

ORIGINAL PAPER

DEPRESSIVE SYMPTOMS AND PERCEIVED CHRONIC STRESS PREDICT TEST ANXIETY
IN NURSING STUDENTS

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Abstract

Aim: The aim of this study is to identify predictors of test anxiety in nursing students. **Design:** Cross sectional pilot study. **Methods:** A questionnaire was administered to 112 students of an Austrian nursing school (mean age = 21.42, SD = 5.21). Test anxiety (measured by the standardized PAF Test Anxiety Questionnaire), perceived chronic stress, depressive symptoms, pathological eating and further psychological and health parameters were measured. **Results:** We found highly significant correlations between test anxiety and working hours (0.25), depression score (0.52), emotional stability (-0.31), and perceived chronic stress (0.65) ($p < 0.01$, for all). Regression analysis revealed chronic stress and emotional instability as best predictors for test anxiety. Furthermore, path analysis revealed that past negative academic performance outcomes contribute to test anxiety via depressive symptoms and perceived chronic stress. **Conclusion:** Depressive symptoms and perceived chronic stress are strongly related to test anxiety. Therefore therapy and training methods that address depressive symptoms and perceived chronic stress, and thereby aim to modify appraisal of potential stressful situations, may be successful in addressing test anxiety.

Keywords: nursing education, depressive symptoms, test anxiety.

Introduction

Burnout and stress-related health disorders in nurses are major research issues often related to poor work environment, early exit from the profession and problems with image and recruitment (Hasselhorn et al., 2003; Khamisa et al., 2013; Mazano-Garcia, Ayala-Calvo, 2014; Milisen et al., 2010; Rudman et al., 2014). However, data is much scarcer regarding health and stress issues involved in nursing education, although this would seem to be an opportune period in which to begin prevention of and training in coping with stressful situations. Evidence suggests that burnout symptoms can appear in nursing students and have significant effects on their professional life, including future clinical performance (Rudman, Gustavsson, 2012). Primarily, this evidence focuses on stress related to the clinical practice of nursing students (Hausmann, 2009; Jimenez et al., 2009). Little is known about academic stressors such as exams and fear of failure.

From a teaching perspective these aspects play an important role in the everyday life of students. Evidence indicates that test anxiety is a significant stressor for students which can have physiological implications (Simic, Manenica, 2012; Zhang et al., 2011). There may be a relationship between test anxiety and ability to cope with exam situations. Doron et al. (2009) showed in a study of more than 400 undergraduate students that self-belief significantly predicted the use of active coping mechanisms, planning, and the seeking of social support before exam situations. There is evidence that problem-focused coping behaviors are more adaptive in those in good psychological health (Wang, Yeh, 2005). Self-doubt and test anxiety may also be related to negative test outcomes (Grolimund, 2004). Hodapp et al. (2011) reported a correlation coefficient of 0.17 ($p < 0.05$) between the PAF Test Anxiety Questionnaire and self-reported test outcomes in a student group ($n = 161$). Furthermore, academic performance seems to be negatively correlated with stress, indicating an association between test anxiety and stress (Ahrberg et al., 2012). Test anxiety is also associated with mental health. The results of a Swiss study involving more than 400 participants indicate that avoidance of exams may be a symptom of depression. Incidence of depression

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was almost twice as high in a group of students that had withdrawn from exams than in other students (Meyer de Stadelhofen et al., 2003). These results are supported by Gibbons (2010), who found that test-avoidance is the best predictor for burnout in nursing students.

Aim

The aim of the current study was to gain deeper insight into the predictors of test anxiety and the degree to which nursing students are affected by it.

Methods

Design

A cross-sectional study.

Sample

This cross-sectional study was conducted at the nursing school of Linz General Hospital. 117 trainees from all three levels of the nursing curriculum were requested to complete a questionnaire about test anxiety (convenience sample). They filled in the

questionnaire during their lectures. Five participants were excluded from the data analysis due to extensive missing data and/or missing information in the socio-demographic data section. 112 students were included in the analysis, aged between 17 and 48 (mean = 21.42, SD = 5.21), of whom 91.07% were female, and 8.93% were male.

Data collection

Variables

Test anxiety

Test anxiety was measured by a German version of the standardized PAF (Prüfungsangstfragebogen) Test Anxiety Questionnaire (Hodapp et al., 2011). The PAF contains 20 items and five subscales of test anxiety: excitement, concern, interference and lack of confidence. Items focus on emotions and cognition during exam situations (for example: 'I experience oppressive feelings'). Scores range from zero to four, with high scores indicating high test anxiety).

Table 1 shows Cronbach's Alpha values between 0.79 and 0.88, indicating the high reliability of this scale.

