

CORRELATES OF COURSE ANXIETY AND ACADEMIC PROCRASTINATION IN HIGHER EDUCATION.

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ABSTRACT

The study examined the prevalence of procrastination among graduate students, and also investigated the relationship between academic procrastination and six dimensions of statistics anxiety. Participants were 103 Masters of Education graduate students enrolled in the final phase of a two-year Sandwich programme at the University of Education, Winneba in the Central Region of Ghana. Statistics anxiety and academic procrastination of teacher-participants were measured using the Statistical Anxiety Rating Scale (STARS) and the Procrastination Assessment Scale-Students (PASS). Findings revealed that a high percentage of students reported problems with procrastination on writing term papers, studying for examinations, and completing weekly reading assignments. A canonical correlation analysis ($R_{c1} = .54$) revealed that academic procrastination resulting from both fear of failure and task aversiveness correlated significantly to worth of statistics, interpretation anxiety, test and class anxiety, computational self-concept, fear of asking for help, and fear of the statistics lecturer. Implications for statistics anxiety reduction as a procrastination intervention are discussed.

KEY WORDS: Course Anxiety, Academic Procrastination, Task Aversiveness, Research Methods.

INTRODUCTION

Research methods and statistics courses have been an essential part of many programmes in higher education worldwide. The rationale for teaching research methods and statistics at the university level is to enable students to handle, use, and interpret research or statistical data in their field of study. An additional goal for teaching statistics is to prepare students to deal effectively with statistical aspects of the world outside the classroom (Gal & Ginsburg, 1994; Nasser, 2004).

Research and statistics anxiety, which is experienced by majority of graduate students, has been found to debilitate performance in statistics (Onwuegbuzie, 2000a; Walsh & Ugumba-Agwunobi, 2002) and research methodology courses. As such, it is likely that statistics anxiety is, in part, responsible for many students delaying enrollment in these courses for as long as possible. Moreover, it is possible that, once enrolled in these courses, students with high levels of statistics anxiety tend to procrastinate on assignments.

It has been estimated that as many as 80% of graduate students experience uncomfortable levels of statistics anxiety (Mann, 2001; Onwuegbuzie & Wilson, 2003). According to Onwuegbuzie, DaRos and Ryan (1997), statistics anxiety is the apprehension which occurs when individuals encounter statistics in any form and at any level. Moreover, research methods and statistics anxiety is situation-specific, in as much as the symptoms only emerge at a particular time and in a particular situation-specifically, when learning or applying statistics in a formal setting (Zeidner, 1991; Onwuegbuzie et al., 1997). Studies have found that many students tend to experience high levels of course anxiety when confronted with statistical ideas, problems, or issues, instructional situations, or evaluative situations (Zeidner, 1991; Onwuegbuzie & Seaman, 1995; Onwuegbuzie & Daley, 1996).

Indeed, statistics anxiety appears to involve a complex array of emotional reactions which, in mild forms, may induce only a minor discomfort. Severe forms, however, can result in negative outcomes, such as apprehension, fear,

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nervousness, panic, and worry (Onwegbuzie, 2000a).

Research indicates that statistics anxiety is a multidimensional construct (Cruise, Cash & Bolton, 1985; Onwegbuzie, DaRos & Ryan, 1997). Using factor analysis, Cruise et al. (1985) identified six components of statistics anxiety, namely: (a) worth of statistics, (b) interpretation anxiety, (c) test and class anxiety, (d) computational self-concept, (e) fear of asking for help, and (f) fear of statistics teachers. According to these authors, worth of statistics refers to a student's perception of the relevance of statistics. Interpretation anxiety is concerned with the anxiety experienced when a student is faced with making a decision from or interpreting statistical data.

Test and class anxiety refers to the anxiety experienced when attempting to solve scientific problems involving some mathematics, as well as the student's perception of her/his ability to do science. Fear of asking for help measures the anxiety experienced when asking a fellow student or lecturer/professor for help in understanding the material covered in class or any type of statistical data, such as that contained in a research article or a printout. Fear of research methods/statistics teacher is concerned with the student's perception of the research methods and or statistics instructor.

Statistics anxiety either as a one-dimensional or as a multidimensional construct has been found to be related to science self-concept and self-image (Azure, 2005), number of university science courses, science ability, science preparation, calculator use, learning style, ethnicity, and expected grade (Zeidner, 1991; Onwegbuzie, 1999a).

