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Anxiety and Stress in First Year University Students

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Abstract

The purpose of the study was two-fold: to confirm the finding that anxiety and stress increases as exams draw near, and to provide evidence that smokers will have greater increases in anxiety and stress than non-smokers, as well as increased smoking urges as exam draws near, to deal with the related increase in anxiety and stress. To investigate this, participants were asked to fill out the DASS-21 at three-time points (4 weeks, 2.5 weeks, and 1 week) before the Psychology 1000 midterm examination. Smoking urges of smokers was also to be assessed, however, due to lack of smoking participants, no smoking data was collected. Results did not confirm the finding that student's anxiety and stress increase as the exam draws near. ANOVA indicated there was not a significant difference in anxiety and stress scores between T1, T2 or T3. Further analysis indicated that the anxiety and stress scores for this sample were significantly higher than the normative data for the DASS-21 indicating a possible ceiling effect; implications of these results are discussed.

Anxiety and Stress in First Year University Students

University is a stressful time in a young adult's life. Demands related to student role, family and relationships, and finances are of concern for university students, with student role demands being the number one demand reported by students (Arthur & Hiebert, 1996). Studies examining stress in post-secondary education have found that pressure and self-imposed stress are the most common types of stressors experienced by students (Misra, McKean, West & Russo, 2000; Hamaideh, 2011) and the most common reactions to stressors are emotional (anxiety, fear, guilt, anger, frustration, and depression) (Misra et al, 2000). How students deal with the stress of university life has also been studied and it has been found that students often report increases in alcohol consumption and cigarette smoking (Misra et al, 2000). The current study sought to examine the association between the anxiety and stress experienced by university students and the relationship to smoking behaviours.

Anxiety is a common mental health problem. According to the Canadian Mental Health Association (CMHA), anxiety disorders are the most common mental health problem (CMHA, 2017) and according to the Anxiety Disorders Association of Canada, approximately 25% of Canadians will experience one or more anxiety disorders in their lifetime (Anxiety Disorders Association of Canada, 2003). The American Psychiatric Association's (APA) Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013), defines anxiety disorders as "disorders that share features of excessive fear and anxiety related behaviour disturbances" (p. 189). The DSM-V divides anxiety disorders into the following: separation anxiety, selective mutism, specific phobias, social anxiety (social phobia), panic disorder, agoraphobia, generalized anxiety disorder, substance/medication-induced anxiety disorder, anxiety disorder due to another medical condition and other specified anxiety disorder, each with its own diagnostic criteria. Although all anxiety disorders manifest as excessive worry about

future danger, accompanied by behavioural disturbances and related cognitions that significantly impair social, occupational or other areas of daily functioning, each disorder is different in that the objects or situations of worry, the avoidance behaviour, and the associated thoughts differ for each disorder (APA, 2013). For specific phobias, people are worried about very specific objects or situations such as spiders, or being exposed to germs, and will experience intense fear and avoidant behaviour towards that stimulus, whereas in social phobia, people worry about scrutiny and evaluation by others and may experience fear and anxiety and may avoid all social situations. In all anxiety disorders, the anxiety and fear differ from the normal, transient fears and anxieties that commonly occur in the population (APA, 2013). An example of such transient fears and anxieties common to the university student population is test anxiety.

Because of the transient nature of exams (situation specific stimuli) test anxiety would seem to be associated with state anxiety (transient, situation specific) rather than trait anxiety (stable, tendency to respond with anxiety). However, past research by Trent and Maxwell (1980) found a stronger association between trait anxiety and test anxiety than state anxiety and test anxiety (Trent & Maxwell, 1980). Lotz and Sparfeldt (2017), on the other hand, found little difference in relationship between trait and state anxiety and test anxiety (Lotz & Sparfeldt, 2017). Also, research on gender differences has found that women experience more test anxiety than men (Baker, 2003; Pamphlett & Farnill, 1995; Seipp, 1991; Sowa & LaFleur, 1986). Interestingly, two studies that examined populations of students in Nigerian universities found no gender differences in test anxiety (Onyeizugbo, 2010; Oladipo, Ogunbamila, & Idemudia, 2015). Perhaps cultural differences in Nigerian universities compared to North American universities is an area for further research.

