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Modelling of Students' Personality and Self-concept on their Test-Anxiety towards Measurement and Evaluation course

By

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Abstract

This study established the most meaningful causal model for explaining the influence of undergraduate students' personality and self-concept on their test-anxiety towards measurement and evaluation course. We adopted correlation research design in conducting the study. The participants consist of 150 final year undergraduate students in the Faculty of Education drawn using multistage sampling procedure. The instruments titled: Students' Personality Trait Questionnaire (SPTQ); Students' Self-Concept Questionnaire (SCQ), and Students Test-Anxiety Questionnaire (STAQ) were used for data collection. Data were analyzed using SEM-PLS applying the WarpPls software. Results generated a meaningful causal model for explaining the influence of undergraduate students' personality and self-concept on their test anxiety towards measurement and evaluation course. The measurement model showed a high level of validity and reliability. Results further showed that 12 paths had a significant direct influence on the endogenous variables in the model. Most indirect paths showed no significant influence on the endogenous variables. It was recommended that university students form positive personality traits and self-concept to reduce their test-anxiety level.

Keywords: Measurement and evaluation**,** self-concept, structural equation modelling, students' personality, test-anxiety, undergraduate.

Introduction

The need for positive learning outcomes have continued to drive interests in school improvement research and practice. Teachers play an important role in any school and their teaching effectiveness determines school improvement. The teacher needs the basic rudiments in measurement and evaluation to assess students' performance and acquire test construction, usage, and interpretation. They also need to acquire skills to assess psychomotor and affective aspects of students' learning outcomes and evaluate the effectiveness of instructional materials, content and intervention strategies as well as effective in diagnosing learning deficiencies and plan for remedial work, make use of standardized tests among others (Chikwe, 2021). All these are core drivers that could be used to enhance students learning outcomes and enhance the general improvement in teaching and learning. Hence, measurement and evaluation are important course and tools to enhance teachers' effectiveness. Owing to this, the course must be taken by all students undertaking their first degree in faculty of education so as to prepare them sufficiently for effective teaching and learning.

However, it is noted that teachers lack sufficient knowledge and skills about measurement and evaluation because the courses and practices in undergraduate study at university level were not adequate in teaching core knowledge and skills in relation to measurement and evaluation (Karakuş & Türkkan, 2017). This could be due to their inability to apply basic principles of measurement and evaluation and also because the course content contains some basic calculations that some undergraduate students are not often comfortable with and will be tested on before graduation. Which could make them have some level of fear, apprehension and tension towards the course in the form of test-anxiety among the students.

Test-anxiety has become a topical issue in recent research. Specifically, the construct has been investigated to determine whether it relates with other constructs like personality and self-concept. Test-anxiety is a performance-based anxiety, a feeling individual have when their performance is considered or under pressure to achieve success (Ojediran & Oludipe, 2016) which is characterized by unusual body movements, and difficulty in concentration, insomnia, fatigue, muscles contraction, abdominal pain and tremor (Porto, 2013). The construct consists of two basic components; worry and emotional component. The worry is the cognitive factors which might be due to lack of confidence or a response to perceived inability to handle a given task properly while the emotional component involves the physical reactions of the students to a test situation (Van de Velde, 2015).

Test-anxiety symptoms impede students' test performance by changing cognitive, affective, and conative processes related to testing situations (Kaur & Kumaran, 2016). Also, test-anxiety is an important construct that affects many students' success in the examinations, especially undergraduate universities students who do not perform well due to extreme test-anxiety despite their adequate knowledge (Asmalı, 2017). Accordingly, Macher, et al. (2013) explained that anxiety resulting from examinations is a severe problem for many students which may have long-lasting effects beyond a single testing situation.

The prevalence of test-anxiety among students is high. According to Whitaker, et al. (2007), many researchers believe that 10% to 41% of students suffer from the effects of test-anxiety. Moreover, Sealand (2011) explained that test-anxiety is a problem in education which is very important because it affects the learning of many students. This implies that

many students regularly experience test anxiety which can have effect on their academics and as well as their future endeavours. This concerns calls for investigate to possible factors that can predict students test-anxiety.