A growing body of research has documented a consistent negative relationship between statistics anxiety and course performance (Lalonde & Gardner, 1993; Pan & Tang, 2004; Onwugbuzie, 2004). In fact, statistics anxiety in research methods has been found to be the best predictor of achievement in research methodology (Onwuegbuzie et al., 2000) and statistics (Fitsgerald et al., 1996; Gordon, 2004; Onwuegbuzie, 2005) courses. Additionally, using qualitative techniques, Onwuegbuzie (1997a) reported that statistics anxiety primarily affects a student's ability to understand fully research articles, as well as to analyse and to interpret statistical data.

Statement of the problem

Statistics anxiety and procrastination has been a major problem of undergraduate and graduate students in all programmes. Statistics anxiety, which is experienced by majority of graduate students in research methods, has been found to debilitate performance in statistics and research methodology courses (Onwuegbuzie & Wilson, 2003). A growing body of research has documented a consistent negative relationship between statistics anxiety, academic procrastination and course performance. It has been established that the levels of statistics anxiety experienced by students can be so great that undertaking research methodology and statistics classes have come to be regarded by many students as a negative experience (Onwuegbuzie, 2000b). As a result of course anxiety, graduate students often delay enrolling in research methodology and statistics courses for as long as possible, sometimes waiting until the final semester of their degree programmes – which is clearly not the optimal time to undertake such courses (Onwuegbuzie, 1997a, 2004). Unfortunately, few studies (if any) have examined methods to reduce the worry and anxiety in learning statistics for graduate students in the social sciences (Onwuegbuzie & Wilson, 2000). Graduate students of the University of Education, Winneba, are no exception to this problem. Thus, although not yet empirically tested, it is likely that the propensity for academic procrastination by graduate students of UEW is related to levels of course and statistics anxiety.

Literature review

Academic procrastination is defined as the purposive and needless delay in beginning or completing tasks (Rothblum, Solomon & Murakami, 1986) or programme. Because academic procrastination has been correlated positively to generalised and specific kinds of anxiety such as test anxiety and social anxiety (Solomon & Rothblum, 1984; Rothblum et al., 1986), it was hypothesised that academic procrastination would be positively correlated to statistics anxiety associated with worth of statistics, interpretation anxiety, test and class anxiety, computational self-concept, fear of asking for help, and fear of the statistics instructor.

Solomon and Rothblum (1984) noted that nearly one-quarter of Caucasian-American College students report problems with procrastination on academic tasks such as writing term papers, studying for examinations, and keeping up with weekly readings. Academic procrastination has been found to be associated with negative academic outcomes, including missing deadlines for submitting assignments, delaying the taking of self-paced quizzes, low course grades, and course withdrawal (Semb, Glick & Spencer, 1979; Onwuegbuzie, 2004).

Solomon and Rothblum (1984) found that the fears of failure and task aversiveness are the primary reasons for procrastinating, and the latter accounting for 18% of the variance. The fear of failure factor includes items which relate to evaluation anxiety and overly perfectionistic standards for one's performance, and low self-confidence. In contrast, the task aversiveness factor comprises items which reflect a dislike of engaging in academic activities and a lack of energy. These findings led them to conclude that there are two groups of procrastinators at the undergraduate level: (a) a relatively small but extremely homogenous groups of students who report procrastinating as a result of fear of failure, and (b) a relatively heterogeneous group of students who report procrastinating as a result of aversiveness of the task.

Purpose of the study

No research appears to have examined the prevalence of academic procrastination among graduate students of public universities in Ghana. This was the first purpose of the present study. The second purpose of the current research was to investigate the relationship between academic procrastination and statistics anxiety among the Masters of Education (MEd.) students.

Research hypothesis

Ho: There is no significant relationship between statistics anxiety and academic procrastination among graduate students of the University of Education, Winneba.

Significance of the study

It was hoped that findings from this study would not only increase our understanding of procrastination, but also would further our understanding of statistics anxiety – which, in turn, could assist in designing instructional and counseling strategies to improve students' related deficiencies in these areas. It will also add rich

literature on course anxiety and the implications to already available knowledge.

