A cross-national comparison of test anxiety in Swedish and Finnish grade 3 pupils: Measured by the CTAS

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Abstract

The education systems in Sweden and Finland have different formal and informal testing traditions. A recognized possible adverse effect of testing is test anxiety among pupils and students which may have a negative impact on examination performance. Research into which factors of testing practice affect the levels of test anxiety in younger pupils in real classroom settings is a neglected area internationally yet holds great importance for school practitioners. A cross-national study was conducted to determine whether there are any differences in test anxiety between groups of young pupils in Sweden and Finland, as measured by the Children’s Test Anxiety Scale (the CTAS), and whether these differences are ‘real’ differences or a result of differential item functioning. The dimensionality of the CTAS construct is further examined. Exploratory Structural Equation Modelling was used to analyse the data obtained. Partial measurement invariance with respect to nationality and gender was achieved, demonstrating that the CTAS accurately measures latent constructs such as thoughts, autonomic reactions and off-task behaviours in boys and girls, and Swedish and Finnish pupils. No differences were found in the levels of test anxiety experienced by Swedish and Finnish pupils. Girls reported higher levels of autonomic reactions related to test anxiety, but no gender differences in thoughts and off-task behaviours were identified. Methodological limitations and the future implications of the results obtained are discussed.

Keywords: test anxiety, CTAS, cross-national, exploratory structural equation modelling

The present study is designed to examine the dimensionality of the Children’s Test Anxiety Scale (“CTAS”), to identify if there are differences in test anxiety between Swedish and Finnish pupils, and whether these differences are ‘real’ differences or a result of differential item functioning. The educational testing scenes in Sweden and Finland differ in many respects which in previous findings have been identified as influencing pupils’ experience of taking tests (see below). Testing is a central but debated tool in formal education that is used to determine whether a pupil has successfully understood the taught material (Leach et al., 2001). Testing might, however, trigger
intense emotions (Pekrun et al., 2004) and one of these with debilitating effects on academic performance is test anxiety (Eum & Rice, 2010). Examining the impact of different testing regimes on pupils’ reported levels of test anxiety contributes to the understanding of the influencing and developmental aspects in pupils’ schooling (cf. Lowe & Ang, 2012) and is therefore of great importance.

Testing takes up a relatively large proportion of school time (Clarke et al., 2000; Wren & Benson, 2004), but the exact proportion of time it consumes seems to differ between nations. Swedish pupils undergo a very small number of examinations during their compulsory education (Organisation for Economic Co-operation and Development – OECD, 2005; Skolverket, 2007). The frequency and types of testing in Sweden further differ from those in Finland; Finnish pupils generally have more classroom examinations over the course of the school year (Kupiainen et al., 2009).

A new assessment programme recently introduced in Sweden requires all pupils in grades 3, 6 and 9 to undergo an increased number of mandatory national examinations. The primary reason for introducing these new tests is to generate data that can be used to monitor school performance; that is to say, the results are used for external evaluation. In Finland, there are no national examinations taken by all students at a given stage in their basic education. Instead, schools are assessed on the basis of the test results of a random representative sample of their pupils in grades 3, 6 and 9, typically in a single subject. Individual schools’ results are not made available to the public or the schools, but are used by the government as internal measures of the performance of the national education system (Garme, 2002; Eurydice, 2009). This lack of mandatory high-stakes examinations is partly responsible for the great number of exams that Finnish pupils must take during their education. The control of learning is decentralised, with schools and individual teachers having the authority to set their own curricula and tests. Thus, despite the absence of national examinations, pupils are assessed numerous times in most subjects throughout the nine years of their compulsory schooling (Kupiainen et al., 2009; Sahlberg, 2011).

In addition to undergoing different numbers of exams during their time in school, pupils in Finland and Sweden also vary in terms of their levels of academic achievement, as measured by various international comparative studies in education (e.g. the Trends in International Mathematics and Science Study – TIMSS, the Programme for International Student Assessment – PISA, and the Progress in International Reading Literacy Study – PIRLS). For several years, the ranking of Swedish pupils in these comparative exercises has fallen; there is a stable downwards trend in Sweden’s PISA rank as measured in 2000, 2003, 2006 and 2009. By contrast, Finnish pupils have maintained consistently high rankings (Kupiainen et al., 2009). Notably, Finland performed very well in PISA 2009, whereas Sweden’s results were significantly worse (Skolverket, 2010). This downwards trend caused an educational crisis in Sweden that prompted the introduction of the aforementioned new assessment programme and its increased number of national examinations, particularly for younger pupils.
A cross-national comparison of test anxiety in Swedish and Finnish grade 3 pupils

(Pettersson, 2008; Krantz, 2010). As previously discussed, the Finns adopted a very different system in the 1980s, eliminating standardised testing in favour of national teaching policies that set aside a portion of teachers’ time for the development of new tests and assessments (Darling-Hammond, 2010).

Both Finland and Sweden could be said to have ‘low-stakes’ national assessment systems, although this may be changing in the case of Sweden. While the Swedish accountability system is not really standards-based, it has certain elements that incline it in that direction. In particular, the introduction of more national examinations, particularly for younger pupils, and the increasing popularity of the voucher system may raise the stakes of the assessments (Eklöf et al., 2009). The publication of individual schools’ results might place a further emphasis on the importance of test results (Hall & Øzerk, 2008). In addition, the Swedish national examinations are all conducted within a short period of time, which could have further unintended consequences (Mons, 2009). Increasingly, test scores are becoming the only metric used when describing and evaluating schools (Osborne, 2006).

Pupils are often well aware of the effects of national assessment (Reary & Wiliam, 1999) and that assessment can increase their accountability (Brown & Hirschfeld, 2008). High-stakes tests are generally perceived as being stressful, resulting in anxiety (O’Neil & Abedi, 1992). However, no matter what the stakes associated with a given assessment regime, pupils will inevitably bear the consequences (Heubert & Hauser, 1999). If pupils experience high stress and intense emotions connected to taking a test, it may adversely affect their performance (Putwain, 2009). One common feeling associated with assessment among pupils and students is test anxiety, a condition that can have a highly negative impact on academic achievement (Ergene, 2003). Research has shown that as a group highly test-anxious individuals perform less well at examinations in both laboratory settings and classrooms (Zeidner, 2007).

On the other hand, it is possible that increased testing may boost educational performance. Studies have shown that exams and tests influence pupils’ behaviour and stances, providing motivation and encouragement (e.g. McDaniel et al., 2007). Together with increases in test-taking skills, familiarity (cf. Connor-Greene, 2000), and changes in attitudes (Bangert-Drowns et al., 1991), this seems to reduce test anxiety (Roediger et al., 2006). Pupils accustomed to tests and regularly being tested may develop a resistance to test anxiety (Snooks, 2004), and a degree of “testwiseness” (Bodas et al., 2008). Those positive effects of testing are indirectly beneficial to pupils’ education (Karpicke & Roediger, 2007). Several researchers have termed it a “hidden curriculum” (cf. Connor-Greene, 2000).