One conclusion that seems to be consistent in the literature is that test anxiety affects academic performance. Various studies have found a negative correlation between test anxiety and academic performance on exams (Cassady & Johnson, 2002; Cassady, 2004; Hunsley, 1985; Musch & Broder, 1999; Seipp, 1991). Musch and Broder (1999) examined whether test anxiety or mathematic skills contributed more to overall exam score variances on a Statistics exam and found that when test anxiety is entered first into the regression model, test anxiety accounted for a significant 10% of exam score variance (Musch and Broder, 1999). Cassady and Johnson (2002) tested students at three different exams and found that students in a high cognitive anxiety group scored significantly lower on all three examinations than a low cognitive anxiety group, as well as significantly lower than the average group on two out of the three examinations (Cassady & Johnson, 2002). Fernandez-Castillo & Caurcel (2015) also found that anxiety just before an exam had a significant negative correlation with selective attention (tending to relevant aspects of a task while ignoring irrelevant aspects) and mental concentration (Fernandez-Castillo & Caurcel, 2015). Oaten and Cheng (2005) compared students who had upcoming examinations to those who did not have examinations (control group) and found that students in the exam group were less able to control their behavior and also reported increases in smoking and caffeine intake (Oaten & Cheng, 2005).

Coping strategies to deal with test anxiety have also been studied. In Baker's 2003 study on dispositional coping strategies, optimism, and test anxiety, Baker examined three different coping styles; reflective (planning and reflecting on problem), suppressive (avoiding the problem), and reactive (distorting the problem) and found that women tend to use more exam-specific reactive coping strategies to deal with test anxiety (Baker, 2003). Anxiety has been studied extensively in relation to smoking and there is a consistent relationship found between

anxiety and smoking behaviours (Scheitrum & Akillas, 2002; Mykletun, Overland, Aaro, Liabo, & Stewart, 2007).

Anxiety is found to be a significant predictor of smoking urges (Niaura, Shadel, Britt, & Abrams, 2002). Research on personality and smoking behaviours has found a strong interaction between high trait anxiety and smoking. A strong interaction exists between highly anxious Type A personalities and smoking for stimulation as well as an interaction of Type B personalities and smoking to relax; that is highly anxious individuals smoke to relax or to stimulate depending on personality type (Scheitrum & Akillas (2002). Prior research on smoking motivation has found evidence that high anxiety sensitivity is positively related to smoking to reduce negative affect in those with panic disorder as well as those suffering from social anxiety. (Zvolensky et al., 2004; Zvolensky et al, 2006; Watson, VanderVeen, Cohen, DeMarree, & Morrell, 2012).

Smoking is the leading cause of preventable death in Canada (Health Canada, 2011). Smoking has negative physiological effects on health including being the leading cause of cardiovascular disease, and contributing to other diseases such as cancer, diabetes, and chronic obstructive pulmonary disease (COPD) (Centre for Addictions and Mental Health, 2012). According to the Centre for Addictions and Mental Health (CAMH), although smoking prevalence in Canada has decreased significantly since 1965, there are still approximately 6 million people who continue to smoke (CAMH, 2012). Among the population of smokers, studies have found that those with mental illness are more likely to be smokers than the general population (Lasser et al, 2000; Steinberg, Williams, & Li, 2015). Smoking a cigarette causes a spike in nicotine which activates neurotransmitters in the brain resulting in feelings of pleasure, stimulation, and or changes in mood. It is the addictive properties of nicotine that contribute to maintenance of smoking behaviour (Fahim, Dragonetti, & Selby, 2015).