Methods

Participants

Participants were 103 graduate students from a number of education disciplines (e.g. science education, mathematics education, home economics education, languages education, special education, and health, physical education, recreation and sports) enrolled in various departments of a graduate-level research methodology course at the University of Education, Winneba. Participation in the study was voluntary and anonymous, with no participant declining. In order to participate, students were required to give their consent by signing informed consent documents. The ages of the participants ranged from 40 to 55 (mean = 45.40, SD = 6.8). Mean academic achievement, as measured by grade point average, was 3.25 (SD = 0.36) from previous academic year's work. Many of the participants were female (56.31%). However, a (non-parametric) Wilcoxon two-sample t-test (Hollander & Wolfe, 1973) revealed no gender difference ($p < .05$) with respect to levels of overall academic procrastination, fear of failure, and task aversiveness. Indeed, this finding is consistent with other studies in which procrastination scores by males and females were not significantly different e.g. Ferrari (1989a). Additionally, a series of Wilcoxon two-sample t-tests revealed no gender difference ($p < .05$) with respect to the six dimensions of statistics anxiety, nor was a gender difference found with respect to grade point average. Thus, all data were collapsed across gender.

Instruments and procedure

Participants were administered the Statistical Anxiety Rating Scale (STARS) and the Procrastination Assessment Scale-Students (PASS). The STARS, which was developed by Cruise and Wilkins (1980), is a 51-item, 5-point Likert-scale instrument assessing statistics anxiety in a wide variety of academic situations. The STARS has six subscales, namely, worth of statistics, interpretation anxiety, test and class anxiety, computational self-concept, fear of asking for help, and fear of the statistics instructor. A high score on any subscale represents high anxiety in that area. The present study used an adopted STARS instrument from Gordon (2004); the score reliability of the STARS subscales, as measured by coefficient alpha, was as follows: worth of statistics (.96; 95%

Confidence Interval [CI] = .95, .97), interpretation anxiety (.90; 95% CI = .87, .92), test and class anxiety (.88; 95% CI = .85, .91), computational self-concept (.86; 95% CI = .82, .89), fear of asking for help (.81; 95% CI = .75, .86), and fear of the statistics instructor (.83; 95% CI = .78, .87).

The PASS, which was developed by Solomon and Rothblum (1984), contains two parts. The first part lists six academic tasks involving writing a term paper, studying for examinations, keeping up with weekly reading assignments, performing administrative tasks, attending meetings, and performing academic tasks in general. Respondents were asked to complete three rating scales for each of the six tasks indicating the frequency with which they procrastinated on that task (1 = Never procrastinate; 5 = Always procrastinate), whether their procrastination on the task is a problem (1 = Not all a problem; 5 = Always a problem), and whether they want to decrease their procrastination on the task (1 = Do not want to decrease; 5 = Definitely want to decrease). As recommended by its authors (Solomon & Rothblum, 1984), the PASS items pertaining to (a) the frequency with which respondents procrastinate on a task, and (b) whether their procrastination on that task is a problem were summed to provide an overall measure of academic procrastination, with total scores ranging from 12 to 60. Higher scores indicate academic procrastination.

The second section of the PASS asks students to think of the last time they procrastinated on writing a term paper. They were to indicate how much each out of 26 reasons reflects why they procrastinated (1 = Not at all reflects why I procrastinated; 5 = Definitely reflects why I procrastinated). A factor analysis

undertaken by Solomon and Rothblum (1984) on the reasons why college students procrastinate indicated two factors, namely, fear of failure and task aversiveness. For the present study, the coefficient alpha score reliability estimates of the PASS measures were .82 (95% CI = .80, .86) for the procrastination scale, .85 (95% CI = .82, .87) for the fear of failure factor, and .76 (95% CI = .67, .83) for the task aversiveness factor.

RESULTS

The means and standard deviations pertaining to the PASS scale and the fear of failure and task aversiveness subscales are presented in Table 1 below. The PASS scale mean was compared to the mean reported by the developers of the PASS (Solomon & Rothblum, 1984). The norm groups used in Solomon and Rothblum's (1984) study comprised 342 university students (101 men, 222 women, 19 unknown genders) who were enrolled in two sections of an introductory-level psychology course. Ninety percent of the participants were 18 to 21 years of age. Interestingly, the mean procrastination score reported by the graduate students in the present study (i.e. 35.42) was higher than that computed for participants in Solomon and Rothblum's (1984) study (i.e. 33.39 for the full sample). Unfortunately, although these authors (Solomon & Rothblum) did not report the standard deviation of the PASS scores needed to conduct an independent t-test, the closeness in procrastination means suggests that the graduate students in the current study had the same propensity to procrastinate as did the undergraduate norm group. Table 1 below presents the means and standard deviations of procrastination measures.