Personality is a construct noted in research to impacts all aspects of human behaviour, meaning that personality could have an impact on anxiety. Personality is defined as a group of aptitudes, acquired interests from experience, and inherited biological motives (Al Qaisyahmad & Thawabieh, 2017). Hence, the interaction between one's hereditary traits and environmental factors combined with the individuals' interest, thought process and growth could help form the individuals' personality. This therefore makes personality very dynamic and different across individuals, with varied personality traits (Rosellini & Brown, 2011). Mustafa (2011) defined traits as physiological, behavioral, and mental abilities which are quite constant and different from one person to another. Accordingly, different dimensions of personality exist which are referred to as big five personality trait and includes: extraversion, neuroticism, agreeableness, openness and conscientiousness. Previous results according to Asmalı (2017) indicates that test-anxiety is positively correlated with neuroticism and negatively correlated with openness, agreeableness and conscientiousness. Also, Asmali states that structural equation modeling results indicated a strong direct path from 'neuroticism' to test-anxiety; and a modest direct effect of extraversion on test-anxiety. This implies that different traits of personality may have a different influence on students' test-anxiety.

Another construct that may influence students' test-anxiety is self-concept. Ajayi, et al., (2011) defined self-concept as a way of thinking, feeling and behaving about oneself which may embrace attitudes, individuals' area of interest or opinions that affect the way such individuals deal with different situations. Ghazvini (2011) defined self-concept as the set of perceptions or reference points that the individuals have about himself; their characteristics, attributes, qualities and deficiencies, capacities and limits, values and relationships used to describe themselves. Accordingly, self-concept comprise various dimensions related to certain personality aspects like physical, social and emotional. In academics, self-concept could be related to how students perceive their ability to execute a task successfully. Hence, Kvedere (2012) defined academic self-concept as a self-perceived belief about individuals' traits and attributes, feelings about themselves, their confidence levels in a particular subject area. Also, Rosen, et al. (2010) defined academic self-concept as domain specific self-concept which explains about the way the students perceived and conceptualized about their ability in academic settings. Therefore, academic self-concept is limited to an academic setting rather than self-concept spread across domains. This could have an influence on their feelings and capability towards a test or examination because scores obtained from such exercises will be used to judge, place and grade them. Hence, there is a possibility that it could influence individuals' level of test-anxiety because test-anxiety itself is a feeling an individual has about their abilities to succeed in a test. More precisely, Xu, et al. (2005) explained that increase in self-concept reduces test-anxiety among students.

Literature Review

Previous literature on test-anxiety has focused on its effect on students' learning and performance in school. Extant literature on the predictors of test-anxiety among undergraduate

students in Nigerian universities is scares. This sections e-ray some extant literature on the prediction on test-anxiety by students' personality traits and self-concept. Zhi (2006) reported that test-anxiety score was significantly negatively correlated with self-esteem scores while Kaur and Kumaran (2016) indicate that significant inverse correlation exist between test anxiety and academic self-concept. Thomson and de Bruin (2007) conducted a study on personality as predictor of life balance in South African corporate employees and found a statistically significant predictive relationship between traits and life balance and that personality traits accounted for approximately 15% of the variance in life balance experience. James, et al. (2021) investigated the correlation between South African grade 12 students' mathematics self-concept and their academic achievement and found that mathematics self-concept positively and significantly predicted academic achievement.

Also, the relationship between personality and test anxiety and self-concept and test anxiety might be mediated by one of the variables. For instance, Su, et al. (2017) explained that self-concept is important in the formation of personality and marks the level of personality development, and both personality and self-concept may affect each other. Accordingly, Eswari, et al. (2019) reported that a significant positive correlation exists between self-esteem and personality. The authors reported further that extraversion, agreeableness, conscientiousness and openness were significant positive predictor of personality and neuroticism while emotion stability was significant negative predictor of the self-esteem. It therefore means that one's personality could be a determining factor in self-concept formation which could also influence the person's test-anxiety level. A study by Ngoka (2015) revealed that there was no significant association between male nursing students' personality types and examination anxiety. Furthermore, there is no link between female nursing students' test-anxiety and their personality traits of Openness, Extraversion, and Agreeableness. Female nursing students, on the other hand, had a substantial negative association between conscientiousness and test anxiety. In addition, neuroticism and test anxiety in female nursing students had a significant positive association. Also, Maralani, et al. (2016) conducted a Structural Modeling on the Relationship between Basic Psychological Needs, Academic Engagement, and Test-Anxiety and findings revealed that exogenous variable of basic psychological needs effects directly negative and meaningfully on test-anxiety. However, the indirect effect on test-anxiety because of academic engagement is not significant.

