .001**	**0.12**
Native American	Black	2.42	-0.91	5.75	.32	0.19
Native American	Arab	-0.44	-4.03	3.15	1	0.04
Native American	Asian	3.83	1.05	6.61	**.001**	**0.32**
Native American	Indigenous Australian	2.04	-11.60	15.70	.99	0.17
Native American	Other	-2.95	-5.78	-0.11	**.04**	**0.24**
Black	Arab	-2.86	-5.82	0.11	.07	0.23
Black	Asian	1.41	-0.47	3.30	.29	0.11
Black	Indigenous Australian	0.374	-13.3	14.00	1	0.03
Black	Other	-0.53	-2.49	1.44	.99	0.04
Arab	Asian	4.27	1.95	6.59	**< .001**	**0.35**
Arab	Indigenous Australian	-2.48	-16.10	11.20	.99	0.20
Arab	Other	-3.38	-5.77	-1.00	**< .001**	**0.28**
Asian	Indigenous Australian	1.79	-11.8	15.40	.99	0.15
Asian	Other	0.89	0.22	1.55	**.002**	**0.07**
Indigenous Australian	Other	-0.90	-14.50	12.70	1	0.07

Note. CI = Confidence interval.

When examining anxiety scores based on race, the assumption of homogeneity of variances was violated because Levene's test showed a significant difference in variances across groups ($F(6, 28078)$

= 9.88, $p < .001$). Again, the Welch's one-way ANOVA was chosen and revealed a significant difference in anxiety scores among racial groups ($F(6, 142.25) = 5.55$, $p < .001$, $\eta^2 = .034$). The eta-squared value indicates a small effect size for the relationship between race and anxiety scores. Among White adolescents the mean anxiety score was 17.38 ($SD = 10.55$), while adolescents of the other races showed mean scores ranging from 16.30 to 20.49, with corresponding standard deviations ranging from 9.89 to 11.65 (Table 4).

Table 4

Means and Standard Deviations of Anxiety Scores by Race

Race	n	$\bar{x}$	SD
Arab	248	19.77	11.27
Asian	17521	17.23	9.89
Black	413	16.30	10.85
Indigenous Australian	11	20.36	11.65
Native American	169	20.49	10.88
Other	3489	17.56	10.30
White	6234	17.38	10.55

Note. n = Number of observations in subgroup, $\bar{x}$ = Mean of the subgroup, SD = Standard deviation of the subgroup.

Post hoc Games-Howell comparisons were performed. The results indicated significant differences in anxiety scores between several race groups, as detailed in Table 5. The corresponding effect sizes were displayed in Table 5, with significant results highlighted in bold. White adolescents showed lower anxiety scores than Native American and Arab adolescents. Also, Native American and Arab adolescents showed higher anxiety scores than Black and Asian adolescents and adolescents with "other" races.

Table 5

Games-Howell Post Hoc Test of Anxiety Scores by Race

Group 1	Group 2	Estimate Mean Difference	95% CI		Adjusted p-Values	Cohen's d
			Lower	Upper		
White	Native American	-3.10	-5.63	-0.58	**.006**	**0.23**
White	Black	1.09	-0.54	2.72	.43	0.10
White	Arab	-2.39	-4.55	-0.23	**.02**	**0.22**
White	Asian	0.16	-0.30	0.61	.95	0.02
White	Indigenous Australian	-2.98	-15.70	9.74	.97	0.27

Group 1	Group 2	Estimate Mean Difference	95% CI		Adjusted p-Values	Cohen's d
			Lower	Upper		
White	Other	0.17	-0.47	0.83	0.99	0.02
Native American	Black	4.19	1.24	7.14	**< .001**	**0.39**
Native American	Arab	0.72	-2.55	3.98	.99	0.06
Native American	Asian	3.26	0.75	5.76	**.003**	**0.31**
Native American	Indigenous Australian	0.12	-12.70	12.90	1	0.01
Native American	Other	-2.93	-5.47	-0.38	**.01**	**0.28**
Black	Arab	-3.47	-6.12	-0.83	**.002**	**0.31**
Black	Asian	-0.93	-2.53	0.66	.60	0.09
Black	Indigenous Australian	4.07	-8.68	16.80	.90	0.36
Black	Other	1.26	-0.40	2.93	.27	0.12
Arab	Asian	2.54	0.41	4.68	**.009**	**0.24**
Arab	Indigenous Australian	0.59	-12.20	13.40	1	0.05
Arab	Other	-2.21	-4.40	-0.02	**.046**	**0.21**
Asian	Indigenous Australian	3.14	-9.59	15.90	.97	0.29
Asian	Other	0.33	-0.23	0.89	.58	0.03
Indigenous Australian	Other	-2.80	-15.50	9.92	.98	0.26

Note. CI = Confidence interval.