Table 1. Means and standard deviations of procrastination measures

Measure	M	SD
Procrastination scale	35.42	12.80
Fear of failure	9.82	4.35
Task aversiveness	8.39	1.65

Table 2 below presents the means and standard deviations of the statistics anxiety measures.

Also presented are median percentile rank equivalent scores (MPRES). The MPRES were calculated by comparing the median anxiety scores in the present study (Table 2) to the percentile rank norms reported by the developers of the scale indicates that at least 50% of the

present sample scored higher than did 86% of the norm group on this dimension. Because the MPRES range from 62 to 86, it is clear that the participants in this study represented a moderate to high statistics-anxious group.

An item analysis of the first part of the PASS was undertaken in order to determine the frequency of procrastination of a variety of

academic tasks. This analysis revealed that 43.7% of the graduate students reported that they nearly always or always procrastinate on writing a term paper, 39.1% procrastinate on studying for examinations, and 60.0% procrastinate on keeping up with weekly reading assignments. A smaller percentage of graduate

students reported that they nearly always or always procrastinate on administrative tasks (17.3%), attendance tasks (6.8%), and school activities in general (16.5%). A series of Fisher's Exact Tests was used to compare the prevalence rates between the present sample and the norm group.

Table 2. Means, standard deviations, medians, and median percentile rank equivalents of statistics anxiety measures.

Dimension	M	SD	Median	Median percentile rank equivalent
Worth of statistics	41.73	14.03	42	86
Interpretation anxiety	31.76	8.39	32	77
Test and class anxiety	27.10	7.12	28	70
Computational self-concept	18.35	6.21	18	70
Fear of asking for help	8.21	3.59	8	67
Fear of the statistics teacher	12.24	4.07	12	62

Findings revealed that, although compared to the norm group, a significantly ($p < .05$) smaller proportion of graduate students reported that they nearly always or always procrastinate on attendance tasks (odds ratio = 0.24), a significantly larger proportion of graduate students reported that they nearly always or always procrastinate on studying for examinations (odds ratio = 1.76), keeping up with weekly reading assignments (odds ratio = 3.46), administrative tasks (odds ratio = 1.72), and school activities in general (odds ratio = 1.69).

With respect the degree to which the graduate students felt that procrastination was a problem for them, 23.7% reported that it was nearly always or always a problem when writing a term paper, 21.5% reported that it was nearly always a problem when writing a term paper, 21.5% indicated that it was a problem when undertaking weekly readings. Nearly one-third of graduate students in the present study (i.e. 30.1%) indicated that procrastination was a problem for them when undertaking administrative tasks. Less than 20% of participants reported that procrastination was a problem for them when they were involved in attendance tasks (18.8%) and school activities in general (8.3%). No statistics were reported by Solomon and Rothblum (1984) for these latter three types of activities, although these authors stated that procrastination was less of a problem with the remaining tasks and school activities in general. The Fisher's Exact Tests revealed that graduate students were 2.28 times more likely

($p < .05$) to report that procrastination was nearly always or always a problem when studying for examinations than were the norm group.

In terms of the extent to which participants reportedly wanted to decrease their tendency to procrastinate, 65.2% indicated that they wanted or definitely wanted to reduce their procrastination when writing a term paper, 68.2% wanted to reduce it when studying for examinations, and 71.7% wanted to reduce it when undertaking reading assignments. Nearly one-third of the graduate students (i.e. 30.9%) indicated that they wanted to decrease their tendency to procrastinate when undertaking administrative tasks, 24.1% when they were involved in attendance tasks, and 42.8% when undertaking school activities in general. The Fisher's Exact Tests revealed that graduate students were 2.09 times more likely ($p < .05$) to report that they wanted or definitely wanted to reduce their procrastination when studying for examinations than were the norm group.

Table 3 presents part of the correlation matrix from which the canonical roots were generated. It can be seen that after applying the Bonferroni adjustment, (a) the fear of failure factor was positively associated with worth of statistics, computational self-concept, fear of asking for help, and fear of the statistics teacher; and (b) the task aversiveness factor was positively associated with worth of statistics, computational self-concept, and fear of statistics teacher.