One of the key determinants of students' success in school is their test-anxiety level. This is because test anxiety could determine students' preparedness and subsequent performance in school. Finding factors that could influence students' test-anxiety is necessary so as to inform policies and programmes that could be used to reduce the level of student's test-anxiety and consequently improve their learning outcome. However, research in Nigeria have focused mostly on how variables influence students' achievement leaving out the influence of such variables on students' test-anxiety. This created a gap in literature that the present study intends to fill. Hence, it was imperative for the present study to conduct research on structural equation modelling of undergraduate students' personality and self-concept on their test-anxiety towards measurement and evaluation course. The following questions were addressed;

1. What is the most meaningful causal model for providing an explanation of the influence of undergraduate students' personality and self-concept on their test-anxiety towards measurement and evaluation course
2. What is the proximity (direct or indirect) of the causal effects of the variables in the model?
3. What are the estimates of the strengths of causation of the variables in the model?

Methodology

The researchers adopted correlation research design in conducting the study. Correlational research design determines whether or not two or more variables change together as well as the degree of relationship that exists between the variables. This research design suits this study because it established the relationship that exists among students' personality and self-concept on their test-anxiety towards measurement and evaluation course. The study was conducted using structural equation modelling to explore the influence of undergraduate students' personality and self-concept on their test-anxiety towards measurement and evaluation course. Structural equation modelling is a correlational research method (Schumacker & Lomax, 2010, p. 29). The participants for the study were 150 final year undergraduate students in Faculty of Education University of Nigeria, Nsukka. The participants were drawn for the study using multi-stage sampling procedure.

Three instruments were constructed by the researchers and used for data collection. The instruments were titled: Students' Personality Trait Questionnaire (SPTQ); Students' Self-Concept Questionnaire (SCQ) and Students Test-Anxiety Questionnaire (STAQ). The SPTQ was a 20-item instrument divided into five clusters with four items in each cluster. Each cluster elicits information on the various dimensions of personality trait: extraversion, neuroticism, openness, agreeableness and conscientiousness. The SCQ was a 10-item instrument that elicits information on students' self-concept. The STAQ was a 10-item instrument that elicits information on student's test anxiety. All the instruments were rated on a four-point likert style scale with response options of Strongly Agree (4), Agree (3), Disagree (2) and Strongly Disagree (1).

The researchers used partial least square (PLS) method to analyze the results and applied the Warppls software. The study followed the two-stage approach suggested by Chin (1998). In this approach, the measurement model is evaluated first before the evaluation of the structural model. Evaluating the measurement model involves confirmatory factor analysis and also confirm the reliability and validity of the instruments. If the measurement model evaluation provides satisfactory results, the researcher moves on to Stage 2, which involves evaluating the structural model (Hair, et al., 2010). In the second stage, the structural model is accessed in order to determine whether the structural relationships are significant and meaningful, and testing hypotheses.

The ethics committee at the university where the research was conducted granted ethical approval. Before the commencement of the study, the respondents were presented with informed consent forms to fill and sign. The informed consent forms were properly filled and signed. Also, the authors adhered to the ethical standard specification of the American Psychological Association (APA, 2017).

