

Review

Test anxiety and neurotizm

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The present study examined the association of the personality trait neuroticism and test anxiety (encoded as worry and emotionality) as well as social relationships (teacher-student and student-student relationship) as possible mediators for girls and boys. Participants were 8th grade students (N = 512) attending schools in Konya. Using cross-sectional data in a self-report study the association between neuroticism and test anxiety was found and was mediated by high quality student-student relationships for both girls and boys. Furthermore, it was shown that especially for girls, a positive teacher-student relationship was associated with low test anxiety. Based on these results, practical implications for the prevention of test anxiety can be derived.

Key words: Test anxiety, neuroticism, student-student and teacher-student relationship, early adolescence, mediator analysis.

INTRODUCTION

Many students, though capable to pass a good exam, fail to do so, because of fear of taking exams (test anxiety from now on). Students who fear being tested, are more easy to deflect, have problems processing relevant information, problems distinguishing relevant from irrelevant information and have problems to bring relevant information in meaningful order that can be voiced to the examiner (Hedl, 1972; Sarason, 1980; Spielberger et al., 1980; Gençdoğan, 2002; Hancock, 2001). If a test is represented by the teacher as very important or even existential, this favors additional test anxiety (Putwain and Best, 2011). Hence, test anxiety may hamper school education and may lead to aborting school education prematurely (Wacker et al., 2005; Gass and Curiel, 2011).

It is quite striking that no other emotion has been researched as extensively as has been test anxiety over the years. A fact, well documented by the more than 1,000 studies, national as well as international, covering this subject (Schnabel, 1998). However, studies considering personal traits of students as well as aspects of

the school environment have been rare up to now. But researchers trying to establish what causes test anxiety and researcher who will provide some cure or relief for students hampered by test anxiety will have to come up with an empirical model that not only refers to and investigates structural determinants of the test environment like the relationship between teacher and student or between students, but that considers personal traits as well. It can be assumed that structural and personal variables conspire to bring about text anxiety (Hancock, 2001).

This thesis aims at doing exactly that, thereby reducing a residual and providing valuable starting points for preventing and treating test anxiety. To do so, neuroticism will be examined with respect to its link to anxiousness and nervousness, which both will be treated as constituents of test anxiety. Empirical results of this paper suggest that teacher-student relationships as well as student-student or between-students relationships act as mitigating factors effecting the link between neuroticism and test anxiety. This result will be discussed with

respect to methods for treatment and prevention.

TEST ANXIETY IN SCHOOLS

Test anxiety, as most often mentioned by students is an important determinant of psycho-somatic health, development of personality and (school) performance (Pekrun, 2000; Selkirk et al., 2011). Based on a study drawing on diary entries, pressure to get better marks, test anxiety and anxiety of receiving poor marks are among the stress factors most often cited by children and adolescents (Seiffge-Krenke, 1995). A study conducted among students in Austria showed that 56% of these students to report feelings of being overcharged, 73% reported a fear of poor marks and 53% of the students voiced their conviction that they could get better marks if only they had less anxiety of being tested (Katschnig and Hanish, 1999; Putwain et al., 2010).

Test anxiety is to be found at all school levels (Winkel, 2009), which is the result of the ever present moments of stress and anxiety induced by the school environment, manifest, e.g., in regular tests and the like (Wong, 2008). Tests are a custom component of schooling and quite often they are experienced as involuntary routine by students (Suhr-Dachs, 2006; Hang et al., 2009). As early as in primary schools pressure to perform starts building on students. Especially at the end of primary school, when selection of secondary schools takes place in German-speaking countries, schools become more and more an arena of student-assessment. Hence, it is almost impossible to not being confronted with test situations during one's lifetime. Especially, girls show higher levels of test anxiety as compared to boys (Di Maria and Di Nuovo, 1990; Horstkemper, 1995), and girls more often suffer from depression, anxiety and psychological disorders (Essau, 2002; Federer et al., 2000). One strand to explain this gender sensitivity of test anxiety posits a relationship between socialisation, especially the learning of role models which ascribe more emotionality and less self-control to women than men (Di Maria and Di Nuovo, 1990; Katschnig and Hanisch, 1999). Another strand, however, attributes the different amounts of test anxiety to be found in women and men to biological factors, that are assumed to predispose women more to test anxiety than men (Ernst, 2001; Lewinsohn et al., 1998; Nishizawa et al., 1997). Gender relation is a tendency that women rely more on for social support systems than men (Aysan et al., 2001). Test anxiety is also related to a stronger avoidance behavior (Stowell et al., 2008). This is confirmed by the finding that higher test anxiety with the choice of coping strategies is related effectively (Aysan et al., 2001).