There are over 1,000 publications on test anxiety among elderly pupils and students (Stöber & Pekrun, 2004), but in general there have been few international studies on how test anxiety affects younger pupils in a classroom environment (Metcalfe et al., 2007), and little attention has been paid to its occurrence in Sweden or Finland. Even though test anxiety levels do not seem to differ greatly between nations (Seipp
& Schwarzer, 1996), it may be sensitive to cultural and socialisation factors, and so it may be imprudent to simply generalise previous research findings to other national populations (Zeidner, 1990; cf. Lowe & Ang, 2012).

The objectives of the study reported herein were thus to determine whether grade 3 pupils in Sweden and Finland differ in their experiences of test anxiety, given that Sweden and Finland have adopted different testing regimes. The level of test anxiety experienced is measured by the CTAS which is translated into Swedish and Finnish, while the dimensionality of the CTAS will first be examined, and then differences between the Swedish and Finnish samples analysed to examine whether these are ‘real’ or a result of differential item functioning.

**Test Anxiety**

Test anxiety is a very circumscribed condition (Beidel & Turner, 1988) and typically involves behaviours, feelings, reactions and thoughts (Wren & Benson, 2004) that occur at all academic levels (Birenbaum & Guvittz, 1993). Numerous authors have stressed the connections between anxiety and educational underachievement as well as academic problems such as early school leaving (e.g. Owens et al., 2008). Test anxiety is believed to be learnt in educational settings, typically evoked during the earlier school years (Pekrun, 2000). Several factors can potentially affect the development of test anxiety. However, these factors are not all active at the same time during a child’s development; an individual’s reaction to a specific test situation is shaped by the specific influence of the factors active during and leading up to the test (McDonald, 2001).

The first scales for assessing individual differences in test anxiety were developed in the 1950s and typically focused on single primary components. These one-dimensional approaches were replaced by seminal two-component approaches, i.e. worry and emotionality or state and trait, in the 1960-1970s (Hagtvet et al., 2001). More recent advances have led to the development of more sophisticated and psychometrically-sound measures of test anxiety. The test anxiety construct today is theorised and conceptualised as being complex, multi-dimensional, and dynamic, and represents a key area in contemporary test anxiety research with characteristic factors or subscales that vary depending on the instrument used. The first distinction is between two basic dimensions in the experience of anxiety, emotionality and worry, which are accepted by most contemporary researchers as major components of test anxiety (Zeidner & Matthews, 2003) and are empirically distinct but interrelated (Zeidner, 2007). Worry is a cognitive distractor that stems from the individual’s valuation of their performance. It can be experienced over relatively long periods of time, sometimes beginning several days before an exam, and may persist throughout testing. Emotionality denotes the individual’s subjective awareness and understanding of their physiological reactions in different evaluative situations (i.e. the more physiological part). It is experienced at a specific point in time (Meijer, 2001) and is dependent on the context, and so can potentially be adjusted or modulated by changing the testing
environment (Zeidner, 2007). Worry has been consistently shown to have a stronger negative influence on test performance than emotionality in all age groups and both sexes, and across diverse cultures (Chung et al., 2005).

Test anxiety may also afflict children, with children as young as 7 years appearing to experience stress as a result of formal testing (Connor, 2003). Increasing standardised testing will likely also lead to an increase in test anxiety among school children in compulsory education (Wren & Benson, 2004). Even though the extent and influence is less clear compared to elderly individuals, it is neither uncommon nor necessarily harmless. Except for playing a major role in academic underachievement, it is also related to a lack of school-motivation, poor academic self-concepts, constraint career advancement, bad personality development and weaker health (Stöber & Pekrun, 2004). Several researchers believe the manifestation of test anxiety in children includes cognitions, somatic symptoms and test-irrelevant behaviours (cf. Wren & Benson, 2004). Compared to adults, Wigfield and Eccles (1989) suggest that children’s anxiety during experiences of failure is initially dominated by emotional-affective responses but subsequently becomes characterised more by cognitive or worry concern over performing poorly. Wren and Benson (2004), who have developed the instrument used in the present study, chose to combine worry cognitions and test irrelevant thoughts. They further hypothesised that autonomic reactions are more consistent with children’s responses than emotional ones, and therefore included them as a component in their model of test anxiety in children. A third behavioural component, off-task behaviour (e.g. nervous habits, distracting behaviours), was also included to better mirror the symptoms of test anxiety in children.

Test anxiety is a growing problem, occurring in different geographic and cultural settings (Bodas et al., 2008). Pupils of all achievement levels suffer and no age group is immune (Legrand et al., 1999). However, some differences between groups relating to gender, background and age have been observed (Richmond & Rodrigor, 1988). Numerous studies have found that, regardless of cross-cultural setting and age, females tend to report higher levels of test anxiety than males (e.g. Chapell et al., 2005; Eum & Rice, 2010). The worldwide occurrence of this phenomenon may reflect existing socialisation practices that encourage women to express feelings that men are expected to suppress or keep in private (McDonald, 2001); alternatively, it may be a consequence of the view that school work and scholastic performance are less highly valued by males and that high scholastic performance is somehow not masculine (Skelton, 2001). Another possible explanation for these gender differences is that the methods used to assess test anxiety might be less sensitive for males than for females (Zeidner, 1998).

Even though test anxiety levels in general do not differ greatly between nations, some studies report that different backgrounds may have an influence. One hypothesis on parental attitudes has been proposed to explain such cross-cultural differences in reported test anxiety. In some nations, parents put excessive pressure on their children
to succeed (Bodas & Ollendick, 2005). But it is also generally likely that high test anxiety among children and students reflects a state of dependence on the parent's opinions and expectations. The child is afraid to disappoint their parents, which may hamper their concentration and ability to perform during exams (Peleg-Popko et al., 2003). Parents who belong to a minority group may put additional pressure on their children to perform well in order to improve their social status. Minority groups must also study a broader curriculum since they have to learn more languages, which may intensify their school worries or levels of anxiety (Peleg, 2009).

Finally, elderly students compared to younger pupils are found in the majority of studies to report higher levels of test anxiety (e.g. Zeidner, 1998; Lowe & Lee, 2008).