The stimulating effects of nicotine have been reported to increase attention and memory in smokers. For example, Ernst, Heishman, Spurgeon, & London (2001), found in an attention task that reaction time was shorter in a nicotine session than in the placebo session. Nicotine or smoking history did not affect scores on a verbal information processing task and there was a significant main effect of group on memory task. Smokers had the highest reaction time, followed by ex-smokers, and never smokers, respectively, indicating that nicotine improved attention but impaired memory (Ernst et al., 2001). Nicotine has also been found to have sedative effects as well. An interesting study by File, Fluck, and Leahy (2001), was conducted on non-smokers in which they were given transdermal nicotine patches and then completed a stressful task. After the task, questionnaires on mood were administered and it was found that nicotine seemed to have calming effect on stress-induced mood changes in females but that it had an aggressive effect on males (File et al., 2001). Another study by Pang, Zvolensky, Schmidt, & Leventhal (2015), examined gender differences in smoking expectancies and found that females believe that smoking reduces negative affect and use smoking as a way to relax more than males regardless of level of nicotine dependence or other smoking expectancies such as positive reinforcement, weight-reduction tool, or negative consequences (Pang et al., 2015). Using smoking as a way to cope with stress seems to be contrary to the stimulant effects of nicotine, however, a study done by Perkins, Grobe, Fonte, & Brues (1992), investigated this paradoxical concept by examining physiological cardiovascular effects (heart rate and blood pressure) of smoking and the subjective effects of smoking by having the participants complete either a high challenge or low challenge test while either allowing those to smoke cigarettes or “sham” smoking (pretending by holding but not actually smoking a cigarette) at designated points during the tests. Non-smokers were used as control. The authors noted anxiety was significantly higher

during the high challenge task in sham smokers than in smoking smokers. They also noted dramatic reductions in stress immediately after the smokers smoked during the high challenge task. Sham and non-smokers showed no significant decrease in stress. It was also found that stress reduction disappeared at the midpoint of each trial in the smoking group suggesting that the stress reduction effects of smoking on smokers are transient (Perkins et al., 1992).

The effects of smoking to relieve stress or reduce anxiety have been studied in students. Volrath (1996) examined first year university students in Switzerland who were experiencing stress and found a positive relationship between maintenance of smoking and negative affect, stress, and ineffective coping. Smokers tended to use more dysfunctional coping strategies (such as denial, distraction, disengagement, venting emotions, and use of alcohol/drugs) than emotion-focused or problem-focused coping strategies (Vollrath, 1996). As mentioned previously, women tend to use distorted coping for test anxiety, and smokers use dysfunctional coping strategies for stress, thus it follows that female smokers would be more likely to use distorted, dysfunctional coping strategies during times of stress and increase in smoking urges would result as a form of such distorted dysfunctional coping. In a study on stress and the impact on self-control, Oaten and Cheng (2005) noted that students reported an increase in smoking and caffeine intake behaviours during the exam period (Oaten & Cheng, 2005), a transient stress-inducing time for students. Although it has been reported that smoking increases during times of stress such as exam periods, the relationship between test anxiety and smoking behaviours has not been directly addressed. The present study had two objectives. The first was to investigate a positive relationship between test anxiety and proximity to exam period as anxiety has been found to increase as the exam draws near (Seipp, 1991; Lotz & Sparfeldt, 2017). The second was to investigate a positive relationship between exam anxiety and smoking urges. Specifically, as the

exam draws near, it is predicted that anxiety will increase, which will result in an increase in smoking urges as a means to cope with the increase in anxiety. This relationship would have implications for development and implementation of smoking cessation programs specifically designed for university students to reduce smoking at times of increased stress and anxiety such as exam periods.

Methods

Participants:

Participants were recruited for this study using SONA systems Psychology Research Participation Pool. Two two-part studies were set up in SONA, one study recruiting 15 participants who self-identify as non-smoking (includes ex-smokers who have quit for 3 months or more) and a second study that recruited participants who identify as smokers, operationally defined as occasional (more than one cigarette per week), or daily (one or more cigarettes per day) smoking. 12 non-smoking participants completed the first testing session and 11 returned and completed the 2nd session at one week before the Psychology 1000 midterm exam.

Due to technical difficulties and lack of smoking participants registered, the first testing session for the smoking participants was delayed by 1.5 weeks. This delay resulted in addition of a testing time period of 2.5 weeks before the midterm Psychology exam (T2). Five participants completed the first session, however, all 5 indicated on the demographic questionnaire that they were non-smokers, and therefore the data collected was included in the non-smoking population. Only 2 of the 5 participants returned for the second testing session at one week before the midterm exam (T3).