A negative influence exerted by test anxiety on school performance, school motivation, psycho-somatic health and self-concept has been established in many studies and irrespective of gender (Deci and Ryan, 1990; Fehm

and Fydrich, 2011; Pekrun, 2001; Zeidner, 2004; Lang and Lang, 2010). Results published by Cortina (2008) show students high in test anxiety to get results that are at least half a grade worse than they would usually get. Furthermore, Deci and Ryan (1990) could show that Students' intrinsic motivation suffered when they received negative assessments of their school performance from teachers and with each negative feedback their anxiety of being tested increased (Wild et al., 2006; Gass and Curiel, 2011). Students who score high on test anxiety may have an increased risk of playing truant and they may even drop-out of school (Cortina, 2008). Furthermore, fear of getting poor grades may foster a development of social anxiety, e.g., fear of losing peer recognition (Suhr-Dachs, 2006). Additionally, studies could show that students with high levels of test anxiety tended to social exclusion (Gillham et al., 2006; Wood, 2006; Niditch and Varela, 2011), which, in turn, may lead to a further increase in test anxiety due to a lack of social support.

Hence, students high in test anxiety constitute a group at risk of entering a negative feedback loop that sees their school career spiralling down. Furthermore, students high in test anxiety are prone to develop psycho-somatic disorders (anxiousness, nervousness) and, because of their social isolation, they are prone to develop depression and isolation (Bukowski et al., 2010; Bonaccio and Reeve, 2010).

TEST ANXIETY AND NEUROTICISM

Not every student is anxious of being tested. Apart from experience with being tested personality traits are most important with respect to experiencing anxiety of being tested. Students showing trait anxiety that can be seen as level of anxiety inherent to the respective students tend more often to revert to state-anxiety in test situations as do students with an average level of anxiety (Spielberger and Vagg, 1995). Especially neuroticism has been shown to have a negative effect on the perception of stress, on strategies to cope with stress on somatic afflictions and psychic well-being (Huebner, 1991; Oerter, 2008). Accordingly, neuroticism may increase test anxiety and may activate trait-anxiety to become state-anxiety. Neuroticism is considered to be a personality trait and is usually operationalized as anxiety, state of disorganization, as marked by low self-confidence and loss of control in situations of stress (Duggan et al., 1995; McCrae, 1990). In a regression analysis, neuroticism test anxiety could be well predicted (Chamorro-Premuzic et al., 2007). Then there is, perhaps, associated with neuroticism fear of being judged by others. This is known as a personality factor test anxiety like factor (Putwain et al., 2010). Even the self-concept and related attributions still play an important role in the development of test anxiety.

Accordingly, students high in trait-anxiety can be expected to suffer more from test anxiety than students low in trait-anxiety. Furthermore, with the aim being a reduction in test anxiety, it is important to consider not only students' personality, but also individual perception of stress situations and social relationships. For example, a neurotic student high in trait-anxiety can be expected to avoid social interaction and increase test anxiety by the subsequent lack of social support. By contrast, a more extrovert student would be expected to easily make contact to peers and/or teachers and to reduce or avoid test anxiety as a function of social support directly resulting from this more extrovert personality.

SOCIAL RELATIONSHIPS IN EDUCATION

According to social connectedness theory, anxiety is the result of social exclusion and lacking belongingness to a community (Cohen and Willis, 1985; Lee and Robbins, 1998). With respect to education some studies showed that between students relationships had a positive impact on school performance, self-confidence, school participation and had a positive impact on psychosocial adaption while hampering development of anxiety and counteracting feelings of isolation (Newcomb et al., 1993; Schmidt-Denter, 2005; Schwartz et al., 2005). Also, the teacher-student relationship plays a role as long as the students who are underestimated by the teachers have more stamp of test anxiety (Urhahne et al., 2010).

