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MENTAL TOUGHNESS, NARCISSISM, AND SELF-WORTH AS PREDICTORS OF SECONDARY SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT IN MATHEMATICS IN ANAMBRA STATE

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ABSTRACT
Students' mental toughness, narcissism and self-worth are strong indicators and facilitators of effective learning. The study aimed to explore the students' mental toughness, narcissism and self-worth as predictors of academic achievement in mathematics in Anambra State. Four research questions and three null hypotheses guided the study. The study adopted a multiple regression predictive research design. The population of the study comprised of 21204 SS II students from which a sample of 630 were drawn. Multi-stage procedure was used to select the sample. Three standardized research instruments namely; Mental Toughness Questionnaire (MTQ), Narcissism Personality Inventory (NPI) and Contingencies of Self-Worth Scale (CSWS) were used for data collection. Students' mathematics achievement scores from the state wide promotion examination were used to represent mathematics achievement. Cronbach's alpha was used to determine the reliability of the items in the instruments. Reliability index were found to be .68, for mental toughness.71, for narcissism, and .89, for self-worth. The overall reliability coefficient was .76which shows that the instrument was reliable and good for the study. The data were analyzed using standard multiple regression analyses. The t-test for r, F-test and test of significance for β, were used to test hypotheses. Findings from the study showed that using mental toughness, narcissism and self-worth scores yielded an adjusted R squared of .002. This implies that predictors accounted for about 0.2% of the variance scores in mathematics academic achievement. It was also, recommended that teachers and other educators should device more strategies that will help them to advise the students to consider their mental toughness, narcissistic trait and self-worth as adaptive behaviours that will positively influence their life achievement contexts as well as contributing indirectly to their future lifelong learning.

Keywords: Mental Toughness, Narcissism, Self-worth and Academic Achievement.

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Introduction

One of the explanations researchers have explored in order to explain why students achieved academically, while others do not , are rooted in the nature of influences emanated from the non-cognitive constructs in relation with the cognitive outcomes of the students. Students' success is a joint effort to engage in academic activities and satisfaction in life and there is a relationship between non-cognitive constructs and academic achievement. The present study aimed to examine if the students' non-cognitive variables such as mental toughness, narcissism and self-worth will predict their cognitive variable such as academic achievement. Dumfart and Neubauer (2016) noted that there is increasing interest in studying the role of non-cognitive traits in contributing to variation in academic attainment across development. This indicates that non-cognitive variables could have an impact that determines human academic development which has not been clarified in the domain of educational psychology. According to Papageorgiou, Malanchini, Denovan, Clough, Shakeshaff, Schofield and Kovas (2018), several non-cognitive traits have been identified as buffers against the negative impact of stressful situations on performance in education. As a result of this, examining narcissism, self-worth and mental toughness as variables that have the potential influence to jointly predict academic achievement could have social imperative in determining human life-long learning.

Interestingly, Clough, Earle and Sewell (2002) opine that mental toughness is a personality trait that includes an array of positive characteristics such as perceiving challenge as an opportunity rather than a threat and feeling in control of life situations. Mental toughness (MT), reflects an effective coping mechanism in reaction to stressors and it facilitates proactively seeking out opportunities for personal growth (St Clar-Thompson, Bugler, Robinson, Clough, McGeown & Perry, 2015). Clough and colleagues (2002) characterized MT as a composite of four sub-components (the 4Cs) such as; control, commitment, challenge and confidence. In the aspect of control (life and emotion), it represents the tendency to feel and act as if one is influential and keep anxieties in cheek. Commitment, described the tendency to be deeply involved in pursuing goals despite difficulties that arise. In the challenge aspect of mental toughness, it deals with the tendency to see potential threats as opportunities for self-development and continue to strive in changing environments. Then confidence on its own (inabilities and interpersonal) represents the belief that one is a truly worthwhile person in spite of setbacks and the ability to push oneself forward in social setting.

Previous research has shown that MT is an important construct for explaining individual differences in learning and educational performance (McGeown, St Clar-Thompson & Clough, 2016). Then, the predictive nature of this construct on students' academic achievement in the mathematics domain has remained unclear in

the educational research. On this note, the researchers operationally defined mental toughness as the psychological construct that involves having a personal stable belief that deals with seeking out challenge, wiliness to achieve, persistence and resilience in a difficult situation with high level of commitment and self-control. Then examining how MT could interplay with narcissism and self-worth to predict academic achievement is one an interesting aspect of the study. Although, narcissism is a personality trait that makes an individual to think that he/she is better than others and prior study conducted found that it does not significantly correlated with students' academic achievement (Anyanwu, Ezenwosu, Emesi &Eleje, 2022).