Table 3: Pearson product-moment correlation of procrastination measures and the statistics anxiety dimensions

Statistics anxiety factor	Procrastination scale	Procrastination measure	
		Fear of failure	Task aversiveness
Worth of statistics	.15	.34*	.38*
Interpretation anxiety	.23	.26	.25
Test and class anxiety	.20	.20	.24
Computational self-concept	.15	.30*	.32*
Fear of asking for help	.26	.39*	.26
Fear of the statistics teacher	.09	.31*	.37*

* Statistically significant (i.e $p < .001$) after Bonferroni adjustment.

The strength of the relationship between the two sets of variables was assessed by examining the magnitude of the canonical correlation coefficients. These coefficients indicate the degree of relationship between the weighted procrastination dimension variables and the weighted statistics anxiety variables. In addition, the statistical significance of the canonical roots was tested via F-statistic. The canonical analysis revealed that both canonical correlations combined were statistically significant ($F [12, 254] = 3.78, p < .05$). However, when the first canonical root was excluded, the remaining canonical root was not statistically significant. Together these results suggest that the first canonical function was statistically significant but the second was not.

Thomson (1984) opined that, because the calculated probabilities are sensitive to sample size, particular attention should be paid to the educational significance of the obtained results. The educational significance of canonical correlations typically is assessed by examining their size (Thomson, 1984). The canonical

correlation indicates how much variance the sets of weighted original variables share with each other (Thomson, 1984). In the present study, the first canonical correlations ($R_{c1} = .26$) appeared to be moderately educationally significant, contributing 6.8% (i.e R_{c1}^2) to the shared variance. The second canonical correlation ($R_{c2} = .03$) did not appear to be educationally significant. Consequently, only the first canonical correlation was interpreted.

Data pertaining to the first canonical root are presented in Table 4. This table provides both standardised function coefficients and structure coefficients. An examination of the standardized canonical function coefficients revealed that, using a cutoff correlation of 0.3 recommended by Lambert and Durand (1975, cited in Owuegbuzie, 2004) as an acceptable minimum loading value, two of the six statistics anxiety dimensions (i.e. worth of statistics and fear of asking for help) made an important contribution to the anxiety-composite-with fear of asking for help being the major contributor (See Table below).

Table 4: Canonical solution for first function.

Variable	Standardized Coefficient	Structure	
		Coefficient	Structure ²
Statistics Anxiety Dimension:			
Worth of statistics	0.460*	.850*	.723
Interpretation anxiety	-0.038	.604*	.365
Test and class anxiety	-0.233	.520*	.270
Computational self-concept	0.213	.735*	.540
Fear of asking for help	0.553*	.793*	.629
Fear of the statistics teacher	0.199	.799*	.638
Reason for Procrastination Dimension:			
Fear of failure	0.684*	.874*	.764
Task aversiveness	0.532*	.770*	.593

*loadings with large sizes

With respect to the reason for procrastination set, (see Table 4 above) both dimensions (i.e. fear of failure and task aversiveness) made an important contribution to the composite set.

Structure coefficients are the correlations between a given variable (dimension) and the scores on the canonical composite (i.e. latent variable) in the set to which the variable (dimension) belongs (Thompson, 1984). Thus, structure coefficients indicate the degree of relationship of a given variable in the set with the canonical composite for the variable set. The structure coefficients (Table 4) revealed that all six dimensions of statistics anxiety made important contributions to the first canonical variant. The square of the structure coefficient, which is the proportion of variance that the original variable shares linearly with the canonical variant, is used to determine the relative importance of the significant variables.

The square of the structure coefficient (Table 4) indicated that worth of statistics, fear of the statistics teacher, fear of asking for help, and computational self-concept made very large contributions, explaining 72.3%, 63.8%, 62.9% and 54.0% of the variance, respectively. (These variances are not unique and thus do not sum to 100%). Interpretation anxiety and test and class anxiety made moderate contributions. With regard to the reasons for procrastination cluster, both dimensions made noteworthy contributions, with fear of failure making the largest contribution (See Table 4) – explaining 76.4% of the variance.

