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Statistics Anxiety and Self Efficacy in Psychology Students: A Challenge for Teaching and Learning in STEM

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BACKGROUND & METHODS

Importance of Statistics in STEM Research methods and statistics (RMS) are embedded in the university curricula for psychology, STEM, and more widely[1,2]. Statistical skills are also associated with the development of psychological literacy[3] and graduate attributes[4].

Statistics Anxiety A major challenge facing the teaching and learning of statistics in HE is the high levels of statistics anxiety and low levels of statistics self-efficacy experienced by students required to learn statistics as part of another course[5,6] and the negative impact of these factors on academic performance[7].

Aim The purpose of this project was to 1) Identify the prevalence of statistics anxiety and measure statistics self-efficacy in UG and PGT psychology students; 2) Identify perceived causes of statistics anxiety; 3) Establish any practical interventions that could be introduced in attempt to alleviate anxiety and increase self-efficacy.

Methods Quantitative and qualitative data were collected, using measures of anxiety (STARS[8] UK version[9]) and self-efficacy in statistics[10] (e.g., *"Select the correct statistical procedure to be used to answer a research question"*) and psychology (e.g., *"Design an experiment to test a hypothesis in psychology"*), open ended questions and focus group discussions.

RESULTS

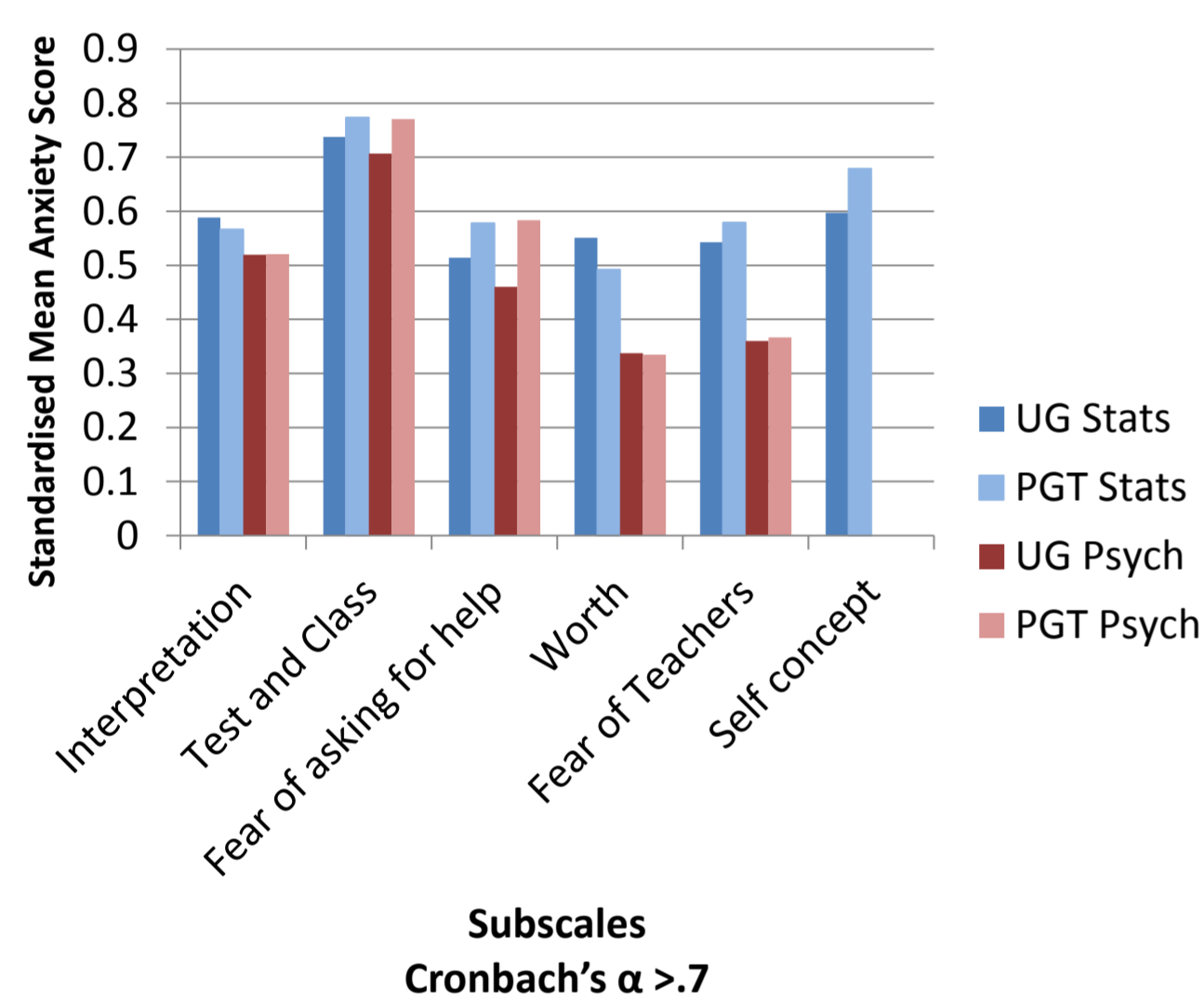Figure 1: Statistics and Psychology Anxiety Experienced by UG and PGT Students