For instance, individual with narcissistic personality tend to have strong entitlement, authority, self-admiration and superiority within themselves. This personality trait has both cognitive and motivational elements that that systematically nurture the discontinuous aspect of human development. For example, the study of Papageorgiou *et al* (2018) found that students with subclinical narcissistic personality tend to performed better in academic. This shows that students with subclinical narcissistic trait are having good mental toughness which enable them to exhibit persistence in the period of academic challenges as an adaptive behaviour to perform better than others. Papageorgiou and colleagues concluded that narcissistic personality and mental toughness are two non-cognitive personality constructs that determine students' performance in school.

Similarly, Nimbalkar (2020) opined that narcissism has been described as a standard maturational phase of healthy development and possesses sense of self-importance, individual desire to gain attention and admiration from others. This supported early observation from the study of (Corsini & Auerback, 1988) which noted that narcissistic personality include; inflated self-image, interpersonal exploitative, cognitive expressiveness, insouciant temperament and deficient social conscience. The construct of narcissism was examined in two clusters such as powers and exhibitionism as these had covered the characteristics of narcissism such as; authority, superiority, entitlement, exploitativeness, self-sufficiency and vanity (Raskin & Hall, 1979). The authority and self-sufficiency factors are referred to as adaptive narcissistic factors that characterized power and exhibitionism types of narcissism because of their association with desirable personality variables, whereas the exploitativeness and entitlement factors are referred to as maladaptive factors because of their associations with less desirable personality variables (Soyer, Kopelman, & Waston, 2001). Since the above scholarly review had noted that narcissism can influence the inflated self of an individual, it means that there could be a link between narcissism and the development of self-worth of an individual. Based on the existing scholarly contributions, the scholars defined narcissism as a developmental personality

construct that makes the individuals to think they are better than other in any situational context. Therefore, exploring the link that could exist between narcissism and self-worth to predict academic achievement will add more understanding to the empirical aspect of the present study.

Suffice it to say that the paucity of empirical studies that examined the predictive nature of narcissism, mental toughness, and self-functioning (self-worth) on students' academic achievement in mathematics in Anambra State is another issue that necessitated to the present study. Though, relating narcissism, mental toughness and self-worth as exogenous variables that could jointly predict academic achievement will help to discover the variable that has the highest proportion in predict academic achievement among the three variables.

Self-worth is an attribute of self-esteem in which a person has staked his/her self-functioning, so that person's view of his or her value/worth depends on perceived successes or failure to self-standards in that domain. The domain of self-worth is its contingencies in the individuals' self-esteem. The study of (Garcia, 2009) previously examined self-worth in two aspects such as; external contingencies self-worth and internal contingencies self-worth. External contingencies self-worth are the contingencies that are dependent on factors that are not controlled by the individual, they include academic competence and family support. In contrast, internal contingencies self-worth depends solely on psychological processes that operate within the individual. These contingencies self-worth include virtue and God's love (Crocker & Wolter, 2001). Internal contingencies are healthier contingencies than external contingencies self-worth, and are related to higher levels of being a healthy self-esteem.

The study of Crocker and Wolter (2001) discovered that contingencies self-worth (CSW) is organized by the level of importance to the individual, and depending on how strong the contingency is. This shows that some contingencies will be more accessible than others. External contingencies self-worth are the less healthy contingencies, and they can lead to inappropriate behaviour. Individuals whose self-worth is based on academic competence may cheat on test, or if individuals base their self-worth on approval from others, they may lie to get their approval (Crocker & Wolter, 2001). For example, when narcissists have a low sense of self-worth, they tend to show more emotional responses, such as anger and anxiety (Rhodewalt & Morf, 1998). It can be assumed that for most narcissists, mental toughness is based on external contingencies of self-worth. It could also be assumed that when the contingencies self-worth of an individual was based upon academic competence, if he/she failed a test, the individual tend to feel worthless and his or her self-esteem plummeted (Crocker, Karpmski, Quinn & Chase, 2003).