Third, the relationship between personality traits and mental health outcomes was investigated using a multiple linear regression analysis. When checking for the assumptions of the multiple regression for both depression and anxiety, there were no outliers observed in either depression or anxiety scores and the distribution was approximately normal (see Appendix B). The variation inflation factors (VIF) were under 10, indicating no multicollinearity. However, the Breusch-Pagan test showed that there was heteroscedasticity in the residuals ($p < .001$) and the Breusch-Godfrey test shows that there might have been autocorrelation in the residuals ($p < .001$). These findings revealed violations of the assumption of homoscedasticity and the assumption of independence of residuals. Due to these findings, the results of the regression model should be interpreted with caution. The analysis revealed a significant relationship between the depression scores and the TIPI scores ($F(10, 28074) = 1387$, $p < .001$, adjusted $R^2 = 0.330$). The adjusted R^2 indicated that approximately 33.0% of the variance in depression scores can be explained by personality traits measured by the TIPI-items, suggesting a moderate effect size. Examination of individual predictors indicated that all personality traits significantly contributed to the depression scores (Table 6). Specifically, higher scores on "2. Critical, quarrelsome" (Agreeableness), "4. Anxious, easily upset" (Neuroticism), "6. Reserved, quiet"

(Extraversion), "8. Disorganized, careless" (Conscientiousness), and "10. Conventional, uncreative" (Openness to Experience) were associated with higher depression scores, while higher scores on "1. Extraverted, enthusiastic" (Extraversion), "3. Dependable, self-disciplined" (Conscientiousness), "5. Open to new experiences, complex" (Openness to Experience), "7. Sympathetic, warm" (Agreeableness), and "9. Calm, emotionally stable" (Neuroticism) were associated with lower depression scores.

Table 6

Regression Coefficients for Personality Traits (TIPI-Items) Predicting Depression Scores

Coefficient	β	SE	t-Value	p-Value
Intercept	18.410	0.363	50.66	**< .001**
Openness to Experience				
5. Open to new experiences, complex	-0.312	0.039	-7.94	**< .001**
10. Conventional, uncreative	0.231	0.034	6.89	**< .001**
Conscientiousness				
3. Dependable, self-disciplined	-0.375	0.038	-9.93	**< .001**
8. Disorganized, careless	0.683	0.034	20.34	**< .001**
Extraversion				
1. Extraverted, enthusiastic	-0.660	0.038	-17.50	**< .00**
6. Reserved, quiet	0.797	0.035	22.46	**< .001**
Agreeableness				
7. Sympathetic, warm	-0.092	0.040	-2.31	**.02**
2. Critical, quarrelsome	0.434	0.036	12.17	**< .001**
Neuroticism				
4. Anxious, easily upset	1.383	0.040	35.02	**< .001**
9. Calm, emotionally stable	-2.052	0.039	-52.33	**< .001**

Note. β = Unstandardized estimate, SE = Standard error.

When examining the relationship between anxiety scores and personality traits, the regression model revealed a significant association between anxiety scores and the personality traits (TIPI-items) ($F(10, 28074) = 1158$, $p < .001$, adjusted $R^2 = 0.292$). The adjusted R^2 value indicated that approximately 29.2% of the variance in anxiety scores can be explained by the combined effects of the personality traits measured by the TIPI-items, suggesting a moderate effect size. Examination of individual predictors indicated that all personality traits, except for "10. Conventional, uncreative" (Openness to Experience), significantly contributed to the anxiety scores (Table 7). Specifically, higher scores on "2. Critical, quarrelsome" (Agreeableness), "4. Anxious, easily upset" (Neuroticism), "6. Reserved, quiet" (Extraversion), "7. Sympathetic, warm" (Agreeableness), and "8. Disorganized, careless" (Conscientiousness) were positively associated with anxiety, while higher scores on "1. Extraverted,

enthusiastic" (Extraversion), "3. Dependable, self-disciplined" (Conscientiousness), "5. Open to new experiences, complex" (Openness to Experience), and "9. Calm, emotionally stable" (Neuroticism) were negatively associated with anxiety.