Table 1 Test anxiety measured by PAF (Hodapp et al., 2011): Comparison of study group with reference sample

	Study (n = 112)			Reference sample PAF (n = 1.350)		
	M	SD	Alpha	M	SD	Alpha
Excitement ¹	11.54	3.74	0.83	10.12	3.60	0.86
Concern ¹	14.48	3.39	0.79	13.05	3.36	0.81
Interference ¹	9.96	3.05	0.77	8.89	3.00	0.79
Lack of confidence ¹	10.95	3.56	0.87	11.72	3.09	0.85
Test anxiety ²	46.90	9.21	0.85	43.78	9.25	0.88

¹PAF subscale; ²PAF sum score

Psychological variables

We used the WHO-5 well-being questionnaire to assess depressive symptoms ('depression') (Lowe et al., 2004). This questionnaire contains five screening questions (for example: 'I have felt cheerful and in good spirits'). Scores range from zero to five, with high scores indicating greater well-being; for scaling, item polarities were reversed).

Data addressing adverse eating behaviors ("pathological eating") was collected using the SCOFF (Sick Control One stone Fat Food) questionnaire, consisting of five yes/no-items (for example: 'Do you make yourself sick because you feel uncomfortably full?') (Hölling, Schlack, 2007).

To identify coping strategies ('Coping engagement vs. disengagement') we translated the Coping Strategies Inventory Short Form (CSI-SF) by Addison et al. into German (2007). 16 items focus on coping strategies [for example: 'I try not to think

about the problem']. Response categories range from zero (never) to four (very often)].

Personality was addressed by a ten-item scale referring to the Ten-Item Personality Inventory (TIPI), including extraversion, agreeableness, conscientiousness, emotional stability, and openness. Each item consists of two descriptors, separated by a comma, using the common stem, 'I see myself as...'. Each of the five items was rated on a seven-point scale ranging from one (disagree strongly) to seven (agree strongly). (Gosling et al., 2003).

The amount of chronic stress was measured by a short version of the Trier Chronic Stress Inventory (TICS) (Schulz et al., 2004). The questionnaire has 12 items covering five different forms of chronic stress for the period of the past three months: chronic concerns, work- and socially-related overload, excessive demands and lack of appreciation [for example: 'Experience of fear that something

unpleasant will happen'. The scale ranges from 0 (never) to 4 (very often)].

Other variables

We assessed the frequency of ten common symptoms (for example, headache and backache) against the Likert-scale (0 = never; 4 = very often). To identify possible relationships between ability to concentrate on a task and test anxiety, we used the D2 Test of Attention. For analysis, we used the raw score of mistakes (Brickenkamp, 2002). Furthermore, we asked students for their grade point mean (test outcome) for the current semester. Further questions address health issues, socio-demographic data, and learning habits.

Data analysis

We used IBM SPSS Statistics 21 for our statistical analysis. Descriptives and reliability analysis were calculated for the PAF scale and subscales. Intercorrelations (Pearson correlation coefficients) were calculated for test anxiety (PAF sum score and subscales), psychological variables, and other variables. A stepwise linear regression analysis with test anxiety as the dependent variable was obtained, including variables that were significantly correlated with test anxiety. An exploratory path analysis, including grade point mean, depression score, chronic stress and test anxiety, was calculated.

Results

Descriptives

Table 1 shows a reliability analysis of the PAF Test Anxiety Questionnaire. Cronbach Alpha values were between 0.77 and 0.87. This is comparable to the reference sample, indicating the high reliability of the scale. Although not significant, the mean of the scale is higher than in the reference sample. The proportion of highly test anxious and highly chronically stressed students was significant in participants: 10.7% and 22.3%, respectively. The cut-off values corresponded to the percentage rank (PR) 95 of the reference sample (Hodapp et al., 2011; Schulz et al. 2004).

Predictors of test anxiety

Correlation analysis showed highly significant correlations between test anxiety and working hours per week, emotional stability, depression, chronic stress ($p < 0.01$ for all) and grade point mean, symptoms, pathological eating and coping disengagement ($p < 0.05$ for all) (see Table 2).

In a stepwise linear regression model, including significantly correlated variables with test anxiety as the dependent variable, chronic stress was the best predictor ($R^2 = 0.42$, for model 1). Model 2 included chronic stress and emotional stability ($R^2 = 0.44$) (Table 3).