Subscales
Cronbach's α >.7

Figure 2: Self Efficacy in Statistics and Psychology Related Tasks
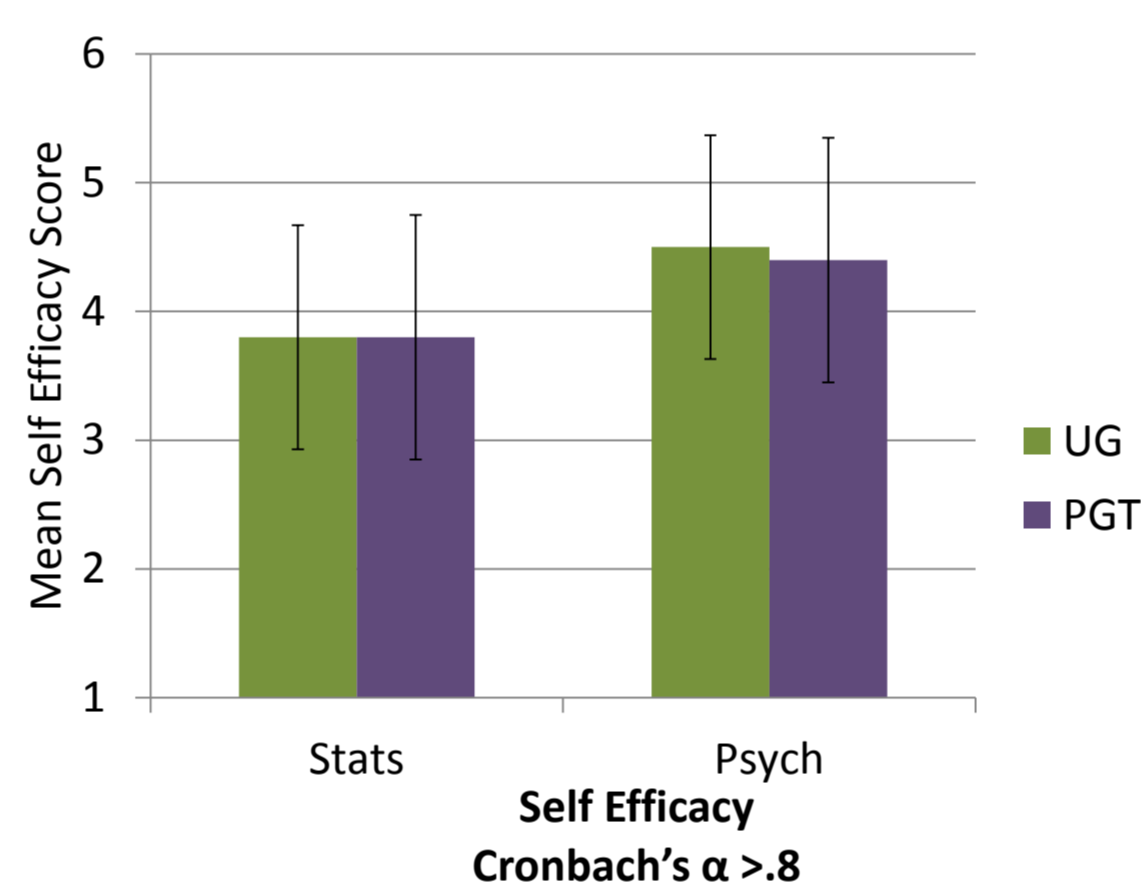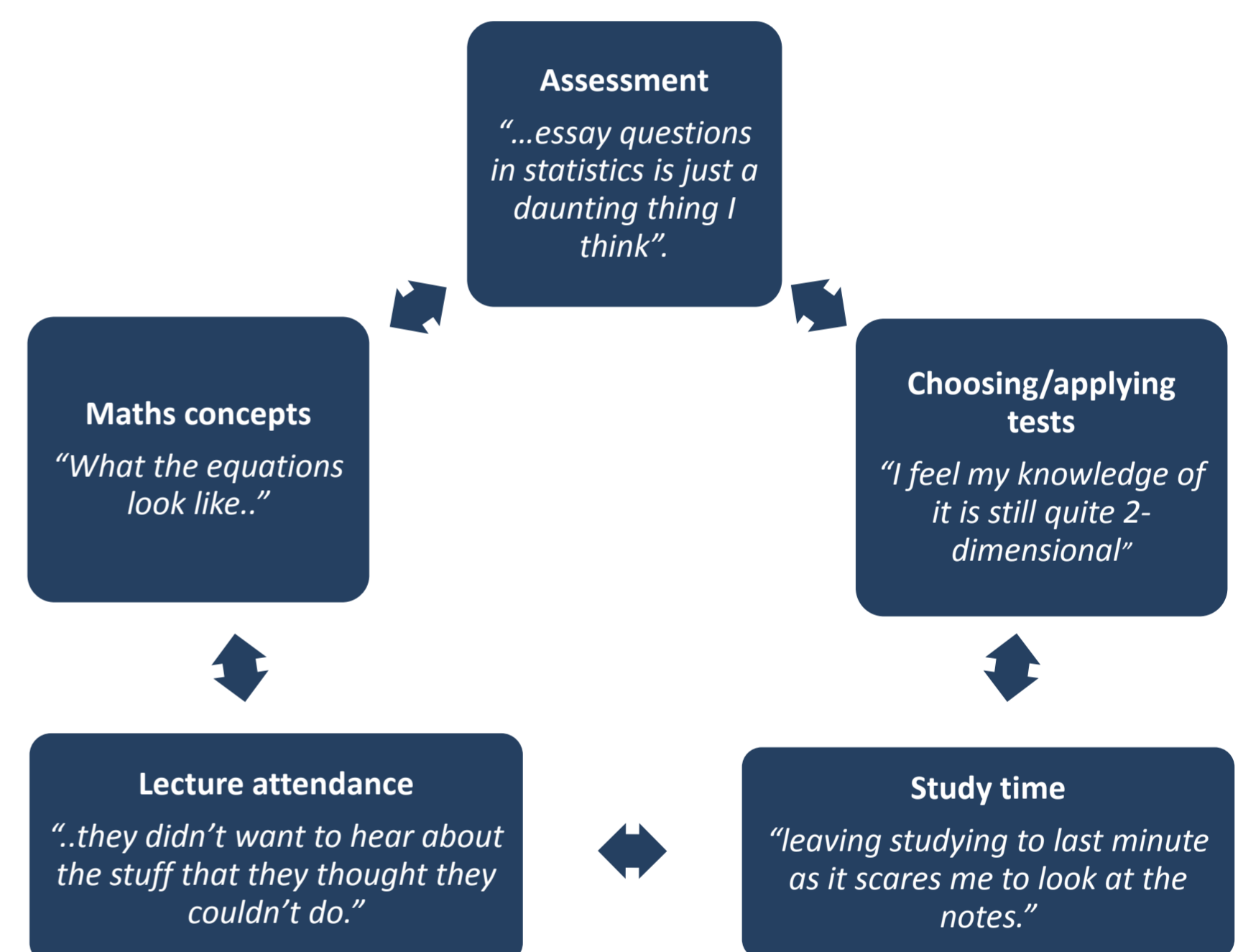
Self Efficacy
Cronbach's α >.8