DISCUSSION

The purpose of this study was: (a) to examine the prevalence of procrastination among graduate students and (b) to investigate the relationship between academic procrastination

and six dimensions of statistics anxiety. Interestingly, this appears to be the first study to determine the prevalence of academic procrastination among graduate students in Ghana. Findings revealed that from approximately 40% to 60% of the graduate students reported that they nearly always or always procrastinate on writing a term paper, studying for examinations, and keeping up with weekly reading assignments. Additionally, between 20% and 45% of graduate students reported problems with procrastination in these three areas. Furthermore, between 65% and 75% of the students wanted to decrease their procrastination on these tasks. As noted by Solomon and Rothblum (1984), the high frequency of self-reported procrastination on writing term papers, studying for examinations, and keeping up with weekly reading assignments suggests that these tasks are deemed to be more important to students than are such tasks as attending classes or meetings, filling out forms, and registering for course. According to Solomon and Rothblum (1984), because students perceived performing the former set of tasks as important in as much as course grades are directly based on them, students are more likely to procrastinate on completing these tasks because they find them aversive and are afraid of failure.

An extremely disturbing finding is that a larger proportion of students in the present study than in the undergraduate norm group reported that they nearly always or always procrastinate on studying for examinations and on weekly reading assignments. These results are extremely surprising, bearing in mind that graduate students tend to represent the upper echelon of academic achievers. The mean grade

point average of the present sample, 3.57, confirms their high-achieving status. Solomon and Rothblum (1984) did not report their mean but it is likely to have been significantly lower.

Thus, it is important to determine why academic procrastination appears to be so high among graduate students. For example, it could reflect the complexity of course material and assignments at this level. That is, students who were low procrastinators as undergraduates, once they become graduate students, are intimidated by the increased level of complexity and academic standards whether perceived or real and thus procrastinate more. Thus, an interesting line of research would be whether levels of academic procrastination are stable across students' undergraduate and graduate years.

It is also possible that graduate students procrastinate more for different reasons than do undergraduates. Specifically, whereas the latter may procrastinate more as a result of low academic ability and low self-confidence (Rothblum et al., 1986; Dolinsky, 2001), rebelliousness and resentment (Rorer, 1983; Milgram et al., 1988), or an attempt to protect a vulnerable self-esteem (Zeidner, 1991; Huntley, Schneider & Aronson, 2000), it is possible that for graduate students, delaying academic tasks such as writing a term paper are indicative of perfectionism.

As noted by Saddler and Sacks (1993) and Onwuegbuzie (2000a), some procrastinators engage in perfectionism either to produce a flawless product (i.e. self-perfectionism) or to impress others (i.e. socially prescribed perfectionism). Indeed, Onwuegbuzie (1997a), in a qualitative study of graduate students enrolled in research methodology courses, found that perfectionist behaviour is associated with procrastinating over research proposals. Interestingly, levels of both self-oriented perfectionism and socially prescribed perfectionism are high among graduate students (Onwuegbuzie & Daley, 1999). Thus, knowledge of the interplay between procrastination, perfectionism, and achievement among graduate students would be helpful.

Nevertheless, the fact that most graduate students appear to delay writing term papers and studying for examinations might explain why underachievement is prevalent in research methodology (Onwuegbuzie, 1997; Tang, 2005) and statistics (Onwuegbuzie et al., 1997) classes. Presumably, procrastinating does not necessarily lead to underachievement in the

majority of graduate students' courses, particularly those which represent their areas of study. However, in research methodology and statistics classes, which many students believe to be the most difficult (Onwuegbuzie, 1998a), it is likely that frequent procrastination debilitates performance – even if it results from perfectionism. As such, future studies should investigate the potential debilitating role of procrastination in these courses.

Perhaps that most disturbing finding in the present study was the fact that the graduate students were nearly 3.5 times more likely to report that they nearly always or always procrastinate on weekly reading assignments than were the undergraduate students in Solomon and Rothblum's study. Bearing in mind the complex and laconic nature of statistics and research methodology textbooks, it is likely that the frequency of procrastination for statistics and research methodology instructors is self-evident. This is particularly disturbing because highly procrastinating college students are more likely to report the presence of physical symptoms (Rothblum et al., 1986) and depression (Saddler & Sacks, 1993).