Additional testing was set up in SONA, plus contact with professors of Psychology 1000 classes to initiate verbal recruitment of smoking participants, however, no participants signed up for the study. All participants were enrolled in full-time study (3.0 course load or greater) as well as in Psychology 1000 at Brescia University College.

Materials:

Smoking History Measure/Demographics (Questionnaire #1):

Questionnaire #1 was a demographic questionnaire (see Appendix A) which included information as to age, full-time status, number of courses, number of exams, and smoking history. Smoking history included questions such as “have you ever in your life smoked a cigarette?”, “do you occasionally smoke cigarettes (less than one per day)?”, “do you smoke cigarettes daily (more than one per day)?” If yes was answered to any, the number of cigarettes smoked per day/week was to be answered as well.

Stress/Anxiety Measure:

Questionnaire 2 (Appendix B) is a modified version of the Depression Anxiety Stress Scales (DASS) (Lovibond & Lovibond, 1996). The original DASS is 21-item 4-point likert scale questionnaire that contains subscales of anxiety, depression, and stress. The depression subscale of the DASS was not included as only anxiety and stress are the measures of interest for this study. The modified version consisted of 14 items. Participant rates statements according to frequency and intensity of experiences over the last week where 0 = not at all like me, 1 = applied to me to some degree, or some of the time, 2 = applied to me to a considerable degree, or a good part of the time, 3 = applied to me very much, or most of the time. Examples of the

statements include: “I found it hard to wind down”, “I tended to over-react to situations”, “I felt scared without any good reason”. There is no reverse scoring on this measure.

Smoking Urges Measure (Questionnaire #3):

The participants who self-identified as smokers in SONA were asked to also fill out the Brief Questionnaire on Smoking Urges (Appendix C). This questionnaire is a 7-point Likert scale on smoking urges at the present moment. The participant reads such statements as “Nothing would be better than smoking a cigarette right now”, “I could control things better right now if I could smoke”, “smoking would make me less depressed” and rates them from 1-7 where 1 = strongly agree, 2 = disagree, 3 = disagree a little, 4 = neither agree nor disagree, 5 = agree a little, 6 = agree, and 7 = strongly agree. There are two subscales in this questionnaire that are associated with two dimensions of self-reported urges to smoke. Items 1, 3, 6, 7, and 10 refer to a “a desire and intention to smoke with smoking perceived as rewarding”. Items 2, 4, 5, 8, and 9 refer to “an anticipation of relief from negative affect with an urgent desire to smoke” (Cox, Tiffany, & Christen, 2001). Because all of the supposed smoking participants identified as non-smokers, this questionnaire data was not included in the analysis.

Procedure:

Time 1 (T1) testing took place 4 weeks before the Psychology 1000 midterm exam. T2 took place at 2.5 weeks before the same exam. T3 took place at one week before the exam. Testing sessions were completed in group sessions in one of Brescia’s classrooms.

T1 – 4 weeks before exam (“non-smokers”)

Participants were given a pen, and a testing package. The package included a participant number, the information form, a consent form, a paper Questionnaire #1 (demographic

questionnaire) and a paper Questionnaire #2 (Modified DASS). The participants read the information sheet and signed the consent form. Any questions about the study were answered. Once finished, the participants handed in the forms. The participants were thanked and asked to return in 3 weeks for session #2. The session was open for 20 minutes. Each participant was awarded one research credit.

T2 – 2.5 weeks before exam (“smokers”)

Participants were given a pen, and a testing package. The package included a participant number, the information form, the consent form, a paper Questionnaire #1 (demographic questionnaire), a paper Questionnaire #2 (Modified DASS), and a paper Questionnaire #3 (Brief Questionnaire on Smoking Urges). The participants read the information sheet and signed the consent form. Any questions about the study were answered. Once finished, the participants handed in the forms. Participants were randomly assigned a participant number. The session was open for 30 minutes. Each participant was awarded one research credit.