Figure 3: Perceived Causes and Impact of Statistics Anxiety

Statistics Anxiety *Prevalence:* Over 50% of UG (*N* = 54) and PGT (*N* = 12) students showed moderate/high levels of stats anxiety. *Figure 1*: UG and PGT students were more anxious about statistics than psychology in the interpretation, worth & fear of teachers subscales (*p* < .05).

Statistics Self-Efficacy *Figure 2:* UG and PGT students had higher levels of self-efficacy in their ability to complete psychology related tasks than in statistics related tasks *p* <. 05). *Statistics self-efficacy was positively correlated with students' statistics course grades (r = .41, p = .006).*

Perceived Causes and Impact *Figure 3*: Qualitative analysis indicated students' perceived causes of statistics anxiety, and the impact on engagement with the course.

INTERVENTIONS

A bag full of books? Previous work has indicated that the open-book exam format can reduce statistics anxiety[11]. The RMS exam was changed to an open-book format, and over 90% of UG students (*N* = 40) indicated that this format reduced anxiety and increased their self-efficacy in statistics, compared to the traditional exam format (*p* < .01).

Friday Stats Blues? The RMS lectures were moved from Friday to Wednesday, and 58% of UG students (*N* = 40) indicated that this would increase their likelihood of attending.

Because Stats is worth it ! A humorous movie was produced which highlighted the worth of statistics in psychology and as a graduate attribute. This movie reduced UG students' (*N* = 40) negative views of the "worth" component of statistics anxiety (*M* = 27.82, *SD* = 1.38) compared to a control group (*M* = 32.38, *SD* = 1.38, *p* = .033). However, the level of interpretation anxiety was significantly higher for the experimental group (*M* =29.73, *SD* = .85) compared to the control group (*M* = 25.42, *SD* = .85, *p* = .002).

FUTURE WORK

- Develop interactive VLE resources and peer support to accompany RMS lectures.
- Highlight the worth of statistics in course materials, and enhance support for interpretation anxiety.
- Target interventions to those with highest levels of statistics anxiety.

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