Research Design

Participants and Setting

A total of 172 pupils, 103 girls (69 of whom were Finnish and 34 of whom were Swedish) and 69 boys (40 Finnish and 29 Swedish), participated in this study. The children came from six different schools, two of which were Swedish (of which one school conducted teaching in Swedish and one school teaching in Finnish) and four of which were Finnish (of which two schools conducted teaching in Swedish and two schools teaching in Finnish); in total, individuals from eleven grade-three classes, as defined in the Swedish and Finnish education systems were studied; four were Swedish and seven Finnish. The participants were between nine and ten years of age. Finland is officially bilingual (Finnish and Swedish), while in Sweden Finnish is an official minority language; notably, it is the language used in teaching in one of the Swedish schools studied. Both language groups in the respective countries were thus included in the study. We decided to treat the Swedish- and Finnish-speaking pupils as a single group in both countries because there were no differences between the language groups \( t(100) = .70, p = .49 \) and \( t(58) = 1.11, p = .27 \) in the CTAS and because our study was focused on cross-national differences. Convenience samples were collected in both countries. Of the original sample of 188 children, 172 consented to participate, and their parents' informed consent was obtained. Data collection was conducted in such a way that it did not violate the ethical guidelines formulated by the Swedish Research Council (2006) and the Finnish National Advisory Board on Research Ethics (2002) regarding information, consent for participation, scientific use and confidentiality. Parents were asked about their highest level of education (i.e. compulsory school, vocational training, upper-secondary school or higher education). There were some differences in parental educational background between the schools, \( F(5, 138) = 11.72, p < .01 \). Pairwise comparisons of means revealed that one of the schools in Sweden had a significantly lower parental educational background than two of the Finnish schools \( p < .05 \). However, parental educational background and the CTAS total score were unrelated, \( r(135) = -.11, p = .21 \).
A cross-national comparison of test anxiety in Swedish and Finnish grade 3 pupils

Procedure
The CTAS was administrated over a period of one month during ordinary school time. The administration was not immediately after or before the children had a test but during regular teaching in all classes. The children sat quietly and filled in the assessment in the classroom and were able to ask the researcher or the class teacher when uncertain about a question. One hour was set aside for information on how to fill in the CTAS (i.e. to choose the response alternative that best agreed with their opinion) and for answering it. Conditions and instructions were the same for all participants. The researchers were responsible for scoring the CTAS.

Instruments
Test Anxiety. The CTAS (the Children’s Test Anxiety Scale: Wren & Benson, 2004) is a refined and modernised 30-item version of the most widely used measure of this construct, the 30-item TASC (the Test Anxiety Scale for Children: Sarason et al., 1969). The scale was purposefully developed for measuring the construct of test anxiety in children. Based upon earlier and previous research, Wren and Benson (2004) believe test anxiety in children to be a situation-specific trait including cognitions, somatic symptoms, and test-irrelevant behaviours. The CTAS assesses an individual’s level of apprehension or anxiety about testing on a 1-4 Likert scale, asking for participants’ response about how anxious they would feel in response to various settings and experiences; it is a self-reported pen-and-paper instrument for measuring test anxiety in children. Since its target group is very young children, it fills a need that is unmet by other methods for assessing test anxiety (Cizek & Burg, 2006). The CTAS is one of several widely used test anxiety inventories that have satisfactory reliability coefficients and high practicality in naturalistic field settings (Zeidner, 2007). Wren and Benson (2004) report good internal consistency for the original sample (α=.92) and their cross-validation sample (α=.92). An individual’s overall score is equal to the sum of their responses to each item of the instrument; respondents are asked to respond to a series of questions with four response options: 1 = almost never; 2 = some of the time; 3 = most of the time; and 4 = almost always. The test has three dimensions: thoughts, with 13 items, (e.g. “While I am taking tests, I worry about failing”); autonomic reactions, with 9 items, (e.g. “While I am taking tests, my belly feels funny”); and off-task behaviours, with 8 items, (e.g. “While I am taking tests, I check the time”).

Item data from the 172 respondents were used to validate the factor structure of the responses. A series of explorative factor analyses using Maximum Likelihood with an oblique rotation were conducted to verify the factor structure of the CTAS in the current sample. We were interested to see if our data would support the proposed factor structure of Wren and Benson (2004) or the two-factor structure of test-anxiety commonly found in the literature. Analyses with all 30 items favoured the three-factor solution over the two-factor solution, Δχ²(28) = 164.687, p < .001.
After this, the data were screened to identify poorly working items. Items that showed a non-normal distribution and had weak factor loadings in the factor analyses were excluded from further analyses. This resulted in a revised measure of 19 items. Again, the three-factor solution provided a better fit, $\Delta \chi^2(17) = 79.889, p < .001$. The model fit of all explorative factor analyses can be found in Table 1 and the factor loadings of the three factor models can be found in Appendix A. The internal consistency of the responses was assessed by calculating Cronbach’s alpha value, which was 0.86 for the revised test (19 items).

### Table 1.
Goodness-of-fit indexes for the Exploratory Factor Analyses on the CTAS

| Model                  | $\chi^2$  | df  | CFI   | TLI   | RMSEA | $\Delta \chi^2$ | $\Delta df$ | $\Delta p$ |
|------------------------|-----------|-----|-------|-------|-------|-----------------|-------------|------------|
| 2-factor model (30 items) | 767.654*  | 376 | .77   | .73   | .078  |                 |             |            |
| 3-factor model (30 items) | 602.967*  | 348 | .85   | .81   | .065  | 164.687         | 28          | <.001      |
| 2-factor model (19 items) | 271.659*  | 134 | .88   | .85   | .077  |                 |             |            |
| 3-factor model (19 items) | 191.770*  | 117 | .93   | .90   | .061  | 79.889          | 17          | <.001      |