Note: all participants in this session indicated on the demographic form that they were non-smokers and so the data collected was included in the non-smoking population.

T3 – 1 week before exam

Participants were given a pen and another Questionnaire #2 labelled with their corresponding participant number. Each participant completed the questionnaire, handed it in, and were given a debriefing form. The participants were thanked and any questions were answered.

Results

All statistical analyses were performed using SPSS. Anxiety and stress have been shown to be highly correlated constructs. To confirm this, a Pearson correlation analysis was run on anxiety and stress scores for this sample. The results revealed a significant positive relationship between anxiety and stress scores, $r=.84$, 95% BCa CI [.705, .929], $p=.00$, with a large effect size, $r^2=.71$.

Anxiety and Stress Increases as exam draws near.

The expectation was to have two groups (smoking and non-smoking) participants tested twice for within-subjects comparison of anxiety and stress. Due to technical difficulties and lack of participants recruited for the smoking group, an additional time of testing was done at 2.5 weeks before the final exam, resulting in 3 time-points, T1 (4 weeks before Midterm exam), T2 (2.5 weeks before midterm exam) and T3 (1 week before midterm exam). The three time-points were treated as a between-subject design. A one-way ANOVA was performed using stress and anxiety scores as the dependent variables, and time as the independent variable. The assumption of homogeneity was not violated ($p>0.05$). The results of the ANOVA indicated that there was not a significant difference in the means of anxiety scores $f(2, 28) = .69$, $p = .51$, or stress scores, $f(2, 28) = .64$, $p = .67$, between the three-time groups (see Figure 1.0). Contrast analysis was performed and showed no significant difference between anxiety scores or stress scores at T1, T2, and T3 (see Table 1).

Smoking Urges, Anxiety, and Stress in Smoking Participants

Anxiety and stress scores as well as smoking urges data were not collected on smoking participants due to the lack of smoking participants available for the study.

Number of Exams

One-tailed Pearson Correlation analysis was run to see if the number of exams a student has, was related to an increase in anxiety and stress scores. Results indicated that number of exams was not statistically significantly related to anxiety, $r(2,28) = .23$, $p = .11$, or to stress, $r(2,28) = .08$, $p = .34$.

Normative Data

Normative data was taken from a study using the DASS-21 for a large adult non-clinical sample of UK adults (N=1794) (Henry & Crawford, 2005). Mean scores for the anxiety subscale was 1.88, and the mean score for the stress subscale was 4.73. A t-test was performed for anxiety scores using the normative means as a test statistic, comparing the two groups. T-test for anxiety indicated that there was a significantly large difference in mean anxiety scores, $t(30) = 5.183$, $p = .000$, 95% CI [2.91, 6.69], effect size = 0.93, of the student population compared to the general public. A T-test for stress indicated that there was also a significantly large difference in mean stress scores $t(30) = 5.363$, $p = .000$, 95% CI [3.24, 7.23], effect size = 0.96. See Figure 2.0 for a graph depicting comparisons of mean scores.