In the same vein, it is known that teacher-student relationships based on trust, compassion that harbour little if any potential for conflict, increase students' willingness to perform, their discipline and self-esteem (Eder, 2006; Wentzel et al., 2010). Thus, quality of the relationship between teacher and student is an important predictor of student's school performance and student's well-being (Baker et al., 2008).

Drawing on these findings it can be assumed that a teacher-student relationship as well as between-students relationships that provide a positive emotive basis for girls and boys reduce test anxiety and further the development of personality.

EMPIRICAL INVESTIGATION

Research question and hypotheses

Based on the assumptions that (a) as compared to boys girls overall do have a higher level of test anxiety, (b) that anxiousness is a facet of the personality trait 'neuroticism' and (c) that well-working and intact social networks exert a positive influence on stress perception the following hypotheses have been derived:

H₁: Girls report higher levels of test anxiety than boys, with anxiety being operationalized as anxiousness and nervousness, and girls do reach higher levels of neuroticism than boys.

H₂: A positive correlation can be found between anxiousness, nervousness (as measures of test anxiety) and neuroticism.

Furthermore, a negative correlation exists between anxiousness, nervousness and neuroticism with between student's relations and teacher-student relation.

H₃: Correlations between neuroticism, anxiousness and nervousness are mediated by between student's relations and student-teacher relations that are positively experienced. This is the case for boys as well as for girls.

Sample

512 primary level students (301 female and 211 male students) of 32 private schools in Konya voluntarily took part in the empirical study based on a standardised questionnaire. The study had been approved by the respective headmaster of the school. Schools had been randomly selected. However, random selection was pre-determined by the criterion that at least beginning with level 4 German should be instructed on a regular basis. This was a necessary condition because questionnaires had been issued in German language only. However, to guarantee maximal understanding with the students, the prime investigator of this study had been always present, when questionnaires had been answered. Translation problems or problems of comprehension could be easily solved with the aid of the prime investigator. All students who answered questionnaires were in their eight school year.

Scales

Test anxiety (Test anxiety inventory, TAI)

To measure the level of test anxiety the test anxiety inventory developed by Hodapp et al. (1982) has been used. The test anxiety inventory is to this day the dominant scale in anxiety research (Szafranski et al., 2012). The inventory consists of two scales, supposed to measure anxiousness (TAI-worry) and nervousness (TAI-emotionality), each encompassing 5 items. Each item is measured on a five-point Likert-Scale. Sample items for anxiousness are: "Ich mache mir Sorgen, ob ich auch alles schaffe" (I am anxious whether I am up to the job) or "Ich frage mich, ob meine Leistung ausreicht" (I wonder, whether my performance is sufficient) (Cronbach's $\alpha = 0.85$). Sample items for nervousness are: "Ich spüre ein komisches Gefühl im Magen" (I have a strange feeling in my gutts) and "Ich bin am ganzen Körper verkrampft" (I am strained all over my body) (Cronbach's $\alpha = 0.87$).

Big five inventory

To measure neuroticism the German version of the Five Factors Inventory has been deployed (Rammstedt and John, 2005). Neuroticism is a subscale of this inventory that consists of five items, e.g.: "Ich mache mir viel Sorgen" (I worry a lot) (Cronbach's $\alpha = 0.68$). Students were required to answer each item on a scale ranging from 1 (totally agree) to 4 (totally disagree).

Between students relationships

Quality of the between students relationships has been measured with the "Landauer Skala zum Sozialklima (Landau Scale of Social Climate, LASSO) compiled by Saldern and Littig (1987). The scale consists of six items, for which four alternative answers are given. Reliability as measured by Cronbach's Alpha is 0.70, sample items are the following: "Bei uns wird man leicht zum Außenseiter, wenn man nicht tut, was die Klasse für richtig hält" (It is easy becoming an outsider if you don't do what is expected of you by your classmates) or "In unserer Klasse gibt es einige Schüler, die bei den

Table 1. Descriptive statistics for anxiousness, nervousness and neuroticism.