*Note: * $p < .001$

### Statistical analysis

The main analysis was conducted using version 6.1 of the Mplus software package (Muthén & Muthén, 1998-2011). We utilised explorative structural equation modelling (ESEM) in our analyses. The ESEM approach differs from the typical confirmatory factor analysis approach in that all factor loadings are estimated, subject to constraints so that the model can be identified (Asparouhov & Muthén, 2009; Marsh et al., 2010). This approach was chosen because the preliminary explorative factor analyses revealed that many indicators had cross-loadings to secondary factors, which could lead to biased results when using traditional CFA that relies on the assumption that each indicator loads on only one factor. The comparative fit index (CFI), the Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA) were used to assess the model fit. For both the TLI and CFI, values greater than .90 and .95, respectively, typically reflect an acceptable and excellent fit to the data. For the RMSEA, values less than .05 and .08 reflect a close fit and a reasonable fit to the data, respectively (Marsh et al., 2004). To ensure that pupils with a different school language within the two countries did not differ in test-anxiety, t-tests were performed. To investigate differences in pupils’ parental educational level between schools a one-way ANOVA was conducted.
Results
In accordance with the aim of the study, an ESEM with covariates (MIMIC) modelling approach was used to study measurement invariance and population heterogeneity. The MIMIC approach was chosen instead of a multigroup ESEM because MIMIC models have smaller sample size requirements and therefore suited our data better. We started the modelling by specifying an ESEM model for the test anxiety construct with three factors; thoughts, autonomic reactions, and off-task behaviour. The factors were allowed to correlate. The model fit was acceptable, $\chi^2(117, N=172) = 191.770, p < .001, CFI = .93, TLI = .90, RMSEA = .06$, and clearly better than those obtained by Wren and Benson (2004) in their validation study of the CTAS, $\chi^2(402, N=261) = 853, p < .001, TLI = .81, RMSEA = .07$. According to our research questions, gender and nationality were then incorporated into the model as covariates. The direct effects of the covariates on individual items were initially constrained to zero, and this model was then used as a baseline model for further analyses (Figure 1).

![Figure 1. Exploratory structural equation model of the theoretical three-factor model of test anxiety in children with gender and nation as covariates.](image-url)
Modification indices for the baseline model were examined to identify possible differential item functioning in the CTAS. The model fit ($\chi^2(149, N=172) = 272.310, p < .001, \text{CFI} = .90, \text{TLI} = .86, \text{RMSEA} = .07$) and the modification indices suggested that there were improvements to be made. An examination of the modification indices revealed large values for item 3 on gender, and for item 24 and item 29 on nationality. We continued the analyses by adding direct effects from gender to item 3, and from nation to items 24 and 29 which resulted in an improved model fit, $\chi^2(146, N=172) = 230.968, p < .001, \text{CFI} = .93, \text{TLI} = .90, \text{RMSEA} = .06, \Delta \chi^2(3) = 41.342, p < .001$. The regression path from gender to item 3 was significant (Figure 2) and the interpretation for the direct effect is that for a given off-task behaviours factor value, girls tend to look more around the room in a test situation. The direct effect from nationality to item 24 was also significant and should be interpreted that for a given thoughts factor value, Swedish children are more worried about what will happen if they fail the test. The direct effect from nationality to item 29 was also significant.

![Figure 2: Path diagram for the final model. The dashed arrows represent the independent direct effects of predictors on individual items. Only significant paths ($p<.05$) are included.](image)
The interpretation of the regression path is that, for a given thoughts factor value, Finnish children are more worried about what their parents would say if they fail in the test. The modification indices further indicated that three items with similar content should have correlated residuals. Adding these correlations improved the model substantially, $\chi^2(144, N=172) = 209.528, p < .001$, CFI = .95, TLI = .92, RMSEA = .05, $\Delta\chi^2(2) = 21.440, p < .001$. In conclusion, despite the minor bias detected in three items, the necessary condition for meaningful group comparison – partial measurement invariance – was clearly achieved.

The direct effect of nationality on the latent factors showed no significant differences between the Finnish and Swedish children in the three domains of test anxiety. The direct effects of gender on the latent factors showed a significant mean difference between boys and girls in the latent variable autonomic reactions (Figure 2). The girls reported stronger autonomic reactions than the boys. No gender differences were identified in the thoughts and off-task behaviours factors. The parameter estimates are summarised in Table 2, and an illustration of the final model is given in Figure 2.

**Discussion and Conclusion**

This cross-national study was conducted to determine whether the dimensionality of the CTAS was valid for groups of pupils in Sweden and Finland, if there were any differences in test anxiety between Swedish and Finnish pupils, and whether these differences are ‘real’ differences or a result of differential item functioning.

The present study lends support to the three-factor model of test anxiety proposed by Wren and Benson (2004). However, the original scale had to be heavily modified to achieve good construct validity. This was expected because the model fit indices from the original study indicated that improvements should be made to the CTAS. The questions that were discarded did not differentiate pupils well enough, as reflected in the skewed distributions in these items. Many indicators had cross-loadings to secondary factors, which could lead to biased results when using traditional CFA that relies on the assumption that each indicator loads on only one factor. We therefore utilised exploratory structural equation modelling that counteracts this problem. The resulting model had a good model fit, which shows that the theoretical three-factor model describes the data well. Partial measurement invariance across nationality and gender was clearly achieved, which means that the CTAS accurately measures the latent constructs of thoughts, autonomic reactions and off-task behaviours in both Finnish and Swedish boys and girls. The only item to function differently between the boys and girls was “I look around the room”; girls reported higher values on this individual item on the same latent level of off-task behaviours as boys. This might be due to girls’ tendency to seek support from their peers. Peers’ support may partly buffer them from emotional distress such as worrying and rumination (Rose & Rudolph, 2006) and help them to cope with stressful situations (Day & Livingstone, 2003). Girls, more than boys of the same age, seem more concerned for others and
relate their own feelings more to those of others (cf. Wehrens et al., 2010). In general, social support may aid our sense of control and dampen arousal (Fuhrer & Stanseld, 2002); but girls seem to have a greater need than boys for the teacher’s acknowledge-
mant and harbouring of feelings (Nie & Lau, 2009) and support of most types from classmates (Demary & Malecki, 2002).

The responses to two items relating to worries about the test going badly indicated the existence of differences between the two nations. Assuming that the “thoughts” latent construct is the same in both nations, Swedish pupils experienced more worry