As a contingency self-worth, academic competence is at least potentially more hurtful than beneficial to the individual mostly when it is based on domain of external

contingencies self-worth. External and internal contingencies self-worth are the strong attributes of self-functioning that could interact with narcissism and mental toughness to predict academic achievement. Therefore, further explanation and empirical examination on mental toughness, narcissism and self-worth in predicting academic achievement is needed in the Nigerian educational research.

Considering the above scholarly contributions, one could assume that students whose self-worth is proximally and contingent with their mental toughness and narcissism, may optimally have a relative link to predict academic achievement. On this note, the researchers operationally defined self-worth as a healthy psychological construct that represents an attribute of self-esteem which allows individuals to fulfill their own needs for esteeming the self. Therefore, contingencies self-worth is the valuing potentialities in individuals which facilitate and describe the degree to which the individuals could base their esteemed self. These may help or hurt the desire to achieve based on the nature of contextual and personal factors that shape the individuals' desired goal. Base on this, Crocker *et al* (2003) suggested that the type of contingencies self-worth a student has adopted in relation with other variables like mental toughness and narcissism could either be beneficial or hurt predictive outcome of his /her academic achievement.

Several theorists, therefore, concluded that students who base their self-worth on academics tend to perform well because these students strive to seek the self-esteem boosts that follow good performances and avoid the self-esteem drops that follow poor performances (Osborne, 1995, Osborne, 1997).The less students base their self-worth on academics the less they tend to have this extra motivation to perform well (Major & Schmader, 1998, Steele, 1997). Another reason to expect a positive link between basing self-worth on academics and academic performance is that less successful students tend to reduce or disengage their academic contingencies of self-worth in order to protect their self-esteem (Major & Schmader, 1998). Other theorists propose that students who base their self-worth on academics actually risk underperforming (Burhans & Dweck, 1995). These theorists note that although basing self-worth on academics can be motivating. It can also increase pressure, which can reduce intrinsic motivation, increase ability-validation goals and anxiety, and impair self-regulation.

These scholarly reviews seem to suggest that academic contingencies of self-worth can impair performance in variety of academic settings. A more nuanced view is that students with high basing of self-worth on academics are at risk of underperforming in academic settings that emphasize evaluation rather than learning (Major & Schmader, 1998). Although, achievement motivation research shows that students, in general, tend to underperform in the former compare to the latter settings (Utman, 1997). The study of Molden and Dweck (2000) proposed that students who base their self-worth on academics are especially vulnerable

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to this performance pattern. Indeed, Lawrence and Crocker (2009) found that when students thought they were taking a test that measured ability, the more they base their self-worth on academics, the worse their test performance. Based on these theoretical assumptions, the rationales and implications of the interplay that could observed as a result of the interplay among students' self-worth, mental toughness and narcissism in determining academic achievement have not been established for academic exploration in the Nigerian academic research.

Academic achievement has been defined as scores obtained from examination that measure the extent to which a person has acquired certain information or mastered certain skills, usually as a result of specific instruction (Meherns& Lehman, 2016). It is assumed that the perceptions of students toward their narcissism that include adaptive and maladaptive behaviour in connection with their self-worth will have a robust relative indicators towards their academic achievement. On this note, the study will adopt students' promotion mathematics scores to represent academic achievement.

For students to learn and achieve academically, especially in the subject that deals with articulation, aggregation and critical thinking, they must be sufficiently and psychologically healthy inbehaviour. A psychologically healthy individual is the person that has a positive perception of his/her behaviour as it represents the total self. This positive personality view can be developed through educational processes in the formal educational institutions. Surprisingly, the dramatic increase in the prevalence of problematic behaviours during adolescence has broken the traditional view that academic success is the only standard in assessing good students. In the Nigerian settings, not only students' academic achievement, but also their behaviour has been given considerable public attention. For example, Masten, Rosiman, Long, Burt, Obrandovic and Riley (2005) proposed that for school-age children, high academic achievement and behavioural competence should be regarded as two important indicators for their success. It has been observed that narcissist behaviours are triggered by the size of the individual's social network, relations with peers, and efficiency in social skills. These could have social implications to determine individuals' narcissism which may relate negatively with self-worth and mental toughness in determining their academic achievement.