Scale	Girls		Boys		Range
	M	SD	M	SD	
(1) Anxiousness	3.21	.67	2.93	.71	1-4
(2) Nervousness	2.44	.85	2.09	.70	1-4
(3) Neuroticism	2.48	.67	2.13	.61	1-4

Table 2. Correlations between anxiousness, nervousness, neuroticism, between students relationship and teacher-student relationship for boys and for girls.

Scale	(2)		(3)		(4)		(5)	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
(1) Anxiousness	.55** =299	.57** N=210	.29** N=295	.18* N=208	-.29** N=295	-.14* N=208	-.17** N=299	.07 N=210
(2) Nervousness	1	1	.31** N=295	.26** N=209	-.23** N=295	-.21 N=209	-.15* N=299	.08 N=211
(3) Neuroticism			1	1	-.11 N=292	-.01 N=207	-.06 N=296	-.01 N=209
(4) Between Students relationship					1	1	.18** N=297	.15* N=209
(5) Teacher-Student Relationship							1	1

* $p \leq .05$; ** $p \leq .01$.

anderen wenig Beachtung finden" (Some of the students in our class receive only little attention from others). Negatively coded items have been recoded.

Teacher-student relationships

The Landauer Skala zum Sozialklima (LASSO) has also been used to measure the quality of teacher-student relationships. Cronbach's Alpha showed a reliability of 0.74. Students had to answer five items with four categories ranging from 1 "agree completely" to 4 "disagree completely". Sample items used to measure teacher-student relationships are: "Die meisten Lehrer interessieren sich für das, was ich zu sagen habe" (Most teachers show an interest in my contributions) or "Die meisten Lehrer behandeln mich fair (I get fair treatment from most of my teachers).

RESULTS

To test hypothesis 1 single-factor univariate analyses of variance (ANOVA) have been calculated (Table 1). To test for group differences between girls and boys with respect to anxiousness and nervousness, non-parametric Kruskal-Wallis-tests have been performed. This was induced because both sub-samples, the sub-sample of boys as well as the sub-sample of girls are not normally distributed. Results showed that girls reached significantly

higher levels of neuroticism than boys ($F(2, 510) = 18.58$; $p < .01$, $\eta^2 = 0.067$). Equal results showing higher levels of the respective measure for girls than for boys can be found for anxiousness ($H(1) = 20.22$, $p < .01$, $U = 24087$, $r = -0.2$), as well as for nervousness ($H(1) = 18.95$, $p < .01$, ($U = 24430$, $r = -0.2$).

Correlation analysis was used to test the second hypothesis (Table 2). Results show hypothesis 2 to be partially confirmed. For girls, significant correlations are found between neuroticism and anxiousness (.29**) and for neuroticism and nervousness (.31**). Both correlations are found for boys as well, though to a lesser degree: neuroticism and anxiousness (.18**) and neuroticism and nervousness (.26**). It follows that the higher the level of neuroticism shown by girls and boys the higher the test anxiety (composite of anxiousness and nervousness).

Furthermore, girls showed negative correlation coefficients for between students relationships and anxiousness (-.29**) and nervousness (-.23**). The same results could be found for boys, though with a somewhat different impetus: between student's relationship and anxiousness (-.57**), between student's relationships and nervousness (-.21**). Accordingly it can be said that the higher the quality of between student's relationships the