Table 7

Regression Coefficients for Personality Traits (TIPI-Items) Predicting Anxiety Scores

Coefficient	β	*SE*	*t*-Value	*p*-Value
Intercept	10.498	0.313	33.56	**< .001**
Openness to Experience				
5. Open to new experiences, complex	-0.502	0.034	-14.82	**< .001**
10. Conventional, uncreative	-0.019	0.029	-0.66	.51
Conscientiousness				
3. Dependable, self-disciplined	-0.085	0.033	-2.60	**.009**
8. Disorganized, careless	0.360	0.029	12.48	**< .001**
Extraversion				
1. Extraverted, enthusiastic	-0.168	0.032	-5.17	**< .001**
6. Reserved, quiet	0.313	0.031	10.24	**< .001**
Agreeableness				
7. Sympathetic, warm	0.184	0.034	5.40	**< .001**
2. Critical, quarrelsome	0.214	0.031	6.96	**< .001**
Neuroticism				
4. Anxious, easily upset	1.880	0.034	55.28	**< .001**
9. Calm, emotionally stable	-1.285	0.034	-38.09	**< .001**

Note. β = Unstandardized estimate, SE = Standard error.

Last, the relationship between gender, race, personality traits, and mental health outcomes were examined by using a multiple regression analysis. When checking for the assumptions of the multiple regression for both depression and anxiety, there were no outliers observed in either depression or anxiety scores and the distribution was approximately normal (see Appendix C). The VIF were below 10, indicating no multicollinearity, but the Breusch-Pagan test ($p < .001$) indicated heteroscedasticity, and the Breusch-Godfrey test ($p < .001$) suggested possible autocorrelation in the residuals, violating the assumptions of homoscedasticity and independence of residuals. Thus, caution is advised when interpreting the regression model results. The analysis revealed a significant relationship between the depression scores and the predictors gender, race, and personality traits ($F(12, 28072) = 1156$, $p < .001$, adjusted $R^2 = 0.331$). The adjusted R^2 value indicated that approximately 33.1% of the variance in depression scores can be explained by the combined effects of the predictors: gender, race, and personality traits. Which suggested a moderate effect size. Examination of individual predictors of the multiple regression model showed that gender did not significantly predict depression

scores. However, race and all personality traits significantly contributed to the depression scores (Table 8). Specifically, higher scores on "2. Critical, quarrelsome" (Agreeableness), "4. Anxious, easily upset" (Neuroticism), "6. Reserved, quiet" (Extraversion), "8. Disorganized, careless" (Conscientiousness), and "10. Conventional, uncreative" (Openness to Experience) were associated with higher depression scores, while higher scores on "1. Extraverted, enthusiastic" (Extraversion), "3. Dependable, self-disciplined" (Conscientiousness), "5. Open to new experiences, complex" (Openness to Experience), "7. Sympathetic, warm" (Agreeableness), and "9. Calm, emotionally stable" (Neuroticism) were associated with lower depression scores.

Table 8

Regression Coefficients for Gender, Race, and Personality Traits (TIPI-Items) Predicting Depression Scores

Coefficient	β	SE	t-Value	p-Value
Intercept	18.499	0.463	40.00	**< .001**
Gender	-0.174	0.152	-1.14	.25
Race	0.005	0.002	2.08	**.04**
Openness to Experience				
5. Open to new experiences, complex	-0.317	0.039	-8.03	**< .001**
10. Conventional, uncreative	0.244	0.034	7.18	**< .001**
Conscientiousness				
3. Dependable, self-disciplined	-0.374	0.038	-9.86	**< .001**
8. Disorganized, careless	0.682	0.034	20.28	**< .001**
Extraversion				
1. Extraverted, enthusiastic	-0.654	0.038	-17.28	**< .001**
6. Reserved, quiet	0.788	0.036	22.09	**< .001**
Agreeableness				
7. Sympathetic, warm	-0.085	0.040	-2.15	**.03**
2. Critical, quarrelsome	0.428	0.036	11.97	**< .001**
Neuroticism				
4. Anxious, easily upset	1.391	0.040	34.76	**< .001**
9. Calm, emotionally stable	-2.05	0.039	-52.01	**< .001**

Note. β = Unstandardized estimate, SE = Standard error.

To explore the differences in depression scores between males and females within each racial group, independent samples *t*-tests were used. Arab, Asian, and "other" race females showed significantly higher depression scores than Arab, Asian, and "other" race males. All the other race groups did not show significant differences between males and females (Table 9).

Table 9

Results of Independent Samples t-Tests of Depression Scores by Gender and Race

Race	*df*	*t*-Value	*p*-Value	Mean Male	Mean Female
Arab	3811	25.39	**.04**	22.2	26.3
Asian	82	21.12	**< .05**	19.5	21.4
Black	205	22.54	.38	21.6	22.9
Indigenous Australian	3	22.91	.94	22.3	23.1
Native American	82	24.95	.35	23.5	25.5
Other	1217	23.52	.08	23.1	23.7
White	3836	22.01	**.04**	21.2	22.2

Note. df = Degrees of freedom.