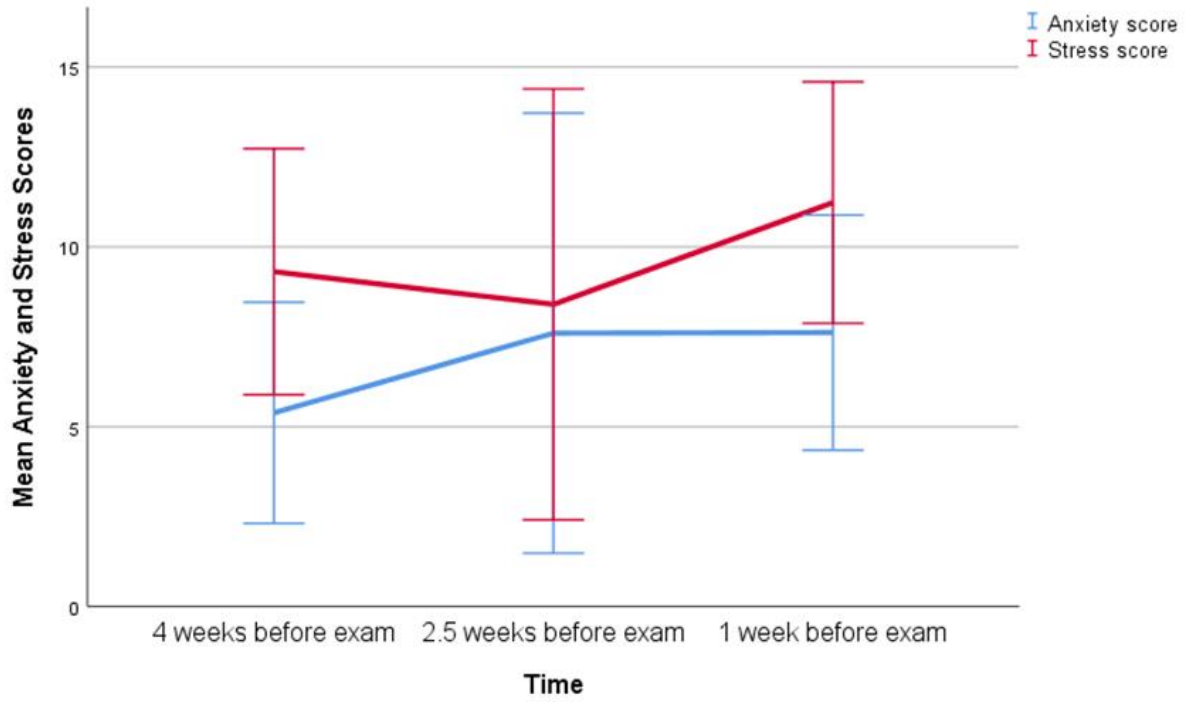


Figure 1.0 Graph showing mean anxiety and stress scores at three time-points; 4 weeks before exam, 2.5 weeks before exam, and 1 week before exam. No significant differences in scores was found. Error bars 95% CI.

	<i>Group</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>Sig.</i>
<i>Anxiety</i>	T1	5.38	5.091	1.117	.274
	T2	7.60	4.930	.006	.996
	T3	7.62	5.409	.006	.996
<i>Stress</i>	T1	9.31	5.663	.241	.811
	T2	8.40	4.827	.977	.337
	T3	11.23	5.555	.977	.337

Significant at $p < .05$

Table 1: Contrast analysis results of anxiety scores and stress scores at T1 (4 weeks before exam), T2 (2.5 weeks before exam), and T3 (1 week before exam).