Results

Measurement Model

To evaluate the measurement model, the researchers examine the indicator loadings. Loadings above 0.70 also 0.50 is accepted by (Hair et al. 2010), this indicate that the construct explained over 50% of the indicator's variance. The next step involves the assessment of the constructs' internal consistency reliability. The internal consistency reliability in PLS-SEM is the composite reliability. In assessing reliability, higher values indicate higher levels of reliability. According to Hair et al. (2010), values between 0.60 and 0.70 are considered acceptable in exploratory research, whereas values between 0.70 and 0.95 are considered satisfactory to good. The first step was to check the Composite Reliability. It can be seen from Table 1 that all the reliability values are greater than 0.6. This means that a high level of internal consistency reliability has been established among the latent variables. To check convergent validity, each latent variable Average Variance Extracted (AVE) is evaluated. Results showed that all the AVEs are greater than the threshold value of 0.5. This means that convergent validity is confirmed.

Table 1. Summary of Reflective Measurement Model

Latent Variable	Indicators	Loadings	Composite Reliability	AVE
Extraversion	Ext1	0.544	0.680	0.623
	Ext2	0.844		
	Ext4	0.616		
Neuroticism	Neu1	0.815	0.719	0.561
	Neu4	0.683		
Agreeableness	Agr1	0.834	0.747	0.596
	Agr2	0.709		
Openness	Ope1	0.777	0.845	0.646
	Ope2	0.886		
	Ope3	0.747		
Conscientiousness	Con1	0.746	0.783	0.675
	Con2	0.748		
	Con3	0.613		
	Con4	0.643		
Self-Concept	Self1	0.512	0.852	0.670
	Self2	0.597		
	Self3	0.752		
	Sekf4	0.688		
	Self5	0.609		
	Sekf6	0.687		
	Self7	0.727		
	Self8	0.696		
	Self9	0.506		
	Self10	0.827		

Test Anxiety	Test2	0.543	0.718	0.528
	Test3	0.712		
	Test4	0.554		
	Test5	0.632		
	Test7	0.530		
	Test8	0.594		
	Test9	0.508		
	Test10	0.550		

To confirm the discriminant validity, the researchers followed the Fornell and Laker (1981) method. According to Fornell and Larker (1981), the square root of the AVE in each latent variable can be used to establish the discriminant validity if this value is larger than other correlations between the latent variables. Table 2 showed that all the AVEs are consistently highest on the construct associated with; hence, the constructs exhibit discriminant validity.

Table 2. Discriminant Validity Results

	Extrav.	Neuro.	Agree.	Openness	Consc.	Self-c.	Testan.
Extrav	**0.651***						
Neuro	0.228	**0.749***					
Agree	0.233	0.076	**0.772***				
openness	0.229	0.230	0.308	**0.804***			
Consc.	0.209	0.199	0.166	0.522	**0.690***		
Self-c.	0.359	0.292	0.309	0.548	0.512	**0.608***	
Testan.	0.366	0.122	0.149	0.335	0.388	0.442	**0.508***

Keys: extrav (extraversion), Neuro (neuroticism), agree (agreeableness), open (openness), conc (conscientiousness), self (self-concept), test (test anxiety), bold items = AVEs

Structural Model Assessment

After confirming the construct measures as reliable and valid, the next step is to assess the structural model results. The structural model was evaluated by assessing the initial hypothesized model (Fig 1). Modification search was conducted, insignificant paths were deleted and items with high collinearity were deleted. After modification search, some paths were deleted and other paths were added and the model rerun to generate a better model. Hence, to assess the structural model, the path coefficients obtained were assessed and presented in table 3.