When examining the relationship between anxiety scores and gender, race and personality traits, the analysis revealed a significant relationship between the anxiety scores and the predictors gender, race and personality traits ($F(12, 28072) = 985.2$, $p < .001$, adjusted $R^2 = 0.296$). The adjusted R^2 value indicated that approximately 29.6% of the variance in anxiety scores can be explained by the combined effects of the predictors: gender, race, and personality traits. Which suggested a moderate effect size. Examination of individual predictors showed that gender, race, and all TIPI-items, except for "10. Conventional, uncreative" (Openness to Experience), significantly contributed to the anxiety scores (Table 10). Specifically, higher scores on "2. Critical, quarrelsome" (Agreeableness), "4. Anxious, easily upset" (Neuroticism), "6. Reserved, quiet" (Extraversion), "7. Sympathetic, warm" (Agreeableness), and "8. Disorganized, careless" (Conscientiousness) were positively associated with anxiety, while higher scores on "1. Extraverted, enthusiastic" (Extraversion), "3. Dependable, self-disciplined" (Conscientiousness), "5. Open to new experiences, complex" (Openness to Experience), and "9. Calm, emotionally stable" (Neuroticism) were negatively associated with anxiety.

Table 10

Regression Coefficients for Gender, Race, and Personality Traits (TIPI-Items) Predicting Anxiety Scores

Coefficient	β	*SE*	*t*-Value	*p*-Value
Intercept	8.394	0.397	21.15	**< .001**
Gender	1.495	0.131	11.43	**< .001**
Race	-0.010	0.002	-4.81	**< .001**
Openness to Experience				
5. Open to new experiences, complex	-0.473	0.034	-14.00	**< .001**
10. Conventional, uncreative	-0.054	0.029	-1.86	.06

Coefficient	β	*SE*	*t*-Value	*p*-Value
Conscientiousness				
3. Dependable, self-disciplined	-0.105	0.033	-3.22	**.001**
8. Disorganized, careless	0.374	0.029	12.97	**< .001**
Extraversion				
1. Extraverted, enthusiastic	-0.192	0.032	-5.90	**< .001**
6. Reserved, quiet	0.355	0.031	11.60	**< .001**
Agreeableness				
7. Sympathetic, warm	0.149	0.034	4.37	**< .001**
2. Critical, quarrelsome	0.246	0.031	8.01	**< .001**
Neuroticism				
4. Anxious, easily upset	1.817	0.034	52.91	**< .001**
9. Calm, emotionally stable	-1.284	0.034	-38.03	**< .001**

Note. β = Unstandardized estimate, SE = Standard error.

To explore the differences in anxiety scores between males and females within each racial group, independent samples *t*-tests were used. Females of all race groups except Indigenous Australian showed significantly higher anxiety scores than males (Table 11). Indigenous Australian did not show significant gender differences in anxiety scores.

Table 11

Results of Independent Samples t-Tests of Anxiety Scores by Gender and Race

Race	*df*	*t*-Value	*p*-Value	Mean Male	Mean Female
Arab	94	-5.03	**< .05**	13.6	21.6
Asian	3954	-14.2	**< .05**	14.9	17.7
Black	233	-3.49	**< .05**	13.5	17.4
Indigenous Australian	3	0.29	.80	22.7	19.5
Native American	79	-2.82	**< .05**	26.7	21.9
Other	1235	-6.31	**< .05**	15.5	18.1
White	4117	-15.9	**< .05**	14.4	18.8

Note. df = Degrees of freedom.

Discussion

The current study aimed to explore the interplay between gender, race, personality traits, and mental health outcomes among adolescents. The findings revealed significant associations between these variables and both depression and anxiety scores.

Gender & Mental Health Outcomes

Regarding the gender differences in mental health outcomes, the results showed that females reported higher levels of both depression and anxiety compared to male adolescents. Therefore, the

hypothesis that female adolescents are more prone to displaying higher levels of depression and anxiety than male adolescents can be validated. This aligns with the existing literature which shows the heightened vulnerability of female adolescents to mental health disorders (Altemus et al., 2014; McLean et al., 2011). However, it is crucial to consider that the sample consisted of 78% female adolescents and 20% male adolescents, which may influence the conclusion. The findings only demonstrated that males report fewer symptoms than females, this does not necessarily mean that females are inherently more sensitive. This does not inherently imply greater sensitivity in females but could suggest reluctance among males to openly discuss symptoms, influenced by societal expectations (DuPont-Reyes et al., 2020). In light of the effect sizes, the gender difference in both the depression and anxiety scores had a small effect size. This implies that the gender-related differences in anxiety levels are more substantial compared to depression levels among the studied population. However, these differences in gender contribute to acknowledging the importance of gender-sensitive approaches in interventions of mental health outcomes (Herrmann et al., 2023).