The second major finding was that procrastination resulting from both fear of failure and task aversiveness appears to be related significantly to worth of statistics, interpretation anxiety, test and class anxiety, computational self-concept, fear of asking for help, and fear of the statistics instructor. The finding that academic procrastination is related to statistics anxiety is consistent with the bulk of the literature which has documented a relationship between procrastination and generalized and specific kinds of anxiety such as fear of failure, test anxiety, social anxiety, and self-consciousness (Solomon & Rothblum, 1984; Rothblum et al., 1986; Ferrari, 1991c; Milgram, 1991).

Solomon and Rothblum (1984) also reported a statistically significant positive correlation between the fear of failure factor and evaluation anxiety. In contrast, the relationship between procrastination resulting from task aversiveness and statistics anxiety contradicts Solomon and Rothblum's (1984) finding of no relationship between the task aversiveness factor and evaluation anxiety. This incongruence, however, perhaps highlights the uniqueness of the statistics anxiety construct from other forms of anxiety. In any case, the relationship between academic procrastination and statistics anxiety provides further evidence that procrastination is more than a deficit in time management and

study skills, but includes cognitive-affective components (Solomon & Rothblum, 1984; Rothblum *et al.*, 1986). In fact, according to Rothblum *et al.* (1986), high procrastinators do not differ in their study behaviour as much as they differ on anxiety.

It is possible that, once enrolled in statistics and research methodology courses, high procrastinators experience extreme elevations in statistics anxiety, because these classes threaten their self-esteem (Onwuegbuzie, 2000b), levels of hope (Onwuegbuzie, 1998b), and the like, which result from the perception that these courses are too difficult, as well as from an attitude that statistics is not relevant for them (Onwuegbuzie, 2003).

The fact that participants were predominantly female is an important limitation of the study. Nevertheless, the fact that no gender differences were found in the present study with respect to overall academic procrastination, fear of failure, task aversiveness, and all six dimensions of statistics anxiety, as well as the fact that the overwhelming majority of previous research has documented that males and females report similar levels of academic procrastination (e.g. Effert & Ferrari, 1989; Onwuegbuzie & Wilson, 2003), suggest that the findings of the present study may be similarly generalisable to both male and female graduate students.

Another limitation of the current study stems from the fact that participants were almost exclusively students of a single university. As such, it cannot be assumed that the present findings generalize to graduate students of other universities and institutions. Thus, more research in this area is needed using students from other higher institutions in Ghana.

CONCLUSION

The fact that academic procrastination was assessed via a self-report instrument, rather than on actual behaviour, is perhaps another limitation of the study, because it is possible that students may give socially desirable responses.

However, according to Rothblum *et al.* (1986), 'self-reported procrastination has been validated against delay in taking self-paced quizzes (Solomon & Rothblum, 1984), delay in submitting course assignments (Rothblum, Beswick & Mann, 1984), delay in participation in psychology experiments (Solomon & Rothblum, 1984) and lower course grades (Rothblum *et al.*, 1984)'. Nonetheless, future studies in this area should consider using behavioral measures of academic

procrastination in addition to self-report instruments.

Several practical implications can be derived from the results of the present study. Because approximately two-thirds of graduate students report that they want to reduce their tendencies to procrastinate when writing a term paper, studying for examinations, and undertaking reading assignments, instructors should find ways to help them accomplish this. For example, statistics and research methodology instructors could break up their term projects into parts, and require that each part be submitted for formal or informal grading at regular intervals.

With respect to reading assignments, students might be asked to undertake a written or oral summary of each assigned reading. In fact, students can even be required to develop advance or post-organisers (e.g. concept maps) of all material read, because these techniques have been found to increase levels of performance (Onwuegbuzie, 2004). In addition, whereas some high procrastinators may benefit from traditional interventions for procrastination such as time management and study skill counseling (Ziestat *et al.*, 1978), self-discipline and self-criticism (Mulry *et al.*, 1994), compliance-based and defiance-base paradoxical strategies (Rohrbaugh *et al.*, 1981), and the use of external contingencies as noted by Rothblum *et al.* (1986), others may benefit more from interventions which focus on anxiety management and reduction. The latter could be accomplished through a number of cognitive and behavioural techniques, such as relaxation therapy, systematic desensitisation, and meditation (Gilliland & James, 1983; Gordon, 2004). Such students also could be given information about how to direct attention away from self-centered worries when they are engaged in statistical activities. Whatever interventions are implemented, it is essential that their efficacy be documented.

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