Table 2.
Parameter estimates for the final model

| Item | Standardised loadings | Intercept | Residual variance | R-Squared | M  | SD  |
|------|-----------------------|-----------|-------------------|-----------|----|-----|
| Item | T | AR | OTB | | | | |
| 2 | -.04 | .64 | .03 | 1.31 | .62 | .38 | 1.79 | .99 |
| 3 | -.01 | .04 | .63 | 1.36 | .56 | .45 | 2.01 | .89 |
| 4 | .09 | .64 | .04 | 1.45 | .52 | .48 | 1.90 | .98 |
| 5 | .77 | .01 | .05 | 2.02 | .39 | .61 | 1.87 | 1.01 |
| 6 | .45 | .03 | .01 | 2.16 | .78 | .22 | 1.88 | .89 |
| 7 | .14 | -.02 | .50 | 2.16 | .72 | .29 | 1.45 | .75 |
| 9 | .53 | .48 | -.14 | 1.52 | .20 | .80 | 1.86 | 1.00 |
| 11 | .40 | .52 | .01 | 1.74 | .32 | .68 | 2.01 | .97 |
| 12 | .04 | .10 | .42 | 2.28 | .80 | .20 | 2.35 | 1.07 |
| 13 | .20 | .39 | .04 | 1.71 | .71 | .29 | 2.19 | 1.12 |
| 15 | .23 | .24 | -.05 | 2.12 | .83 | .17 | 2.33 | 1.02 |
| 18 | -.05 | .05 | .57 | 2.18 | .68 | .32 | 1.65 | .82 |
| 19 | .93 | -.22 | .02 | 2.16 | .33 | .67 | 1.62 | .89 |
| 20 | -.01 | .40 | .01 | 1.65 | .84 | .16 | 1.62 | .82 |
| 21 | .41 | .36 | -.02 | 1.77 | .52 | .48 | 1.93 | .97 |
| 22 | .09 | -.07 | .42 | 2.20 | .81 | .19 | 2.06 | 1.04 |
| 24 | .67 | .17 | .01 | 1.30 | .39 | .61 | 1.73 | .92 |
| 27 | .78 | -.01 | -.04 | 2.04 | .41 | .59 | 1.59 | .83 |
| 29 | .57 | .08 | -.07 | 2.32 | .56 | .44 | 1.70 | .94 |
about what would happen if they failed a test, whereas Finnish pupils worried more about what their parents would say if they failed. Swedish pupils in general have few tests in compulsory education (e.g. OECD, 2005), and this was also the case with the present sample. National testing has only been recently introduced for grade 3 pupils in Sweden, and so the Swedish group may have been uncertain as to the meaning and consequents of their performance at the national tests (cf. Tholin, 2003). In terms of the influence of the parents, the Finnish parental corps and general culture is very positive towards education. Parents generally support the teachers’ work and play a natural role in the school system (Uljens, 2004; Sahlberg, 2007; Kupiainen et al., 2009; Chung, 2010). This high degree of engagement could possibly cause some Finnish pupils to experience excessive pressure, which might negatively affect test-anxious pupils (cf. Peleg-Popko et al., 2003). An overview of school linked experiences in Finland and Sweden suggests that Finnish pupils possible differ from their Swedish counterparts in a number of ‘like of school’ aspects relating to well-being, interest, satisfaction, fun etc., with the Swedes having more positive school experiences than the Finns (Hämäläinen, 2006; Health Behaviour in School-aged Children – HBSC, 2008; Kupiainen et al., 2009; Chung, 2010; Statistiska Central Byrå – SCB, 2010). However, the picture is not unequivocal (United Nations Children’s Fund – Unicef, 2007), and should be interpreted with care.

In our study, being socialised in different testing systems seems not to affect levels of test anxiety. One explanation for this is that the sample is relatively young and has not yet acquired the learning of test anxiety (cf. Lowe & Lee, 2008; Mertler, 2009). On the other hand, since test anxiety is a learnt symptom and Finland conducts informal tests on a regular basis in teaching from a young age, the Finnish pupils possibly could have reported higher levels of test anxiety but the introduction of national tests in Swedish primary school might have compensated for that. Increased frequency and importance of testing are argued to result in greater test anxiety in children (Putwain, 2008). Another explanation is that the Finnish pupils might have become accustomed to tests, developing a resistance to anxiety (Bodas et al., 2008). In the same vein, this was the first time the Swedish sample had been exposed to testing. Increased and lasting exposure to standardised testing is argued to increase the levels of test anxiety (Casbarro, 2005). The National Board of Education in Sweden specifically also emphasised that the new national examinations for grade 3 should minimise the stress associated with the testing and that the examinations should be integrated naturally into teaching, avoiding over-preparation and focusing on effort and attainment to help pupils become more confident in their own performance (cf. Connor, 2003). In sum, test anxiety is likely not an extended problem in either classroom.

Girls exhibited higher levels of test anxiety as judged by autonomic reactions but no gender differences were identified in terms of thoughts and off-task behaviours. This was surprising because preliminary analyses with manifest variables indicated relatively large differences in the thoughts subtest, suggesting that girls would experience higher
levels of test anxiety in this domain. These results show the importance of testing for measurement invariance and using latent constructs that are free of measurement error when making group comparisons. It is possible that the results of other studies, in which females were overrepresented in age groups reporting higher scores on various test anxiety scales, may have been misinterpreted. In younger age groups, however, emotions have been claimed to be the dominant experience of test anxiety rather than worrisome thoughts (Wigfield & Eccles, 1989). Along the same lines, girls tend to express their emotions in different situations to a higher extent compared to boys (cf. Leppänen & Hietanen, 2001; Gurian & Stevens, 2010). In summary, this might explain the differences in gender and autonomic reactions in present study.

Our study has four methodological limitations. Firstly, the samples are not representative for the respective countries and so these results cannot be uncritically generalised to the whole populations of Sweden or Finland. Although the present study needs to be replicated on a larger, representative sample, it does not demonstrate any differences in reported test anxiety among Finnish and Swedish pupils, or among girls and boys, except in the subscale autonomic reactions where girls reported stronger values than boys. Secondly, the structural validity of the CTAS was not that high in the original validation study (low model fit indices) and this was also the case in the present investigation when we did preliminary analyses with the data. Therefore, we undertook a thorough data screening and consequently discarded 11 items to obtain a better measure of test anxiety in children. The revised 19 item test met the criteria of acceptable fit and was therefore used in our main analyses. Some items had very strong secondary loadings, which could indicate poor wording of the items. Therefore, in future studies these items might need to be rewritten in order to better capture the constructs to be measured. Thirdly, our sample size did not allow us to conduct a multigroup analysis, which in some respects is superior to MIMIC modelling; specifically, it can be used test for all aspects of measurement invariance as opposed to only two in MIMIC models. Fourthly, one of the schools had a lower parental educational background than two other schools. However, parental educational background and the CTAS total score were unrelated and, in general, it is also unclear how socio-economic background contributes to different levels of reported test anxiety (cf. Putwain, 2007).

Notwithstanding these reservations, our results show that the CTAS instrument (revised version) seems to be a valid test anxiety scale for groups of Swedish and Finnish children and that there seem to be no differences between the levels reported in the two nations. The validity of the revised scale should, however, be examined in future studies, preferably with a more representative sample. The only subtopics for which girls scored more highly than boys were those pertaining to autonomic reactions.

Even though the levels of test anxiety in the present study are low, an implication of this study for primary education in both countries is that educators could benefit from knowledge of the likely anticipated effects of test anxiety and its different sub-
A cross-national comparison of test anxiety in Swedish and Finnish grade 3 pupils

components. This might prepare them and help them to deal more adequately with pupils’ facets of test anxiety. Test anxiety is believed to reach higher levels among elderly students (e.g. McDonald, 2001; Lowe & Lee, 2008) and pupils become ‘habitualised’ to tests (Pekrun et al., 2007), and educators need to take this into account.