Suffice it to say that many studies have examined the associations between narcissism, mental toughness and academic achievement. For instance, Papageorgion *et al* (2018) revealed that mental toughness (MT) is positively associated with subclinical narcissism. Also, that MT predicted a small percentage of the variation in school achievement. Their study also reported that narcissism did not correlated significantly with school achievement. The study of Zainol (2020) reported a significant relationship between narcissism and academic performance. Also, that narcissism has higher predictive proportion toward academic performance. Then, the study of Garcia

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(2009) reported that external contingencies self-worth was positively correlated with adaptive narcissism, while internal contingencies self-worth was negatively correlated with maladaptive narcissism.The study of Anyanwu *et al* (2022) reported that power narcissism correlated positively with academic achievement, while exhibitionism narcissism correlated negatively with academic achievement but the two dimensions of narcissism were not significantly related with academic achievement. Since no known study has examined these variables as predictors of academic achievement among the students in the Nigerian academic contexts, this should be one of the gaps in knowledge the present study is sought to close. Similarly, the paucity of study that examined the predictive strength of these variables on academic achievement has created an avenue for the present study to emerge. Against this backdrop, the study examined mental toughness, narcissism and self-worth as predictors of academic achievement in mathematics in Anambra State.

Research Questions

1. To what extent are the assumptions of multiple regression equation for predicting students' academic achievement scores in mathematics using mental toughness, narcissism and self-worth scores met?
2. What is the nature of the regression equation for predicting students' academic achievement scores in mathematics using mental toughness, narcissism and self-worth scores?
3. What proportion of variance in academic achievement scores in mathematics is explained by variance in mental toughness, narcissism and self-worth scores?
4. Which of the independent variables that predict students' academic achievement scores in mathematics?

Hypotheses

1. The regression equation does not significantly predict students' academic achievement scores in mathematics using mental toughness, narcissism and self-worth scores.
2. The proportion of variance in academic achievement scores in mathematics explained by variance in mental toughness, narcissism and self-worth scores is not significant.
3. Mental toughness, narcissism and self-worth scores do not significantly predict students' academic achievement scores in mathematics.

Research Method

The researchers adopted a multiple regression predictive research design and used questionnaires to collect data for the study. The population of this study consisted of 21204 which represented all the senior secondary school students II in Anambra State. A sample of 630 SS2 students was drawn from the senior secondary schools in the six education zones in Anambra State. Multi-stage sampling procedure was used to

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select the respondents. The procedures for the selection were as follows: In stage one, three education zones were selected from the six education zones in the state by simple random sampling. Then in stage two, from each sampled education zone, one local government area (L.G.A) was selected through simple random sampling given a total of three (3) L.G.As. In stage three, from each sampled L.G.A, 10 schools were randomly selected giving a total of 30 schools. Then, from each of the schools, 21 SSII students were selected for the study using a table of simple random sampling. This gave a total number of 630 students used in the study.

The study adapted three standardized research questionnaires namely, Tabachnick and Fidell(2001) Mental Toughness Questionnaire, (MTQ), Raskin and Hall (1981) Narcissism Personality Inventory (NPI) and Crocker, Luhtanen, Cooper and Bouvrette (2003)Contingencies of Self-Worth Scale (CSWS). The students' achievement scores were obtained from that state wide Senior Secondary One (SS1) promotion examination from the schools before the administration of the instruments. The methods used for validating the instruments were face and construct validity by the three experts from the Faculty of Education, Nnamdi Azikiwe University Awka. Cronbach's alpha reliability method was used to determine the internal consistency of the sub-scales for the three instruments were such as; mental toughness, narcissism and self-worth were .68, .71, and .89 respectively. The overall scores of the coefficients is .76 which made the instruments fit for the study. The data were analyzed using standard multiple regression analyses. The t-test for r, F-test and test of significance for β, were used to test hypotheses at .05 level of significance.

Presentation of Results

The data were first screened for missing values, and 34 respondents had missing representing 5.4%. Hence likewise deletion approach was adopted. After deleting the 34 respondents, the sample size was reduced to 596. Thereafter, analysis of the study was carried out using standard multiple regression analysis with SPSS 26.

Research question 1: To what extent are the assumptions of the regression equation for predicting students' academic achievement scores in mathematics using mental toughness, narcissism and self-worth sores met?

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Table 1: Descriptive statistics of independent and dependent variables in the regression model for the study.