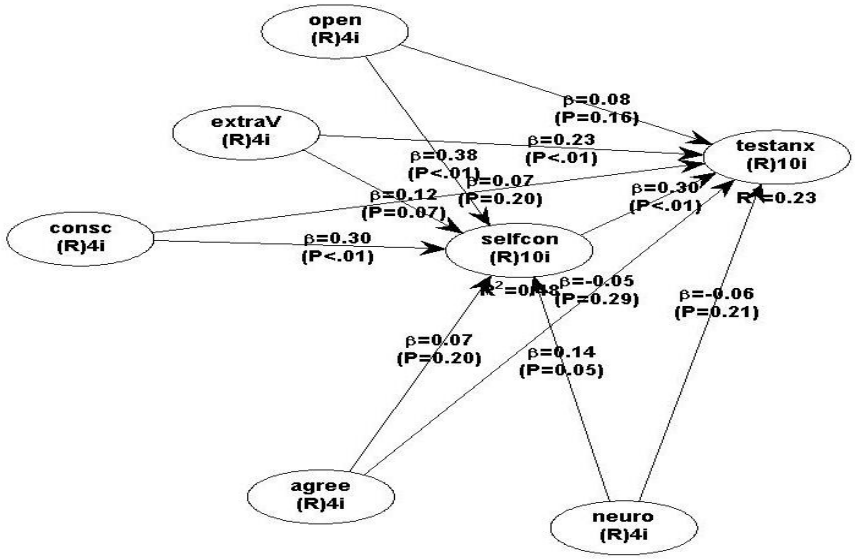

Figure 1: Hypothesized Model

Results from Table 3 showed that all the paths were significant at a 0.05 level of significant. Hence all the twelve paths in the model were retained, thereby yielding the most meaningful causal model for providing an explanation of the influence of undergraduate students' personality and self-concept on their test anxiety towards measurement and evaluation course (Fig 2).

Table 3. *Significance of the Hypothesized Paths in the Model*

S/N	Paths	Path Coefficient	Standard Error	Effect Size (f^2)	t-value	p-value	Decision	Remarks
1	neuro > Ext	0.262	0.077	0.081	3.396	0.001	S	Retain
2	open > Extra	0.157	0.079	0.037	1.984	0.025	S	Retain
3	neuro > Agre	0.277	0.077	0.093	3.359	0.001	S	Retain
4	open > Agre	0.260	0.077	0.084	4.485	0.001	S	Retain
5	agree > Conc	0.170	0.079	0.029	3.221	0.015	S	Retain
6	extra > Self	0.188	0.079	0.070	2.403	0.009	S	Retain
7	neuro > Self	0.148	0.079	0.053	1.865	0.032	S	Retain
8	open > Self	0.307	0.077	0.169	4.009	0.001	S	Retain
9	conc > Self	0.248	0.077	0.148	3.689	0.001	S	Retain
10	Extra > test	0.218	0.078	0.083	3.177	0.003	S	Retain
11	Conc > test	0.152	0.079	0.062	1.961	0.028	S	Retain
12	Self > test	0.407	0.075	0.228	5.270	0.001	S	Retain