Race & Mental Health Outcomes

Regarding the influence of race on mental health outcomes among adolescents, this study uncovered significant differences in depression and anxiety scores between White and non-White adolescents. Specifically, White adolescents exhibited higher levels of depression compared to Asian adolescents. There were also significant results found for Asian adolescents and the "other" races. Additionally, our findings regarding anxiety scores reveal disparities among different racial groups, with Arab and Native American adolescents exhibiting higher anxiety levels compared to White adolescents. However, it is worth noting that the effect sizes of both the depression and anxiety results are small. These results partially support the hypothesis that non-White adolescents are more likely to exhibit higher levels of depression and anxiety compared to White adolescents (Vanderminden & Esala, 2018; Williams & Earl, 2007). However, while this association holds true for anxiety, it does not extend to depression.

Both results on depression and anxiety are not completely in line with existing literature. Studies have shown that depression and anxiety levels were higher for other races, such as Hispanic (Latin) and Black, compared to White people (Blue Cross Blue Shield (BCBS), 2022; Dunlop et al., 2003; Vanderminden & Esala, 2018; Williams & Earl, 2007). Given the found racial differences in mental health outcomes, the specific races exhibiting higher results vary in different studies. This suggests that racial differences in mental health outcomes are complex and multifaceted. These ambiguous results could potentially be influenced by various factors, such as biases among healthcare professionals in diagnostic procedures, reluctance among individuals with non-White backgrounds to seek help due to financial constraints, as well as social stigma surrounding mental health and limited accessibility to mental health services for individuals with non-White backgrounds (Harris et al., 2005; Vanderminden & Esala, 2018; Williams & Earl, 2007). Nonetheless, these findings highlight the need

for racially sensitive research and interventions that take into account the differences faced by adolescents from different racial backgrounds (Lu et al., 2021; McGorry et al., 2022).

Personality Traits & Mental Health Outcomes

When shedding light on the relationship between personality traits and mental health outcomes, the analyses revealed significant associations. The effect sizes underscore the significant impact of personality traits on depression and anxiety, emphasizing their relevance in understanding both conditions. Specifically, it was hypothesized that adolescents with high neuroticism and low extraversion would be more prone to developing depression and anxiety symptoms, while openness, conscientiousness, and agreeableness would have no effect. The results supported part of the hypothesis, revealing that higher levels of neuroticism and lower levels of extraversion were indeed associated with elevated levels of both depression and anxiety, consistent with existing literature (Alizadeh et al., 2018; Bienvenu, 2007; Karsten et al., 2012; Kendler et al., 2006; Kotov et al., 2010; Prince et al., 2020). However, contrary to expectations, significant associations were also found for other personality traits. Specifically, lower levels of openness, conscientiousness, and agreeableness were linked to higher levels of depression and anxiety, contradicting the hypothesis that these traits would have no effect. These findings contribute to the existing literature by addressing a gap in knowledge regarding the impact of these traits on mental health outcomes, as previous research lacked clarity on this matter (Karsten et al., 2012).

Additionally, the results suggest an inverse relationship between certain personality traits and depression and anxiety levels. Meaning, that it was not only evident that higher neuroticism and lower extraversion, openness, conscientiousness, and agreeableness led to higher levels of depression and anxiety by looking at the corresponding Big Five-items. By looking at the reversed items, it was indicated that lower neuroticism and higher extraversion, openness, conscientiousness, and agreeableness may serve as protective factors for mental health. These findings imply that adolescents with lower neuroticism and higher extraversion, openness, conscientiousness, and agreeableness may be less susceptible to developing depression and anxiety. This highlights the role of personality traits in preventing and protecting against mental health disorders.

Gender, Race, Personality Traits & Mental Health Outcomes

Our study aimed to investigate the combined effects of gender, race, and personality traits on mental health outcomes, specifically depression and anxiety, among adolescents. The results of our analysis revealed that when considering these factors together, the overall models for both depression and anxiety were significant. This suggests that gender, race, and personality traits collectively play a role in predicting mental health outcomes in adolescents.

When examining the specific influence of each predictor, we found that gender alone did not significantly predict depression scores after accounting for race and personality traits. This finding suggests that the association between gender and depression among adolescents may not be as straightforward as previously assumed. It might be possible that the relationship between gender and

depression may be influenced or mediated by other factors, such as race or individual differences in personality, given that race and all personality traits significantly contributed to the depression scores.

When analysing the specific influence of each predictor for anxiety scores, we observed that gender and race, along with all Big Five personality traits, emerged as significant predictors. This implies that gender, race, and personality traits as single predictors all have a substantial influence on anxiety levels among adolescents, when controlling for the other variables.