Variables	MT	NA	SW	AA	X	SD	VAR	SK	K	T	VIF	TF
MT	1	.185	.119	-.080	23.0688	3.26277	10.646	.030	-.918	1.044	.958	
NA	.185	1	.171	-.036	22.8305	3.28221	10.773	-.036	-.916	1.060	.943	
SW	.119	.171	1	-.010	23.1141	3.34168	11.167	.037	-.981	1.038	.963	
AA	-.080	-.036	-.010	157.8490	8.33807	69.523	.126	-.615	……..	…….		

Std. Residual Min = -3.010, Std. Residual Max = 2.581
Durbin Waston Statistics = 1.871, MT= Mental Toughness, NA = Narcissism, SW = Self-Worth, AA = Academic Achievement, X = Mean, SD = Standard Deviation, VAR= Variance, SK = Skewness, KT = Kurtosis, VIF = Variance Inflated Factor and TF = Tolerance Factor.

Table 1: Correlation and descriptive statistics of independent and dependent variables in the regression model for this study.

To answer research question 1, seven assumptions of multiple linear regression were tested in this study. First, the assumptions of normality of the data were tested using Skewness and Kurtosis. The assumptions were made since none of the Skewness and Kurtosis values of each of the variables do not exceed + 3 and – 3 as recommended. Second, the assumption of absence of multivariate outliers was checked using standardized residual statistics and Cook distance statistics (1977). Result of standardized residual values indicated that the (Std. Residual Min = -3.010, Std. Residual Max = 2.581). It lies between -3 to 3 as recommended by (Tabachnick and Fidell, 2018). While the result of the Cook distance shows a maximum value of .028 which is less than 1 as recommended by (Cook, 1977). Hence, the assumption of absence of multivariate outliers was not violated. Third, the assumptions of absence of multicollinearity among the predicting variables were checked using Variance Inflated Factor (VIF), and Tolerance Factor (TF). The Tolerance Factors and Variance Inflated Factors (Mental toughness, TF = .958, VIF = 1.044; Narcissism, TF = .943, VIF = 1.060; Self-worth, TF = .963, VIF = 1.038; of the independent variables show that the values were less than 10 for Variance Inflated Factor and greater than .20 for Tolerance Factor respectively as recommended by (Schumaker, 2015). Hence, this assumption of absence of multicollinearity was made. Forth, the assumption of independent of error was

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tested using Durbin Waston statistics. The result shown a Durbin Waston statistics of 1.871 which is less that 4 but greater than 0 as recommended by (Denis, 2020). Hence, the assumption of independent of error was not violated. Fifth, the assumptions of normality of error distribution were tested using normal P.P plot of standardized residual. Figure 2 shows that the normal P.P plot of standardized residual data points were normally distributed. Histogram of the standardized residual in figure 3 also testified to that. Sixth, the assumption of homogeneity of variance and linearity was tested using scatter plot of standardized predicted values. The result in figure 3 shows that the data met the assumption of homogeneity of variance and linearity as the predicted values were distributed above zero in both dimensions and do not show any pattern. Seventh, the assumptions of non-zero variance were tested using variance statistics and the data also met the assumptions of non-zero variances (Mental toughness, Variance = 10.646; Narcissism, Variance = 10.773; Self-worth, Variance = 11.167; Academic achievement, Variance = 69.523) as there is no zero variance for the variables in the study as shown in the table 1.