S = Significant

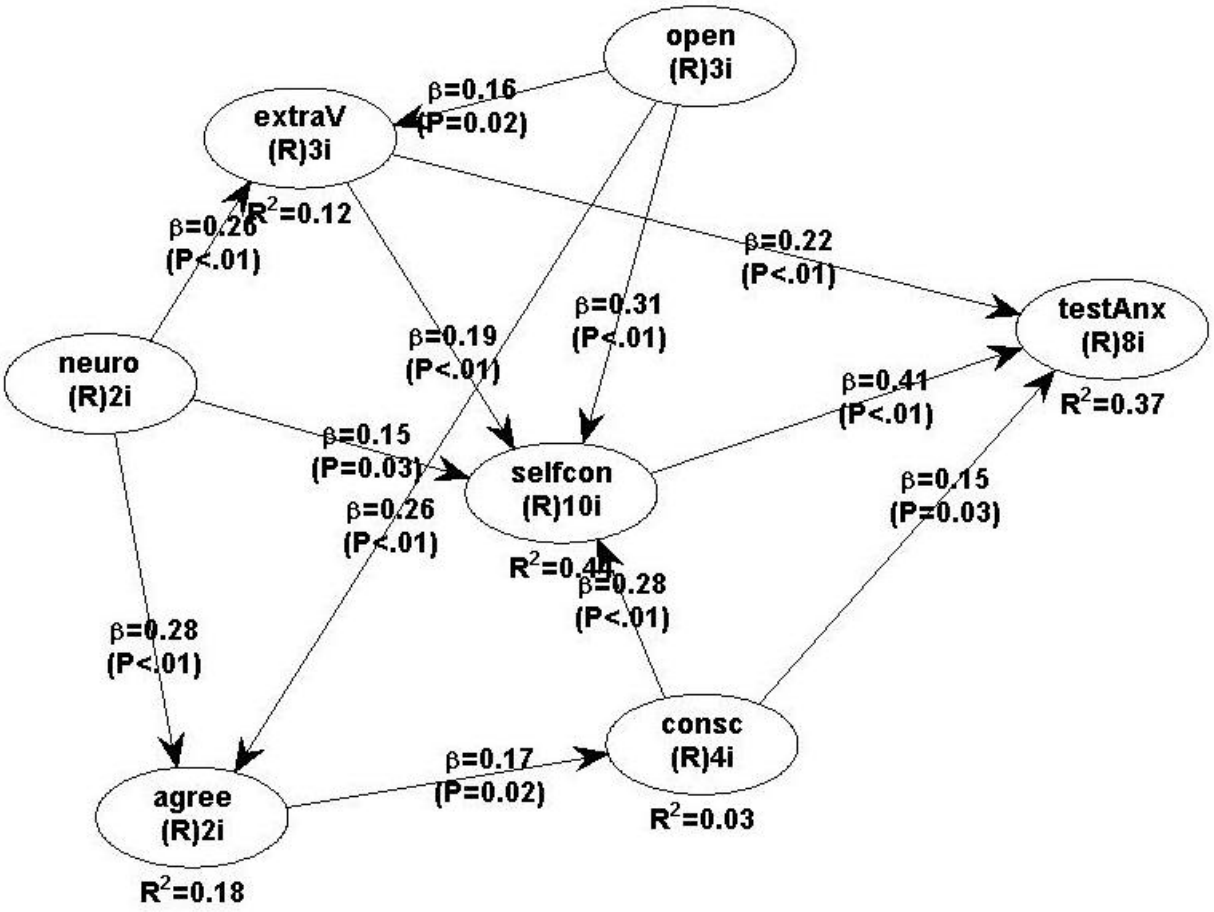

Figure 2: Most Meaning Causal Model

The result in Table 4 showed that all the direct paths in the model significantly influence the endogenous variables. The variables also had small to medium size effects on the endogenous variables. However, most of the paths with indirect influence had no significant influence on the endogenous variables. Their variables also had small effect sizes on the endogenous variables in the model.

Table 4. Direct and Indirect Effect and Strength of Causation of the Variables in the Model

S/N	Paths	Path Coefficient	Standard Error	Effect Size (f^2)	Direct of Path	Strength of effect	p-value	Decision
1	neuro > Ext	0.262	0.077	0.081	Direct	Small	0.001	S
2	open > Extra	0.157	0.079	0.037	Direct	Small	0.025	S
3	neuro > Agre	0.277	0.077	0.093	Direct	Small	0.001	S
4	open > Agre	0.260	0.077	0.084	Direct	Small	0.001	S
5	agree > Conc	0.170	0.079	0.029	Direct	Small	0.015	S
6	extra > Self	0.188	0.079	0.070	Direct	Small	0.009	S
7	neuro > Self	0.148	0.079	0.053	Direct	Small	0.032	S
8	open > Self	0.307	0.077	0.169	Direct	Medium	0.001	S
9	conc > Self	0.248	0.077	0.148	Direct	Small	0.001	S

10	Extra > test	0.218	0.078	0.083	Direct	Small	0.003	S
11	Conc > test	0.152	0.079	0.062	Direct	Small	0.028	S
12	Self > test	0.407	0.075	0.228	Direct	Medium	0.001	S
13	Extr > self > test	0.077	0.057	0.029	Indirect	Small	0.090	NS
14	Neuro > agree > conc	0.047	0.057	0.009	Indirect	Small	0.206	NS
15	Neuro > extra > self	0.049	0.057	0.018	Indirect	Small	0.195	NS
16	Neuro > self > test	0.117	0.080	0.014	Indirect	Small	0.072	NS
17	Agree > conc > self	0.048	0.057	0.015	Indirect	Small	0.201	NS
18	Agree > conc > test	0.026	0.058	0.004	Indirect	Small	0.327	NS
19	Open > agree > conc	0.044	0.057	0.023	Indirect	Small	0.221	NS
20	Open > extra > self	0.030	0.058	0.016	Indirect	Small	0.304	NS
21	Open > self > test	0.159	0.079	0.053	Indirect	Small	0.023	S
22	Conc > self > test	0.116	0.056	0.047	Indirect	Small	0.021	S
23	Neuro > agree > conc > self	0.013	0.047	0.005	Indirect	Small	0.388	NS
24	Neuro > agree > conc > test	0.027	0.066	0.003	Indirect	Small	0.341	NS
25	Agree > conc > self > test	0.020	0.047	0.003	Indirect	Small	0.339	NS
26	Open > agree > conc > self	0.013	0.047	0.007	Indirect	Small	0.395	NS
27	Open > agree > conc > test	0.019	0.067	0.006	Indirect	Small	0.389	NS