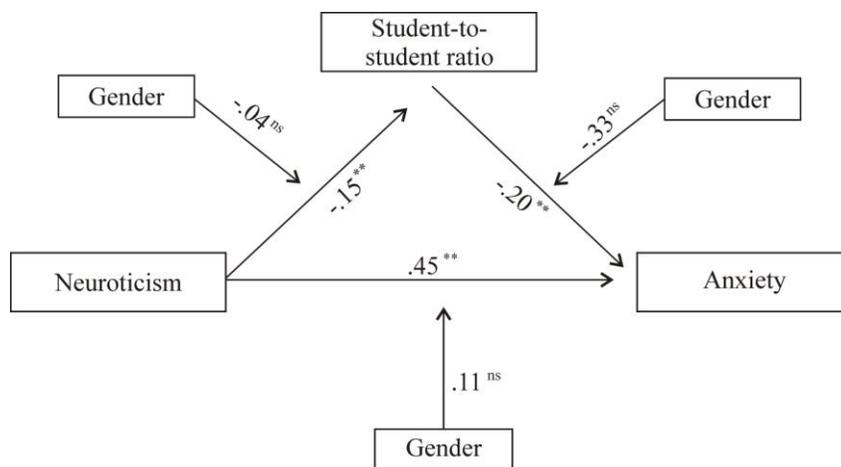


Figure 1. Mediator model with predictor neuroticism, criteria anxiousness and nervousness and mediator between students relationship. * $p \leq .05$; ** $p \leq .01$; ns = not significant.

less anxiousness and nervousness is to be found among girls and boys, hence the less test anxiety they show.

However, and in opposition to what has been suggested, teacher-student relations impact anxiousness ($-.17^{**}$) and nervousness ($-.15^{**}$) only for girls, but not for boys. Consequently, it is only for girls that the quality of teacher-student relations has an impact on test anxiety that reduces anxiety with increasing quality of the relationship.

To test hypothesis 3 mediation analyses have been performed with between student's relationship and teacher-student relationship as mediating variables (M) respectively between neuroticism (X) and anxiousness/nervousness (Y). Mediation analysis as suggested by Preacher and Hayes (2008) estimates direct, indirect and total effects. Results showed a mediation effect between student's relationships for boys as well as for girls. However, teacher-student relationships fail to exhibit any mediating effect for girls and for boys. The analysis that tested whether between students relationships mediate the connection between X and Y showed significant coefficient for the connection between mediator and predictor variables ($\beta_{MX} = -.146$, $SE_{MX} = .036$, $p < .000$), for the connection between predictor variable and anxiousness ($\beta_{YX} = .452$, $SE_{YX} = .042$, $p < .000$) as well as nervousness ($\beta_{YX} = .599$, $SE_{YX} = .047$, $p < .000$). Also, significant effects could be found for the connection between mediator and anxiousness ($\beta_{YXM} = .423$, $SE_{YXM} = .042$, $p < .000$) as well as nervousness ($\beta_{YXM} = .057$, $SE_{YXM} = .047$, $p < .000$). By taking the independent effect of the mediator variable "between students relationships" into account correlation between neuroticism and anxiousness (figure 1) ($\beta_{YMX} = -.201$, $SE_{YMX} = .052$, $p < .000$, path YMX) and between neuroticism and nervousness (figure 2) ($\beta_{YMX} = -.204$, $SE_{YMX} = .058$, $p < .000$, path YMX) could be reduced. Considering indirect effects of the mediator analysis it can be found that high quality between

students relationships mediate the correlation between neuroticism and anxiousness ($\beta_b = .029$, $SE_b = .011$, $p = .006$) and between neuroticism and nervousness ($\beta_b = .030$, $SE_b = .012$, $p = .008$) (Figures 1 and 2).

As a consequence, the negative effect exerted by neuroticism on test anxiety can be dampened by good quality between student's relationships. To examine gender differences, a further analysis has been performed: Interaction terms between gender and an averaged predictor variable as well as between gender and an averaged moderating variable have been calculated and tested for significance. No test showed a significant effect that could be attributed to gender. Hence, mediation models are valid for boys and girls.

Summary

The results reported in this paper that are based on a quantitative survey among eight school year students of schools in Konya showed that test anxiety is prevalent among students and they showed the importance of social relations for coping with test anxiety. Furthermore they suggest to take a gender sensitive perspective.