Our results also hold some implications for future studies. Relatively large mean differences were observed between the Scandinavian groups examined in this work and the American children studied by Wren and Bensons (2004). These unexpected results indicate a need for cross-cultural studies with the CTAS to determine whether they reflect real differences or are artefactual, perhaps as a result of differential item functioning. It would also be interesting to extend these studies to countries with a very different cultural background, and to follow pupils through compulsory education to see how stable this phenomenon is over time and evaluate the longitudinal measurement invariance of the CTAS. Considering test anxiety to be a learnt experience and as likely being influenced by several factors during development, the present study has shown that, for the age of 9–10 years and for girls and boys situated in two different educational settings, the reported test anxiety is the same. However, to understand developmental changes in anxiety more studies, especially follow-up ones, are recommended.

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References

Asparouhov, T. & Muthén, B. (2009) Exploratory structural equation modeling. *Structural Equation Modeling* 16, 397–438.

Bangert-Drowns, R.L., Kulik, J.A. & Kulik, C.C. (1991) Effects of frequent classroom testing. *Journal of Educational Research* 85(2), 89–99.

Beidel, D.C. & Turner, S.M. (1988) Comorbidity of test anxiety and other anxiety disorders in children. *Journal of Abnormal Child Psychology* 16(3), 275–287.

Birenbaum, M. & Gutvirtz, Y. (1993) The relationship between test anxiety and seriousness of errors in algebra, *Journal of Psychoeducational Assessment* 11(1), 12–19.

Bodas, J. & Ollendick, T.H. (2005) Test anxiety: A cross-cultural perspective. *Clinical Child and Family Psychology Review* 8(1), 65–88.

Bodas, J., Ollendick, T.H. & Sovani, A.V. (2008) Test anxiety in Indian children: A cross-cultural perspective. *Anxiety, Stress, & Coping* 21(4), 387–404.

Brown, G.T.L. & Hirschfeld, G.H.F. (2008) Students’ conceptions of assessment: Links to outcomes. *Assessment in Education: Principles, Policy & Practice* 15(1), 3–17.

Casbarro, J. (2005). *Test Anxiety and What You Can Do about It: A Practical Guide for Teachers, Parents, and Kids*. NY: Dude: Port Chester.

Chapell, M.S., Blanding, B., Silverstein, M.E., Takahahi, M., Newman, B., Gubi, A. & McCann, N. (2005) Test anxiety and academic performance in undergraduate and graduate students. *Journal of Educational Psychology* 97(2), 268–274.

Chung, G.K.W.K., O’Neil, H.F., Delacruz, G.C. & Bewley, W.L. (2005) The role of anxiety on novices’ rifle marksmanship performance. *Educational Assessment* 10(3), 257–275.

Chung, J. (2010) An investigation of reasons for Finland’s success in the Programme for International Student Assessment (PISA), (Doctoral Lectures Series 3). Liverpool Hope University: Faculty of Education. Retrieved 9 May 2011 from http://www.hope.ac.uk/education

Cizek, G.J. & Burg, S.S. (2006) *Addressing Test Anxiety in a High-stakes Environment: Strategies for Classrooms and Schools*. Thousand Oaks, California: Corwin Press.

Clarke, M.M., Madaus, G.F., Horn, C.L. & Ramos, M.A. (2000) Retrospective on educational testing and assessment in the 20th century. *Journal of Curriculum Studies* 32(2), 159–181.

Connor, M.J. (2003) Pupil stress and standard assessment tasks (SATs). An update. *Emotional and Behavioural Difficulties* 8(2), 101–107.

Connor-Greene, P.A. (2000) Assessing and promoting student learning: Blurring the line between teaching and testing *Teaching of Psychology* 27(2), 84–88.

Darling-Hammond, L. (2010). *The Flat World and Education: How America’s Commitment to Equity Will Determine Our Future*. New York: Teachers College Press.

Day, A.L. & Livingstone, H.A. (2003) Gender differences in perceptions of stressors and utilization of social support among university students. *Canadian Journal of Behavioural Science* 35(2), 73–83.

Demary, M.K. & Malecki, C.K. (2002) Critical levels of perceived social support associated with student adjustment. *School Psychology Quarterly* 17(3), 213–241.

Eklöf H., Andersson, E. & Wikström, C. (2009) The concept of accountability in education: Does the Swedish school system apply? *Cadno* 2, 1–12.

Ergene, T. (2003) Effective interventions on test anxiety reduction: A meta-analysis. *School Psychology International* 24(3), 313–328.

Eum, K. & Rice, K.G. (2010) Test anxiety, perfectionism, goal orientation, and academic performance. *Anxiety, Stress, & Coping* 1(1), 1–12.
Eurydice (2009) *National Testing of Pupils in Europe: Objectives, Organisation and Use of Results*. Brussels: Education, Audiovisual and Culture Executive Agency P9 Eurydice. Retrieved 16 March 2010 from http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/109EN.pdf

Finnish National Advisory Board on Research Ethics (2002) *Good Scientific Practice and Procedures for Handling Misconduct and Fraud in Science* (2nd ed.). Helsinki: Editia Prima OY.

Fuhrer, R. & Stansfeld, S.A. (2002) How gender affects patterns of social relations and their impact on health: A comparison of one or multiple sources of support from ‘close persons’. *Social Science & Medicine* 54(5), 811–825.

Garme, B. (2002) Skolan, språket och de nationella proven [School, language and national tests]. In Garme B. (ed.). *Språk på väg: Om elevers språk och skolans möjligheter* [Language on its way: About pupils' language and the schools possibilities] (pp. 9–21). Ord och stil. Språksambundets skrifter 33. Uppsala: Hallgren & Fallgren.

Gurian, M. & Stevens, K. (2010) *Boys and Girls Learn Differently! A Guide for Teachers and Parents* (10th Anniversary edition). San Francisco: Jossey-Bass.

Hagtvet, K.A., Man, F. & Sharma, S. (2001) Generalizability of self-related cognitions in test anxiety. *Personality and Individual Differences* 31(7), 1147–1171.

Hall, K. & Øzerk, K. (2008) *Primary Curriculum and Assessment: England and Other Countries*, Cambridge: University of Cambridge Faculty of Education.

Hämäläinen, J. (2006) Nuori ja perhe yhteiskunnan munroksessa [Youth and families in society in transition]. In E. Laukkanen, M., M. Marttunen, S., Miettinen & M. Pietikäinen (eds.), *Nuoren psykisksten ongelmiin kohtaaminen* [Meeting psychological problems of young people] (pp. 43–50). Helsinki: Duodecim.