Table 2 Intercorrelations of possible predictors with test anxiety

	Excitement ¹	Concern ¹	Interference ¹	Lack of confidence ¹	Test anxiety ²
Working hours	0.24*	0.23*	n.s.	n.s.	0.25**
Grade point mean ³	n.s.	n.s.	0.24*	0.27**	0.23*
Test of attention	n.s.	n.s.	n.s.	n.s.	n.s.
Symptoms	0.22*	n.s.	0.26**	0.23*	0.22*
WHO-5 Depression	0.42**	n.s.	0.36**	0.62**	0.52**
Pathological eating	n.s.	n.s.	0.32**	n.s.	0.20*
Coping Engagement	n.s.	0.21*	n.s.	-0.44**	n.s.
Coping Disengagement	n.s.	-0.26**	0.45**	0.24**	0.21*
Extraversion	n.s.	n.s.	-0.20*	n.s.	n.s.
Agreeableness	n.s.	0.19*	n.s.	n.s.	n.s.
Conscientiousness	n.s.	0.27**	n.s.	n.s.	n.s.
Emotional Stability	-0.28**	n.s.	-0.28**	-0.25**	-0.31**
Openness	n.s.	n.s.	n.s.	-0.24*	-0.21*
Chronic stress	0.57**	n.s.	0.40**	0.63**	0.65**

¹PAF subscale; ²PAF sum score; ³High values indicate worse academic performance; * $p < 0.05$; ** $p < 0.01$

Relation between exam outcomes and test anxiety

The correlation between self-reported exam outcomes (grade point mean) and the test anxiety scale was significant (Table 2). We wanted to explore this relationship further and identify possible cause-and-

effect structures, as teaching staff hypothesized that test anxiety might be caused by previously poor exam outcomes. Grade point mean was significantly correlated with depression ($r = 0.31$, $p < 0.01$), but not with chronic stress (0.19 , $p = 0.06$). Chronic stress was significantly related to depression ($r =$

0.72, $p < 0.01$). An exploratory path analysis showed that the relation between grade point mean and test

anxiety is mediated by depression and chronic stress (see Figure 1).

Table 3 Stepwise linear regression analysis, dependent variable: Test anxiety

		Standardized Beta coefficient	p
Model 1:	Chronic stress	0.65	< 0.001
Model 2:	Chronic stress	0.61	< 0.001
	Emotional stability	-0.15	< 0.05

Adjusted R^2 the model 1 = 0.41, F-Change $p < 0.01$; Adjusted R^2 the model 2 = 0.43, F-Change $p < 0.05$

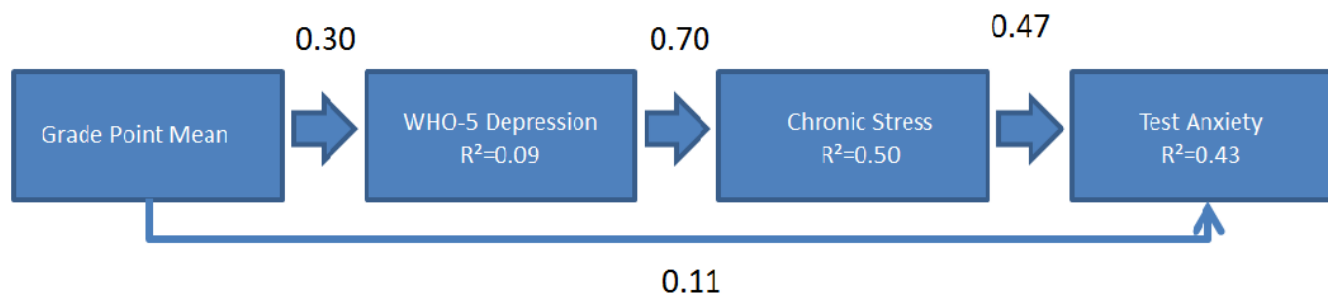


Figure 1 Results of explorative path analysis. Path coefficients are partial correlation coefficients > 0.10 . Grade Point Mean: High values indicate worse academic performance

Discussion

Our study revealed that test anxiety and chronic stress were considerably higher than in the reference samples of the standardized questionnaires, namely the PAF and TICS, respectively. For example, the proportion of highly test anxious students was more than twice the expected figure (10.7%) (Hodapp et al., 2011). Furthermore, this pilot study showed a strong association between test anxiety and perceived chronic stress. Chronic stress was the best predictor of test anxiety and accounted for more than 40% of the variance.

Although chronic stress and burnout are mostly discussed in the context of nurses during their professional career and related to workplace characteristics, recent evidence supports our results indicating that nurses have high stress levels, even *before* they begin their professional career. Hausmann (2009) found that the burnout level of nursing students was similar to that of nurses. Jimenez (2009) discussed the role of academic stressors in nursing students in his study, and Hegge, Larson (2008) found that more than 60% of accelerated nursing students experienced extensive or extreme stress during their education.

Additional evidence from a longitudinal study ($n = 6,147$) measuring the use of antidepressants shows that mental health problems are more frequent in nurses than in the normal population – even before starting their professional career (Madsen et al., 2012).