Exploration of the differences in depression and anxiety scores between males and females across every race group showed that females generally exhibited higher scores compared to males. For depression, significant differences were found for females of Arab, Asian, and "other" racial backgrounds, this suggest that the female adolescents of these races have higher depression levels than male adolescents of these races. For anxiety, significant gender differences were found across most racial groups, Arab, Asian, Black, Native American, White, and "other". This means that females with these racial backgrounds generally exhibited higher levels of anxiety compared to males with these racial backgrounds. These results give insight in the relationship between gender, race, and mental health outcomes and highlight the importance of these differences in interventions and future research.

Limitations and Strengths

It is essential to interpret these findings within the context of the study's limitations. The use of self-report measures in research may introduce response bias, and the cross-sectional design prevents causal inference (Bauhoff, 2011). Also, the presence of unequal variances in certain analyses may affect the accuracy of statistical tests and comparisons, potentially leading to biased results or incorrect conclusions. This discrepancy can lead to inflated Type I error rates, impacting the reliability and validity of findings (Field, 2018; Zimmerman, 2006). Another limitation is the use of a dataset from the Open-Source Psychometrics Project, which could potentially introduce bias. The participants of this dataset might not be fully representative of the broader population due to several factors, such as self-selection biases and the demographics of individuals.

Despite these limitations, a notable strength of this study is its large diverse sample size of 28,599, drawing data from participants in 132 countries. The inclusion of adolescents from diverse backgrounds enhances the external validity of the study and sheds light on mental health disparities on a global scale with a focus on adolescence. This contributes to filling the gap in the existing literature, that focuses mainly on adults and is predominantly conducted in WEIRD (Western, Educated, Industrialized, Rich, and Democratic) countries. Also, this study uses computerized self-report measures and these may be less susceptible to response bias (Gnambs and Kaspar, 2014).

Future Research

Future research should focus on overcoming the limitations identified in this study to enhance the credibility and applicability of its findings. Alternative assessment methods beyond self-reports, such as behavioural observations or physiological assessments, should be explored to lessen potential response biases. Longitudinal research designs present promising ways for unravelling causal

relationships among variables, avoiding the restriction inherent in the current cross-sectional approach. Additionally, investigate strategies to address the issue of unequal variances in statistical analyses, as this could enhance the accuracy and reliability of the results. This could involve exploring advanced statistical techniques, employing robust estimation methods, or conducting pilot studies. Also, to ensure the effectiveness and inclusivity of interventions aimed at improving mental health outcomes, there should be focus on the diverse needs and backgrounds of different races.

A light has been shed on the relationship between personality traits and mental health outcomes; however, the causal direction of personality traits and mental health outcomes remains unknown (Karsten et al., 2012; Prince et al., 2020). Existing research mentions that persistent alterations in personality traits could be a consequence of anxiety and depressive disorders, this is called the scar effect (Karsten et al., 2012; Prince et al., 2020). Future research could further explore bidirectional relationships between personality traits and mental health outcomes, alongside investigating interventions targeting maladaptive personality traits to enhance mental well-being.

Conclusion

In conclusion, the interplay between gender, race, personality traits, and mental health outcomes among adolescents was brought to light in this study. The findings revealed significant associations between these variables and both depression and anxiety levels. Gender differences were evident, with female adolescents showing higher levels of depression and anxiety compared to male adolescents. Regarding race, significant differences in depression and anxiety scores were observed between White and non-White adolescents. These findings underscore the need for racially sensitive research and interventions. The Big Five personality traits also played a significant role in predicting depression and anxiety levels among adolescents. When looking at the combined effects of gender, race, and personality traits on mental health outcomes, it was evident that the overall models were significant suggesting a moderate effect on depression and anxiety levels. While this study has several strengths, including its large and diverse sample size, there are also limitations to take into account. Future research should aim to better understand mental health and develop effective interventions by addressing these gaps, advancing our understanding of the factors influencing mental health outcomes among adolescents with greater precision and depth. Overall, this study adds valuable insights to the field of psychology and underscores the importance of considering individual differences in addressing mental health problems among adolescents.