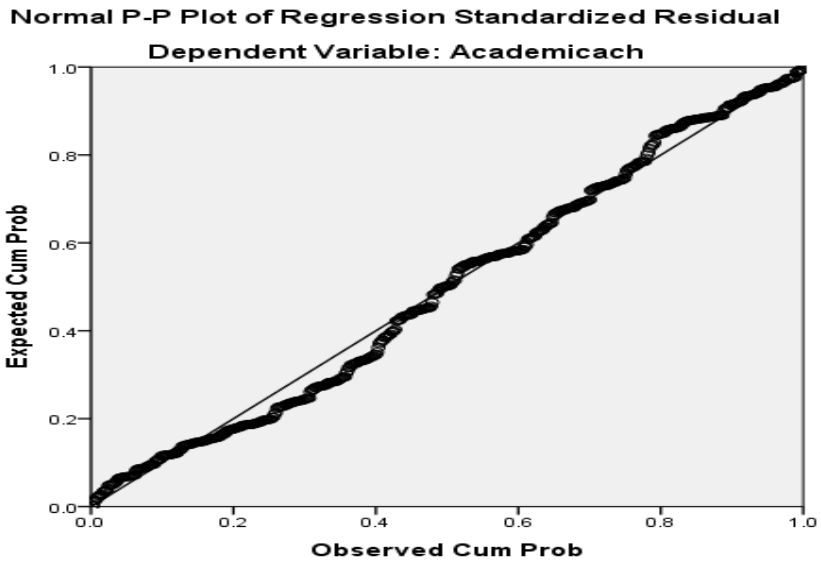


Fig 1 the normal P-P plot of standardized residuals data points of academic achievement.

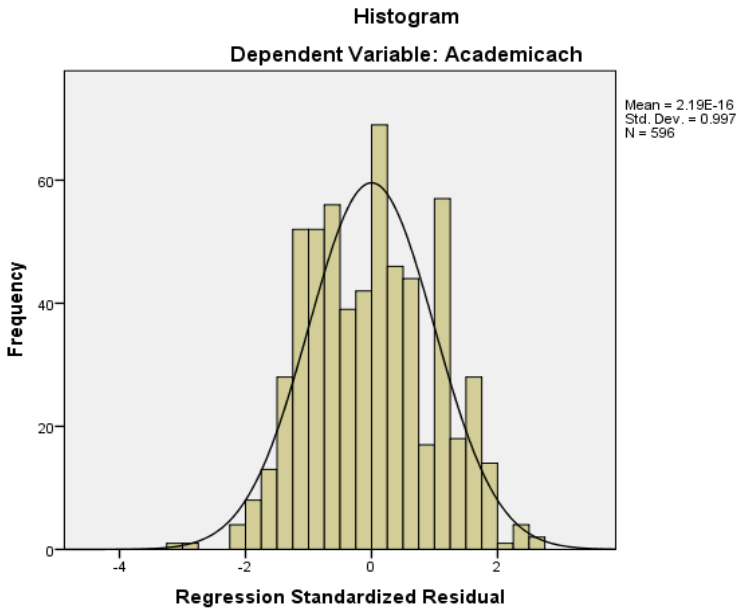
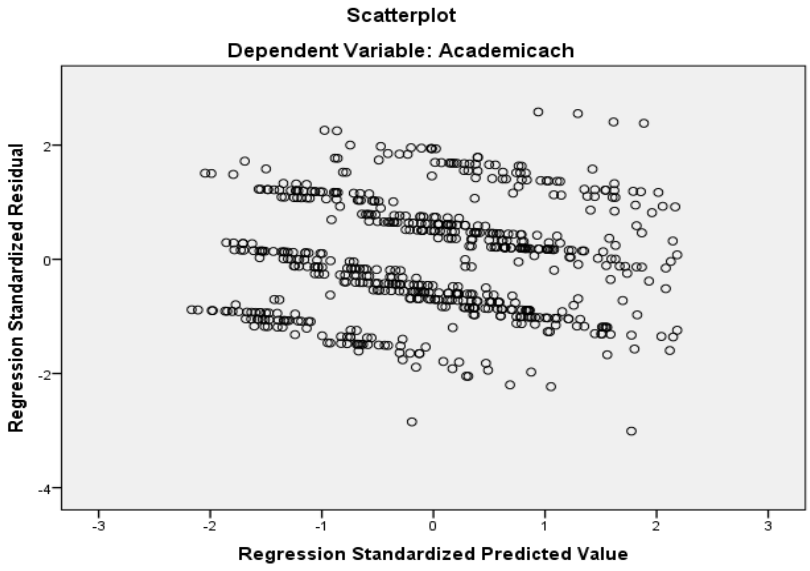


Fig 2 the normal distribution curve of the standardized residuals data points of academic achievement.



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Fig 3: scatter plot of standardized predicted values of academic achievement.

Research question 2: What is the nature of the regression equation for predicting students' academic achievement in Mathematics using mental toughness, narcissism, and self-worth scores?

Table 2: Regression coefficient for mental toughness, narcissism, and self-worth scores.