Teaching staff are inclined to regard test anxiety as a direct outcome of past negative academic performance. However, our results indicate that there are, in fact, multi-causal explanations for it. The correlation between self-reported academic performance (grade point mean) and test anxiety (0.23) was comparable to Hodapp et al. (0.17). Exploratory path analysis revealed a relationship between self-reported academic performance and test anxiety via depressive symptoms and perceived chronic stress. In a study of 144 medical students, Ahrberg et al. (2012) found a significant correlation between highly subjective stress and low academic performance ($r = 0.28$). Metalsky et al. (1993) reported that negative exam outcome is associated with immediate and enduring depressive reactions. The *low* R^2 (see Figure 1) of academic performance for depression as a dependent variable can be explained by the multi-factorial nature of depressive symptoms. They are not influenced by academic performance alone but by life events, everyday difficulties, genetics, personality, physical activity etc. Genetics in particular seem to play a major role in variables related to depressive symptoms measured by the questionnaire. In studies of twins, Rietveld et al. (2013) found that 30–40% of the variance of subjective well-being was attributable to genetics. In another sample of approximately 11,500 Swedish and Dutch individuals, the estimate was put at approximately 12–18%. A twin study by Bogdan et al. (2009) estimated that 46% of the variance for hedonic capacity and 44% of perceived stress is

determined by genetics. Furthermore, the correlation between depression and perceived stress was high ($r = 0.67$), which is supported by our results (see Figure 1). Elavsky, Gold (2009) also reported a significant relationship between depressive mood and perceived stress in 212 American women. Depressive symptoms seem to influence the way we perceive stress. Perceived chronic stress, that is, the feeling that one cannot cope with the multiple challenges of everyday life, can lead to anxiety in a performance-related situation. Therefore, depressive symptoms would seem to be a fundamental component of test anxiety. This is in line with the results published by Meyer de Stadelhofen (2003), who defined withdrawal from exams as a symptom of depression.

However, test anxiety can be addressed by therapy. Can et al. (2012) showed that cognitive and behavioral therapy techniques can be effective in reducing test anxiety. Our results indicate that therapy strategies that focus on depressive and stress symptoms may also have an effect on test anxiety. This may also explain why hypnosis and behavioral therapy seem to have beneficial effects on exam worries whereas simple relaxation techniques that focus on test anxiety alone and do not address depressive symptoms are not so effective (Grolimund et al., 2004). Furthermore, nursing educators should consider changes in organizational structures and in the curricula in order to reduce the potential for chronic stress and test anxiety.

As mentioned above, our sample experienced high stress levels. Evidence suggests stress and depressive symptoms do not exclusively become apparent in nurses during their professional career but even before, and to a higher degree than in the normal population. Madsen et al. (2012) supposed that this is due to a selective process. Results indicate that depressive symptoms may not be the result of perceived stress but rather the cause of it: they influence the way we perceive and appraise stressful events, as described in Lazarus' stress model (Lazarus, Folkman, 1984). This would partly explain why workplace characteristics do not often significantly influence health outcomes. Favourable changes in psycho-social working conditions did not predict long-term sickness absence, but depressive symptoms did (Hjarsbech et al., 2013). In addition, quality of leadership had no effects on depressive symptoms in elder-care workers (Madsen et al., 2014), possibly because depressive symptoms are influenced by many factors, as mentioned above. These aspects also seem relevant to research into burnout. Rudman, Gustavsson (2011) found that burnout levels in newly graduated nurses remain relatively stable over time and changes are

accompanied by changes in depressive symptoms. A recent review published by Khamisa et al. (2013) showed that there is insufficient evidence of a relationship between work-related characteristics and health outcomes, especially burnout, in nurses. As this is a pilot study, the sample is small and any conclusions should be regarded with caution. Further studies must replicate these findings and propose effective strategies to avoid test anxiety in nursing students. In addition, more research is needed in the area of stress and depressive symptoms in nurses before the start of their professional careers in order that evidence-based prevention programs can be devised for them (Augner, 2013).

Conclusion

Our study reveals that there is a high prevalence of chronic stress and test anxiety in nursing students and that depressive symptoms and perceived chronic stress are strongly related to test anxiety. Experience of failure together with depressive ways of thinking seem to be important contributors to perceived chronic stress. Therefore, cognitive behavioral therapy techniques that address depressive symptoms and perceived chronic stress may be successful in ameliorating test anxiety. Future studies should develop and evaluate strategies to reduce test anxiety in nursing students.

Ethical aspects and conflict of interest

Informed consent was obtained. Participation was completely voluntary and subjects could withdraw from the study at any time. Procedures were consistent with the ethical guidelines of the expanded Helsinki Declaration (World Medical Association Declaration of Helsinki, 1997) and those suggested by the American Psychological Association (2002). Head authorities of the nursing school of Linz General Hospital, Austria, gave approval to the study [02-05-2013].

The authors declare no conflicts of interest.

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