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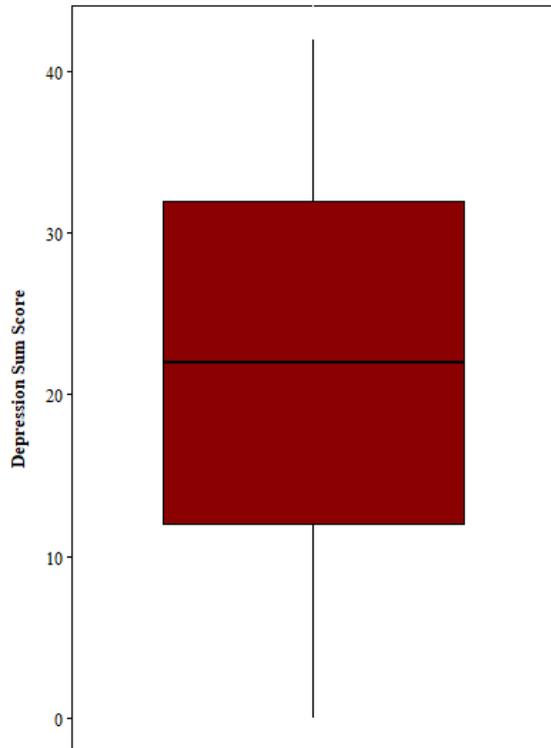
Appendix A

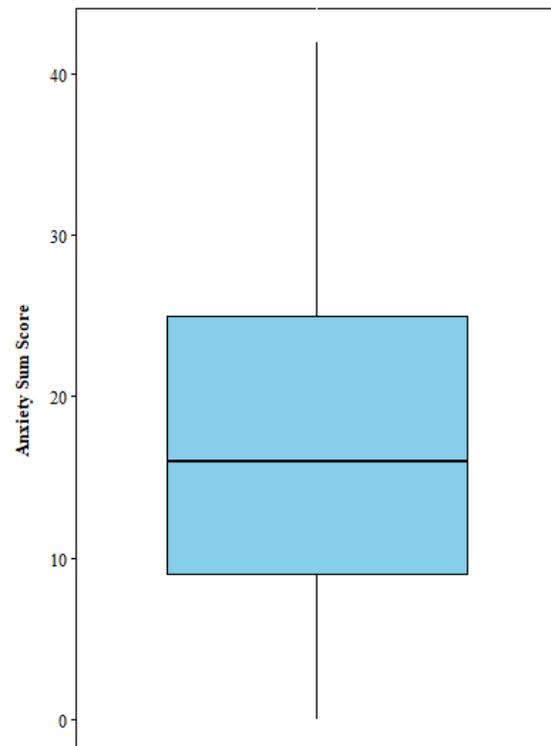**Boxplots and Q-Q Plots of Total Depression and Anxiety Scores**

Figure 1

Boxplot of Total Depression Scores

Figure 2

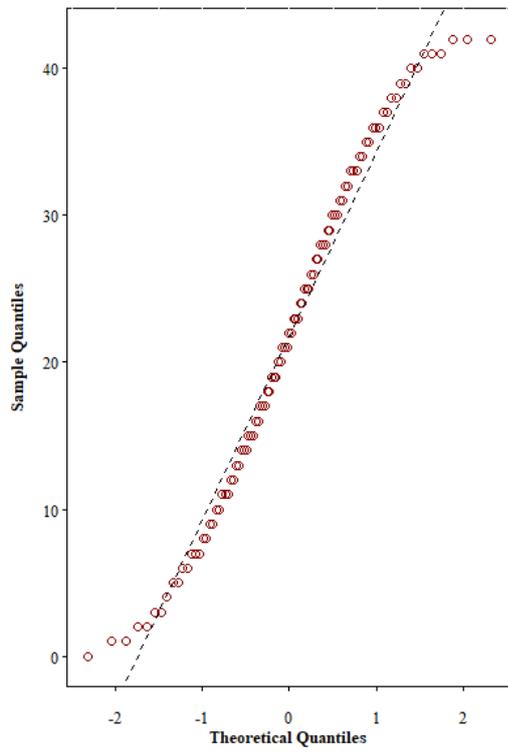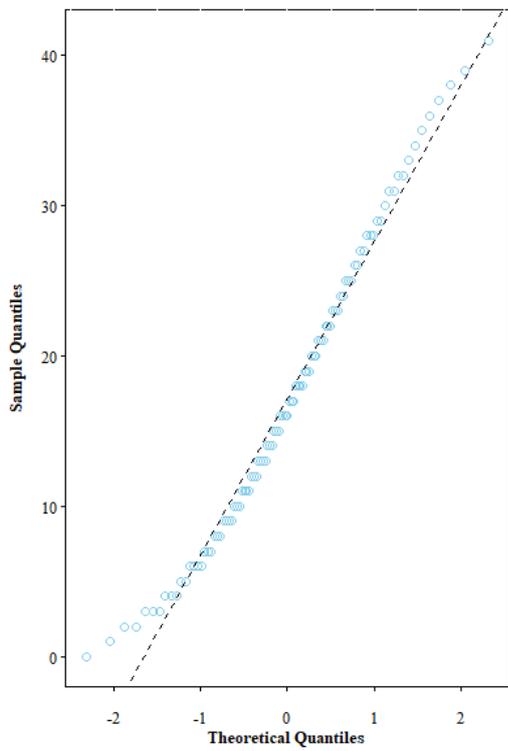*Boxplot of Total Anxiety Scores*