HBSC (2008) *Inequalities in Young People's Health: Health Behaviour in School-aged Children*. The Child and Adolescent Health Research Unit, University of Edinburgh, The Moray House School of Education, Scotland.

Heubert, J.P. & Hauser, R.M. (eds.) (1999) *High Stakes: Testing for Tracking, Promotion, and Graduation*. Washington, DC: National Research Council.

Karpicke, J.D. & Roediger, III H.L. (2007) Repeated retrieval during learning is the key to long-term retention. *Journal of Memory and Language* 57(2), 151–162.

Krantz, J. (2010) *Styrning och mening: anspråk på professionellt handlande i lärandeundervisning och skola* [Steering and meaning: Claiming professional managing in teacher education and school] (Dissertation No 181). Växjö: Växjö University.

Kupiainen, S., Hautamäki, J. & Karjalainen, T. (2009) *The Finnish Education System and Pisa*. Undervisningsministeriet, Ministry of Education, Helsinki University Print.

Leach, L., Neutze, G. & Zepke, N. (2001) Assessment and empowerment: Some critical questions. *Assessment & Evaluation in Higher Education* 26(4), 293–305.

Legrand, L.N., McGue, M. & Iacono, W.G. (1999) A twin study of state and trait anxiety in childhood and adolescence. *Journal of Child Psychology and Psychiatry* 40(6), 953–958.

Leppänen, J.M. & Hietanen, J.K. (2001) Emotion recognition and social adjustment in school-aged girls and boys. *The Scandinavian Psychological Associations* 42(5), 429–435.

Lowe, P.A. & Ang, R.P. (2012) Cross-cultural examination of test anxiety among US and Singapore students on the Test Anxiety Scale for Elementary Students (TAS-E). *Educational Psychology* 32(1), 107–126.

Lowe, P.A. & Lee, S.W. (2008) Factor structure of the Test Anxiety Inventory for Children and Adolescents (TAICA) scores across gender among students in elementary and secondary school settings. *Journal of Psychoeducational Assessment* 26(3), 231–246.
Marsh, H.W., Hau, K.T. & Wen, Z. (2004) In search of golden rules: Comment on hypothesis testing approaches to setting cutoff values for fit indexes and dangers in overgeneralising Hu & Bentler’s (1999) findings. Structural Equation Modeling 11, 320–341.

Marsh, H.W., Lüdtke, O., Muthén, B., Asparouhov, T., Morin, A., Trautwein, U. & Nagengast, B. (2010) A new look at the big five factor structure through exploratory structural equation modeling. Psychological Assessment 22(3), 471–491.

McDaniel, M.A., Anderson, J.L., Derbish, M.H. & Morrisette, N. (2007) Testing the testing effect in classroom. European Journal of Cognitive Psychology 19(4/5), 494–513.

McDonald, A.S. (2001) The prevalence and effects of test anxiety in school children. Educational Psychology 21(1), 89–101.

Meijer, J. (2001) Learning potential and anxious tendency: Test anxiety as a bias factor in educational testing. Anxiety, Stress, and Coping 14(3), 337–362.

Mertler, C.A. (2009) Teachers’ assessment knowledge and their perceptions of the impact of classroom assessment professional development. Improving Schools 12(2), 101–113.

Metcalfe, J., Kornell, N. & Son, L.K. (2007) A cognitive-science based programme to enhance study efficacy in a high and low risk setting. European Journal of Cognitive Psychology 19(4/5), 743–768.

Mons, N. (2009) Theoretical and Real Effects of Standardised Assessment. Retrieved 16 March 2010 from http://www.eurydice.org

Muthén, L.K. & Muthén, B.O. (1998–2011) Mplus User’s Guide. Los Angeles, CA: Muthén & Muthén.

Nie, Y. & Shun, L. (2009) Complementary roles of care and behavioral control in classroom management: The self-determination theory perspective. Contemporary Educational Psychology 34(3), 185–194.

O’Neil, H.F., Jr. & Abedi, J. (1992) Japanese children’s trait and state worry and emotionality in a high-stakes testing environment. Anxiety, Stress, and Coping 5(3), 225–239.

OECD (2005) Education at a Glance: OECD Indicators. Centre for Educational Research and Innovation, Paris: Organisation for Economic Co-operation and Development.

Osborne, M. (2006) Changing the context of teachers’ work and professional development: A European perspective. International Journal of Educational Research 45(4–5), 242–253.

Owens, M., Stevenson, J., Norgate, R. & Hadwin, J. (2008) Processing efficiency theory in children: Working memory as a mediator between trait anxiety and academic performance. Anxiety, Stress & Coping 21(4), 417–430.

Pekrun, R. (2000) A social-cognitive, control-value theory of achievement emotions. In J. Heckhausen (ed.) Motivational Psychology of Human Development: Developing Motivation and Motivational Development, Advances in Psychology 131, (pp. 143–163). Amsterdam: Elsevier.

Pekrun, R., Goetz, T., Perry, R.P., Kramer, K., Hochstadt, M. & Molfenter, S. (2004) Beyond test anxiety: Development and validation of the test emotions questionnaire (TEQ). Anxiety, Stress, & Coping 17(3), 287–316.

Peleg, O. (2009) Test anxiety, academic achievement, and self-esteem among Arab adolescents with and without learning disabilities. Learning Disability Quarterly 32(1), 11–20.

Peleg-Popko, O. Klingman, A. & Nahhas, I. A-H. (2003) Cross-cultural and familial differences between Arab and Jewish adolescents in test anxiety. International Journal of Intercultural Relations 27(5), 525–541.

Pekrun, R., Frenzel, A.C., Goetz, T. & Perry, R. (2007) The control-value theory of achievement emotions: An integrative approach to emotions in education. In P.A. Schutz & R. Pekrun (eds.), Emotions in Education (pp. 13–36). Amsterdam: Elsevier.
A cross-national comparison of test anxiety in Swedish and Finnish grade 3 pupils

Pettersson, D. (2008) Internationell kunskapsbedömning som inslag i nationell styrning av skolan [International knowledge assessment as a feature in national governance of the school]. Acta Universitatis Upsaliensis. Uppsala Studies in Education No 120. Uppsala universitet.

Putwain, D.W. (2007) Test anxiety in UK schoolchildren: Prevalence and demographic patterns. British Journal of Educational Psychology 77(3), 579–593.

Putwain, D.W. (2008) Deconstructing test anxiety. Emotional and Behavioural Difficulties 13(2), 141–155.

Putwain, D.W. (2009) Assessment and examination stress in Key Stage 4. British Educational Research Journal 35(3), 391–411.

Reay, D. & Wiliam, D. (1999) 'I'll be a nothing': Structure, agency and the construction of identity through assessment. British Educational Research Journal 25(3), 343–354.