Girls have been shown to report higher levels of test anxiety and to be more anxious at a general level than boys. Moreover, positive (or high quality) between students relationships could be shown to have a positive and mediating affect on test anxiety - a result persistent for boys and for girls. However, teacher-student relationships have been shown to only dampen the level of test anxiety exhibited by girls. Quality of social relations, it can be summarized, plays a central role in the support of personal development processes of children and adolescents. A social network made up of mutual respect, responsibility and regard provides a basis for individual and successful learning and prevents or

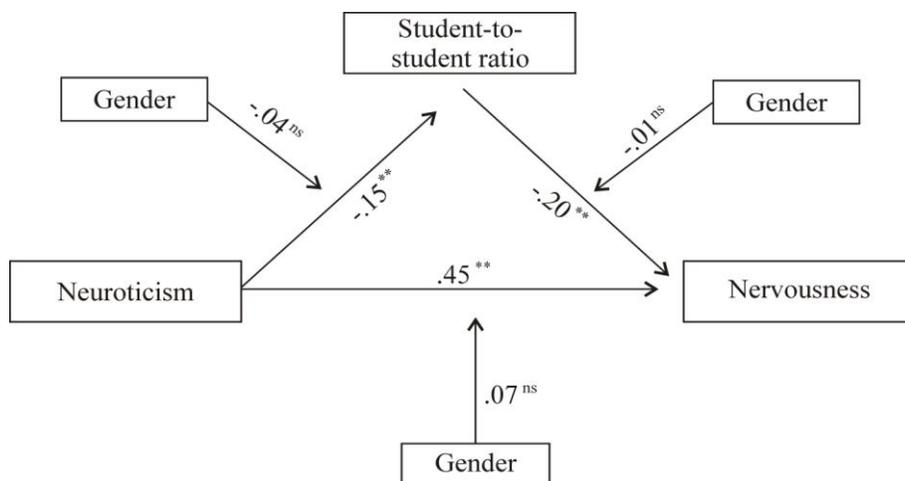


Figure 2. Mediator model predictor neuroticism, criteria anxiousness and nervousness, mediator between students relationship. * $p \leq .05$; ** $p \leq .01$; ns = not significant

dampens test anxiety. As a common goal all actors involved in school education should strive to establish a well-functioning social network which can be of value in reducing test anxiety and reducing stressors, thus allowing to educate students and make them self-determined, responsible and competent people free of anxiousness.

At class level results suggest furthermore, the promotion of social competences and the enforcement of class climate, e.g., by using teamwork, student-mentoring programs (Raufelder and Ittel, 2012) or social competence trainings (Hinsch and Pflingsten, 2007; Hinsch and Wlittmann, 2010). Furthermore, activities in and out of school such as school trips or class teacher's hours can be used to increase feelings of belonging among students.

It is in this context that not only between student's relationships but teacher-student relationships can be positively developed (Baker et al., 2008). Student-teacher relationships are especially a means for reducing test anxiety in girls. Again, it is up to teachers to actively develop their relationship with students. According to Tausch and Tausch (1998) a teacher-student relationship should be warm and based on mutual esteem. Furthermore, a number of possibilities exist in schools which are, up to now, neglected in their potential for reducing test anxiety. According to Pekrun and Götz (2006) well-structured lectures that address understanding reduce anxiety and strengthen personality. In addition, test situations have been shown to be less stress laden when being transparent with respect to what is expected, when emotional support had been provided, when time pressure had been reduced. Building on that it has been suggested that a further reduction in expectations and a replacement of punishment for poor performance with a more productive culture of errors could reduce anxiety as well (Pekrun and Götz, 2006; Suhr-Dachs, 2006).

Test anxiety in education has been always and important issue to be addressed and it will remain being an important issue. Especially teachers are demanded as a role model with respect to social relations and their development and they are crucial in building an emotional environment that is shaped by mutual trust and prevents anxiety from developing and helps to reduce existing test anxiety. This thesis has stressed the importance of between students and teacher-student relationships with respect to individual development. Students without fear are better learners, feel more comfortable at school and contribute to a positive social climate. However, test anxiety is often neglected or even disregarded by parents as well as teachers and it is underestimated with respect to its far reaching consequences for the development of children.

Accordingly, it is necessary to be aware of the possibility of test anxiety and to establish the level of test anxiety present in students, and it is necessary to identify factors that can be used to prevent and influence test anxiety. This is the only way to implement countermeasures at an early level and to reduce test anxiety to a substantial degree. Furthermore, teachers have to be made aware of the importance of the topic of test anxiety as well as its gender sensitive nature. A longitudinal study that is the follow-up to the study reported in this paper will look in more detail at causal links between test anxiety and its antecedents and it will especially look at development processes of students and class specific patterns that influence these processes.

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