Model	Unstandardized Beta	Std. Error	Standardized Beta
Constant	63.497	3.617	
Mental toughness	-.194	.107	-.076
Narcissism	-.058	.107	-.023
Self-worth	.006	.104	-.002

Using the information in table 2, the nature of the regression equation for predicting students' academic achievement in mathematics using mental toughness, narcissism and self-worth scores follows:

Y = b0 + b1x1 + b2 x 2 + b3 x3

Y = 63.497 + -.194x1 + .058x 2 + .006 x3

Ach = 63.497– 0.194 - 0.116 + 0.0189

Achievement = 63.497 – 0.194MT - 0.116 NA + 0.0189 SW

MT = Mental Toughness, NA= Narcissism, SW= Self-Worth.

The equation shows that for every unit decrease in mental toughness, achievement decreased by -0.194. For every unit decrease in narcissism, achievement decreased by 0.116. For every unit increase in self-worth, achievement increased by 0.0189.

Research Question 3: What is the proportion of variance in academic achievement scores in mathematics that is explained by variance in social goal orientation, academic engagement and creativity scores?

Table 3: Regression model summary of mental toughness, narcissism and self-worth scores on students' academic achievement scores in mathematics.

Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate
	.083[a]	.007	.002	8.33051

To answer this research question the adjusted multiple regressions R square in 3 was used. The result of study shows that using mental toughness, narcissism and self-worth scores yielded an adjusted R squared of .002. This implies that predictors accounted for about 0.2% of the variance scores in mathematics academic achievement.

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Research Question 4: Which of the independent variables best predict Students' academic Achievement scores in Mathematics?

Table 4: Regression coefficient for students' academic achievement scores in mathematics using mental toughness, narcissism and self-worth scores.

Model	Unstandardized Beta	Std. Error	Standardized Beta
Constant	63.497	3.617	
Mental toughness	-.194	.107	-.076
Narcissism	-.058	.107	-.023
Self-worth	.006	.104	-.002

To answer this research question 4 the standardized regression coefficient (B) in table 4 was used for comparison. The regression coefficients presented in table 4 shows unstandardized (B) and standardized regression coefficient (B) mental toughness scores are -.194 and -.076. For narcissism scores are -.058 and -.023. For self-worth scores are .006 and -.002 respectively. Using the standardized beta for comparison, mental toughness is mostly predicted students' academic achievement in mathematics as shown by the B of -.076. Narcissism is the second most predicted students' academic achievement in mathematics as shown by the B of -.023. While self-worth is the third most predicted students' academic achievement in mathematics as shown by the B of -.002.

Hypothesis 1: The regression model does not significantly predict academic achievement scores in mathematics.

Table 5: F- test for regression model of mental toughness, narcissism and self-worth scores on students' academic achievement in mathematics scores.

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	283.108	3	94.369	1.360	.254[b]
Residual	41083.301	592	69.397		
Total	41366.409	595			

The analysis of variance in the table shows that the regression equation was significant (3, 592) = 1.360, p < .05. This implies that at least one of the independent variables significantly predicted the academic achievement in mathematics.

Hypothesis 2: The proportion of variance in academic achievement scores in mathematics explained by mental toughness, narcissism and self-worth scores is not statistically significant.

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Table 6: t-test of adjusted R square of the regression model for this study.

Model	R	R- Square	Adjusted R- Square	Std. Error Estimate	t – cal for adj. R^2	DF	t- crt.	Remark
	.083[a]	.007	.002	8.33051	20.300	5941.960	S	

To test hypothesis 2, t-test for adjustment R square was conducted. Results of the study shown in table 6 indicate that t-critical for adjusted R square is 1.960 while that of the calculated is 20.300. Since the t-calculated for adjusted R square 20.300 is greater than t-critical 1.960, the null hypothesis which states that the proportion of variance academic achievement scores in mathematics explained by mental toughness, narcissism and self-worth scores is statistically significant is rejected and the alternative hypothesis is accepted. In other words, the proportion of variance academic achievement scores in mathematics explained by mental toughness, narcissism and self-worth scores is statistically significant. Effect sizes were also evaluated using adjusted R^2comparing it with Cohen's *d* statistics guideline, where d < 0.20 indicates a minimal effects size, 0.20 < d < 0.50 indicates a small effect size, 0.50 < d < 0.80 indicates a moderate effect size, and d > 0.80 indicates a large effect size. The value of R adjusted square .002 indicates a minimal effect.