Figure 3

Q-Q Plot of Total Depression Scores

Figure 4

Q-Q Plot of Total Anxiety Scores

Q-Q Plots of Residuals of the Model for Depression and Anxiety Scores with Personality Traits

Figure 1

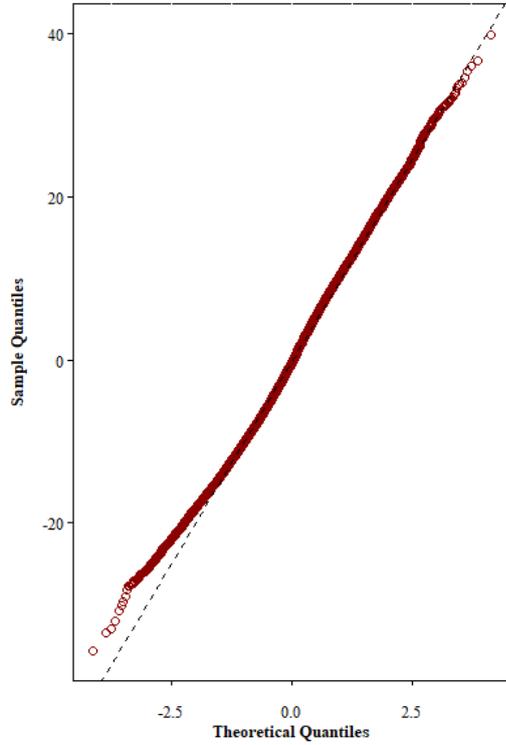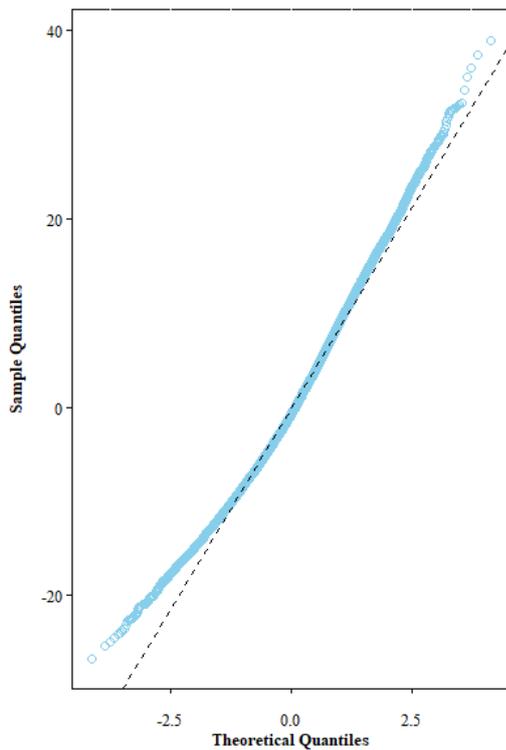*Q-Q Plot Residuals of Depression Scores with Personality Traits*

Figure 2

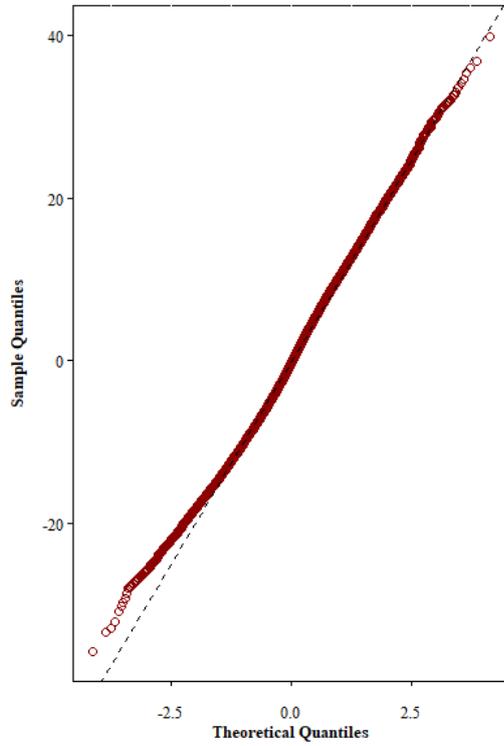*Q-Q Plot Residuals of Anxiety Scores with Personality Traits*

Appendix C

Q-Q Plots of Residuals of the Model for Depression and Anxiety Scores with Gender, Race, and Personality Traits

Figure 1

Q-Q Plot Residuals of Depression Scores with Gender, Race, and Personality Traits

Figure 2

Q-Q Plot Residuals of Anxiety Scores with Gender, Race, and Personality Traits