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The Correlates of Statistics Anxiety (0185)

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Introduction

All courses accredited by the British Psychological Society require Psychology students to undertake a course on research methods and statistics at some point during their course. However anxiety surrounding statistics seems to be prevalent among college students with approximately 80% of graduate students experiencing uncomfortable levels of statistics anxiety (Onwuegbuzie & Wilson, 2003). Statistics anxiety is defined as "The feelings of anxiety encountered when taking a statistics course or doing statistics analyses; that is, gathering, processing, and interpreting" (Cruise, Cash, & Bolton, 1985, p.92). The negative impacts of statistics anxiety have been considered and reported upon since the 1970's with authors noting a link between statistics anxiety and academic achievement (Fitzgerald, 1997; Webb, 1971). Statistics anxiety can be considered to be multidimensional with six components identified by Cruise et al (1985): worth of statistics, interpretation, test and class anxiety, fear of asking for help, fear of statistics teachers and lack of computational self concept. There are several potential correlates of statistics anxiety (Guo, Si, & Webb, 2009; Ornwuegbuzie & Wilson, 2003) but these are often looked at in isolation. The current study aimed to assess the potential correlates of statistics anxiety and their links to academic achievement.

Method

This was a cross sectional questionnaire design involving 122 first and second year psychology students. Potential correlates were identified from a review of the literature. Variables of interest in this study were: General Anxiety, General Stress, Statistics Self-Efficacy, Curiosity, Need for Cognition, Fear of Failure, Motivation, and Academic Buoyancy. All variables were measured using reliable and valid scales that have been widely adopted within the literature. Statistics anxiety was assessed using the Statistics Anxiety Rating Scale (Cruise & Wilkins, 1980) a 51 item instrument that assesses the six factors of statistics anxiety. The scale has been shown to be highly reliable and a high score on each of the subscales indicates a high level of anxiety (Cruise & Wilkins, 1980). Achievement was assessed using students overall grades within their statistics course. Students were approached during

statistics classes near the end of the second semester. Data was analysed using correlations and meditational regression analysis.

Results

Pearson correlation analysis assessed the potential relationships between each of the sub categories of statistics anxiety as well as the total. Correlates can be found in Table 1.

Table 1: Descriptive Statistics and the Potential Correlates of the Statistics Anxiety components (STARS)

	Test	Interpretation	Ask for Help	Worth	Teacher	Computational Self Concept	Total
GCSE Maths Grade	.245**	.298**	.227**	.228**	.175	.426**	-.300**
Achievement (N = 64)	-.196	-.262*	-.066	-.296*	-.338**	-.262*	-.275*
Anxiety	.428**	.412**	.315**	.277**	.263**	.311**	.405**
Stress	.334**	.310**	.288**	.262**	.239**	.306**	.332**
Academic Buoyancy	-.445**	-.351**	-.309**	-.310**	-.202*	-.375**	-.359**
Fear of Failure	.377**	.264**	.264**	.313**	.246**	.247**	.358**
Confidence	**-.559**	**-.669**	**-.535**	**-.627**	-.309**	**-.591**	**.674**
Need for Cognition	-.253**	-.369**	-.303**	-.341**	-.209*	-.330**	-.304**
Curiosity	-.378**	-.439**	-.261**	**-.612**	-.169	**-.523**	-.468**
Adaptive Cognition[1]	.048	-.017	-.108	-.338**	-.069	-.216*	-.199*
Adaptive Behaviour [1]	-.127	-.150	-.197	-.295**	-.193*	-.190*	-.249**
Maladaptive Cognition[1]	.577**	.397**	.434**	.394**	.343**	.411**	.459**
Maladaptive Behaviour[1]	.104	.059	.115	.148	.146	.118	.242**
Mean	27.11	30.22	9.77	40.07	11.45	19.23	
SD	7.10	8.70	3.61	14.28	5.39	6.51	

N = 122 except where stated otherwise. Note: *$p \leq 0.01$, ** $p \leq 0.001$ [1] = Motivation Scales. Bold: Effect Size ≤ .50 (Medium-Large)

As can be seen in Table 1 nearly all of the variables are related to each of the subcategories of STARS. The subcategory of "Teacher" failed to reach significance in some correlations and the Motivation Scales were often not related to the subcategories of STARS. Achievement was significantly correlated to subcategories of interpretation, worth, teacher and computational self concept with teacher having the greatest effect size.

Stepwise linear regression results highlighted that the best predictor of STARS from the potential correlates (not including motivation scales) were Self Efficacy, Fear of Failure and Curiosity explaining overall 56% of the variance in total STARS scores. Predicting achievement from STARS and the Motivation Scales highlighted Adaptive Motivational Behaviours as the only predictor of Achievement above and beyond Maths GCSE explaining 12.9% of the variance.

In order to assess the potential model in which STARS may predict Achievement via Adaptive Motivational Behaviours a meditational regression analysis following the steps of Baron and Kenny (1986) was conducted. For step 1 linear regression indicated that STARS (IV) significantly predicted Adaptive Behaviours (Moderator) (b = -.249, t (118) = 2.785, p = 0.006, r^2 = 0.062). At step 2 linear regression indicated that STARS (IV) significantly predicted Achievement (DV) (b = -.017, t (65) = 2.270, p = 0.027, r^2 = 0.060). At step 3 linear regression revealed that Adaptive Behaviours significantly predicted Achievement (b = .0.40, t (64) = 2.064, p = 0.043, r^2 = 0.060) whilst the relationship between STARS and Achievement was reduced to non-significance when Adaptive Behaviour was controlled for, thus indicating mediation (b = -.009, t (64) = 1.112, p = 0.270, r^2 = 0.054).

Discussion

The current study adds to the expanding literature on statistics anxiety. Results highlight that Statistics Self-Efficacy, Fear of Failure and Curiosity are the highest correlates with Statistics Anxiety. Additionally results highlight the impact Statistics Anxiety can have on Adaptive Motivational Behaviours which in turn impact Achievement. This finding supports and expands upon previous research (Fitzgerald, 1997; Webb, 1971). Of particular interest is the multidimensional nature of Statistics Anxiety and the subcomponents differing relationships with the correlates included in the study. This study can thus inform course leaders of potential interventions relating to Statistics Anxiety which could enhance student experience and academic achievement. Future research aims to follow these students longitudinally throughout their course and to look at differing style of courses nationally in a multilevel statistical model.

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