Hypothesis 3: Mental toughness, narcissism and self-worth scores do not significantly predict students' academic achievement in mathematics.

Table 7: t-test of regression coefficient of students' academic achievement scores in mathematics using mental toughness, narcissism and self-worth scores.

Model	Unstandardized Beta	Std. Error	Standardized B	T	p-value	remark
Constant	63.497	3.617		17.557	.000	S
Mental toughness	-.194	.107	-.076	-1.810	.071	S
Narcissism	-.058	.107	-.023	-.543	.588	NS
Self-worth	.006	.104	.002	.060	.952	NS

Table 7 shows that mental toughness; narcissism and self-worth scores do not significantly predict students' academic achievement scores in mathematics since the p-values are greater than .05.

Discussion of findings

The findings from the study indicated that the seven assumptions that were tested did not violate rules that guide each as stipulated by the statistical guides being consulted in process of checking the

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assumptions. The researchers found that the proportion of variance in academic achievement scores in mathematics explained by mental toughness, narcissism and self-worth scores is significant. This implies that predictors accounted for about 0.2% of the variance scores in mathematics academic achievement. This supported the study of Papageorgion *et al* (2018) which revealed that mental toughness (MT) predicted a small percentage of the variation in school achievement. Though the study of Papageorgion *et al* centered on relationship that examined mental toughness, narcissism and academic achievement before predicting them with academic achievement. Their study did not involve self-worth in predicting academic achievement as the present study has sought to use mental toughness, narcissism and self-worth in predicting academic achievement scores. This present finding supported the study of Zainol (2020) which that narcissism has higher predictive proportion toward academic performance. The study of Zainol basically centered on relationship between narcissism and academic performance before using multiple regression to examine the predictive strength of narcissism on academic performance. Then Zainol's study did not involve mental toughness and self-worth and this is the gap the present study had sought to close using a multiple regression predictive research design.

Recommendations

Based on the findings, the following recommendations were made:

1. The outcomes of the study are indications that mental toughness, narcissism and self-worth played an impact in predicting academic achievement. With these findings, teachers should know that students with high proportion of mental toughness, narcissism and self-worth may perform excellently if their personality constructs are well manipulated and utilized in the process of learning.
2. Students should also know that when there is high proportion of narcissist trait, mental toughness, and self-worth, the chances of overcoming danger of academic failure, especially in prestigious higher institutions is assured. For this reason, students should see the need to develop these exogenous factor to enable them become useful individuals that will achieve their future sets goals in the society. Therefore, they should ignore negative feedback to avoid destroying their positive views of themselves.
3. Parents should have constant communication with the teachers in monitoring the behaviour of the students by nurturing their mental toughness, narcissistic behaviour and self-worth development. This is because students that have positive views of these constructs are likely to base their achievement on positive core values and virtue.
4. Teachers and other educators should device more strategies that will help

them to advise the students to consider their mental toughness, narcissistic trait and self-worth as adaptive behaviours that will positively influence their life achievement contexts as well as contributing indirectly to their future lifelong learning.

Authors contributions:
The authors in the present study tested seven assumptions which other studies that were consulted did not examine and all the assumptions were met. The multiple regression model for the study was developed to indicate how the academic achievement increased or decreased in connection with each of the variable in the study. The regression model summary of the study using mental toughness, narcissism and self-worth was tested which shows that the variables jointly predicted students' academic achievement scores in mathematics. In an attempt to find out the independent variable that mostly predicted students' academic achievement scores indicated that self-worth scores are predicted academic achievement when compared with other variable. Also, the effect sizes were also evaluated using adjusted R^2comparing it with Cohen's *d* statistics guideline, where d < 0.20 indicates a minimal effects size, 0.20 < d < 0.50 indicates a small effect size, 0.50 < d < 0.80 indicates a moderate effect size, and d > 0.80 indicates a large effect size. The value of R adjusted square .002 indicates a minimal effect. This is to show the level of proportion of variance in academic achievement scores in mathematics explained by mental toughness, narcissism and self-worth. These are the gaps which previous studies that were cited in the present study have failed to close.

Conflict of Interest:
The authors declared that they do not have any interest that will constitute a real, potential and apparent conflict of interest with respect to their environment in publication. The authors also declare that they do not have financial or other relation with companies, trade associations or group that may gain or lose financially from the result or conclusion in the study.

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