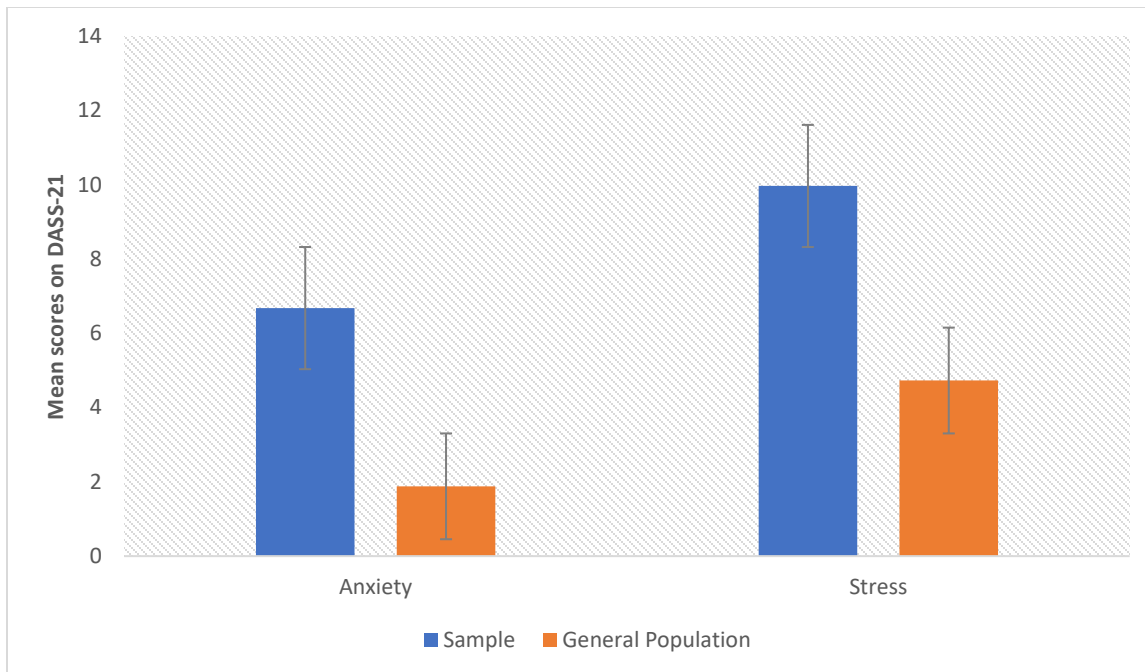


Figure 2.0 Graph displaying differences in means of anxiety scores and stress scores on the DASS-21 in this sample of university students compared to the general population.

Discussion

The results indicate that there was not a significant difference in anxiety or stress scores for the non-smoking population at 4 weeks, 2.5 week or 1 week before the midterm exam, which did not support the hypothesis that anxiety and stress would increase as exams draw near. A potential explanation is a “ceiling effect”, where the anxiety and stress levels of university students are already so high at the first testing point that the scores cannot increase at the subsequent testing points. To examine this further, the mean scores of anxiety and stress were compared to normative data for the DASS-21 and it was found that the mean for this sample of university students was well above the mean for the general population. This suggests that perhaps university students should be considered a special population which has higher and more consistent anxiety and stress scores than the general population. Anxiety and stress measurement tools designed with this special population in mind would be useful for future research.

According to the results, anxiety and stress levels remain consistent throughout the semester. To ensure that number of exams the students had to study for did not contribute to the anxiety and stress scores, a regression analysis was run and it was found that the number of exams did not significantly predict anxiety or stress scores. This means that anxiety and stress scores would remain consistent even when number of exams is taken into consideration. This is also evidence suggesting that university students’ anxiety and stress scores are consistently high. One possible explanation for this is that the sample had consisted of all females and it has been found in previous research that females tend to have higher anxiety than males. Studies on gender differences have found females have higher social anxiety (Sowa & LaFleur, 1986) and test anxiety than males (Sowa & LaFleur, 1986; Cassady & Johnson, 2002). Perhaps if the sample had consisted of male and female participants, differences in anxiety scores between time points would be found. Regardless of gender differences, the present study found that anxiety and stress levels are high for university students and future research should focus on the effects of this increased stress and anxiety on the mental wellbeing of university students.

A significant limitation of this study was the lack of smoking participants which greatly affected the analysis. The hypothesis that smokers would have increased anxiety and stress scores compared to

non-smokers was not able to be assessed due to lack of participants. As well, smoking urges in a smoking population was hypothesized to increase as the midterm exam approaches to help cope with the increased anxiety and stress, however, this was not able to be assessed due to lack of participants. Participation could have increased with a larger participation pool. There is also the possibility that there are fewer university students in general who smoke or are willing to admit that they smoke. Social desirability should be considered as a reason for decreased participation in this study as those who smoke do not want to admit that they smoke for fear of social stigma. Smoking seems to have become less socially desirable, not to mention less accessible with increased smoke-free areas, including outdoor facilities and buildings, especially at educational institutions. Whether the smoking population has decreased, or the social stigma has increased, is hard to tease apart when studies in smoking behaviour rely on self-reports to assess smoking history and behaviour. Future research should focus on finding alternative ways of investigating smoking behaviour that does not include self-reports.

In conclusion, although the study did not assess anxiety, stress, and smoking urges in the smoking university student population, the study did examine anxiety and stress levels of non-smoking students and found that the anxiety and stress levels of the student population are higher than in the general population. As a result, the study provides evidence that university students are a special population and thus universities should provide programs to assist students in coping with anxiety and stress. Due to the high anxiety and stress scores, investigation into whether the DASS-21 is sufficient at measuring stress and anxiety in this population is warranted also.

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