S = Significant; NS – Not Significant

Discussion

Our study shows that the model is valid and reliable for linking undergraduate students' personality and self-concept on their test-anxiety. The composite reliabilities were greater than 0.60, the factor loading was greater than 0.05, and the average variance extracted were highest in the respective factors. This result is in line with the recommendations of Hair et al. (2010) who recommended that factor loadings of 0.50 is accepted because it indicates that the construct explains over 50% of the indicator's variance. The findings are also in line with the suggestions of Hair, et al. (2010) who suggested that composite reliability values between 0.60 and 0.70 are considered acceptable in exploratory research. The results of average variance extracted is also in line with Fornell and Larker (1981) recommendations that the square root of the AVE in each latent variable can be used to establish the discriminant validity if this value is larger than other correlations between the latent variables. Specifically, the results revealed that personality traits and self-concept significantly influence students' test-anxiety in measurement and evaluation course.

Based on the results personality traits influence students' self-concepts. The findings showed that extraversion, conscientiousness and self-concept had significant direct influence on text-anxiety. These findings are in line with previous findings from Asmali (2017) who reported that structural equation modeling results indicated a strong direct path from

'neuroticism' to test-anxiety; and a modest direct effect of 'extraversion' on test-anxiety. Results further showed that openness and conscientiousness had indirect but significant influence on text-anxiety. The findings also support previous findings by Ngoka (2015) who revealed that there is no link between female nursing students' test-anxiety and their personality traits of openness and agreeableness.

The study further revealed that extraversion, neuroticism, openness and conscientiousness directly influence self-concept while agreeableness did not. This collaborate previous findings from Eswari et al. (2019) who reported that extraversion, agreeableness, conscientiousness and openness were significant positive predictor personality and neuroticism while emotion stability was significant negative predictor of the self-esteem. Also, self-concept significantly influenced test-anxiety. The findings support the findings from Zhi (2006) who reported that test-anxiety score was negatively correlated with self-esteem scores. This could be true because personality and self-concept helps individuals to judge their capabilities which could influence their test-anxiety. These findings could be true because personality affect all aspects of life and expectedly, it should influence students' self-concept.

The study also revealed that most of the paths with indirect effect on the endogenous variables were not significant. This is in agreement with similar findings from Maralani, et al. (2016) who reported that the indirect effect of endogenous variables on test anxiety because of academic engagement is not significant. However, the effect size of the variables on test-anxiety were small to medium. This could be so because other variables within the model have cushioned their influence on test-anxiety, thereby reducing test-anxiety.

Conclusion

The study developed a meaningful causal model to explain the influence of undergraduate students' personality and self-concept on their test-anxiety towards measurement and evaluation courses. It was concluded that the causal model developed was meaningful for explaining the influence of undergraduate students' personality and self-concept on their test-anxiety towards measurement and evaluation course. The findings also concluded that personality traits and self-concept significantly influence undergraduate students' test-anxiety towards measurement and evaluation course. The above findings imply that students' personalities and self-concept influence students' text-anxiety. As such, a positive outlook and personality may determine the test-anxiety level of the students. Hence, students need to form the required personality and self-concept to handle their test-anxiety comfortably. Based on the findings of the study, it was recommended that university students should form positive personality traits and self-concept so as to reduce their test-anxiety level. Further research could be carried out on this study by increasing the population size and using more than one university.

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