Richmond, B.O., Rodrigo, G. & de Rodrigo, M. (1988) Factor structure of Spanish version of the revised children’s manifest anxiety scale in Uruguay. Journal of Personality Assessment 52(1), 165–170.

Roediger, H.L. III, McDaniel, M. & McDermott, K. (2006) Test enhanced learning. APS Observer 19(3).

Rose, A.J. & Rudolph, K.D. (2006) A review of sex differences in peer relationship processes: Potential trade-offs for the emotional and behavioral development of girls and boys. Psychological Bulletin 132(1), 98–131.

Sahlberg, P. (2007) Education policies for raising student learning: The Finnish approach. Journal of Education Policy 22(2), 147–171.

Sahlberg, P. (2011) Finnish Lessons, What Can We Learn from Educational Change in Finland? Columbia: Teacher College Press.

Sarason, S.B., Davidson, K.S., Lighthall, F.F., Waite, R.R. & Ruebush, B.K. (1969) Anxiety in Elementary School Children. New York: John Wiley & Sons, Inc.

SCB (2010) Undersökningarna av barns levnadsförhållanden [Investigations about children’s living conditions] (Barn-ULF). Retrieved 3 November 2010 from http://www.scb.se/Pages/Product____261119.aspx

Seipp., B. & Schwarzer, C. (1996) Cross-cultural anxiety research: A review. In C. Schwarzer, & M. Zeidner (eds.), Stress, Anxiety and Coping in Academic Settings. Tubingen (pp. 13–68). Germany: Francke-Verlag.

Skelton, C. (2001) Schooling the Boys: Masculinity and Primary Education. Buckingham: Open University Press.

Skolverket (2007) PIRLS 2006 Läsförmåga hos elever i årskurs 4: i Sverige och i världen [PIRLS 2006 reading comprehension in pupils in grade 4: In Sweden and the world]. Rapport 305. Stockholm: Fritzes Kundservice.

Skolverket (2010) Rustad att möta framtiden? PISA 2009 om 15-åringars läsförståelse och kunskaper om matematik och naturvetenskap [Prepared to meet the future? PISA 2009 about 15-year-olds’ reading comprehension and knowledge in mathematics and natural sciences]. Rapport 352. Stockholm: Fritzes Kundservice.

Snooks, M.K. (2004) Using practice test on a regular basis to improve student learning. New Directions for Teaching and Learning 100, 109–113.

Stöber, J. & Pekrun, R. (2004) Advances in test anxiety research. Anxiety, Stress and Coping 17(3), 205–211.

Swedish Research Council (2006) Good Research Practise – What is it? Views, guidelines and examples. B. Gustafsson, G. Hermerén and B. Petersson (eds.). Stockholm: The Swedish Research Council.
Tholin, J. (2003) *En roliger dans? Svenska skolors första tolkning av innebörden i lokala betygs-
kriterier i tre ämnen för skolär åtta* [A funnier dance? Swedish schools' first interpretation of
the meaning in local grading criteria in grade 8] (Dissertation). Borås: Högskolan i Borås.

Uljens, M. (2004) *PISA-resultat 2004 - förklaringar och utmaningar* [PISA result 2004 –
explanations and challenges]. Retrieved 12 May 2010 from http://www.vasa.abo.fi/users/
muljens/pisa/

UNICEF (2007) *Child Poverty in Perspective: An Overview of Child Well-Being in Rich Countries.*
Innocenti Report Card 7, UNICEF Innocenti Research Centre, Florence, Italy.

Wehrens, M.J.P.W., Buunk, A.P., Lubbers, M.J., Dijkstra, P., Kuyper, H. & van der Werf, G.P.C.
(2010) The relationship between affective response to social comparison and academic perfor-
mance in high school. *Contemporary Educational Psychology* 35(3), 203–214.

Wigfield, A. & Eccles, J.S. (1989) Test anxiety in elementary and secondary school students.
*Educational Psychologist* 24(2), 159–183.

Wren, D.G. & Benson, J. (2004) Measuring test anxiety in children: Scale development and internal
construct validation. *Anxiety, Stress, and Coping* 17(3), September, 227–240.

Zeidner, M. & Matthews, G. (2003) Test anxiety. In R. Fernández-Ballesteros (ed.) *Encyclopedia
of Psychological Assessment, Vol. 2 M-Z* (pp. 964–969). London: SAGE Publications.

Zeidner, M. (1990) Does test anxiety bias scholastic aptitude test performance by gender and
social group? *Journal of Personality Assessment* 55(1&2), 145–160.

Zeidner, M. (1998) *Test Anxiety: The State of the Art.* New York: Kluwer Academic Publishers.

Zeidner, M. (2007) Test anxiety in educational contexts: Concepts, findings, and future directions.
In P.A. Schutz, & R. Pekrun (eds.). *Emotion and Education* (pp. 165–184). San Diego, CA:
Elsevier INC.
Appendix A. Factor loadings for the exploratory factor analyses with a 3-factor structure

| Items (30 items)                                                                 | Thoughts | Autonomic reactions | Off-task behaviour |
|---------------------------------------------------------------------------------|----------|---------------------|--------------------|
| 1. I wonder if I will pass.                                                      | .32      | .19                 | -.16               |
| 2. My heart beats fast.                                                          | .42      | .61                 | -.03               |
| 3. I look around the room.                                                        | .16      | -.01                | .38                |
| 4. I feel nervous.                                                               | .55      | .49                 | .01                |
| 5. I think I am going to get a bad grade.                                        | .77      | .17                 | .21                |
| 6. It is hard for me to remember the answers.                                    | .49      | .17                 | .15                |
| 7. I play with my pencil.                                                        | .20      | -.09                | .51                |
| 8. My face feels hot.                                                            | .25      | .52                 | .21                |
| 9. I worry about failing.                                                         | .83      | .52                 | -.04               |
| 10. My belly feels funny.                                                         | .46      | .60                 | .14                |
| 11. I worry about doing something wrong.                                          | .76      | .47                 | .02                |
| 12. I check the time.                                                            | .18      | .01                 | .39                |
| 13. I think about what my grade will be.                                         | .49      | .39                 | .04                |
| 14. I find it hard to sit still.                                                 | .22      | .30                 | .42                |
| 15. I wonder if my answers are right.                                            | .38      | .12                 | -.02               |
| 16. I think that I should have studied more.                                     | .37      | .07                 | .21                |
| 17. My head hurts.                                                               | .27      | .30                 | .24                |
| 18. I look at other people.                                                       | .07      | -.04                | .47                |
| 19. I think most of my answers are wrong.                                        | .76      | .03                 | .27                |
| 20. I feel warm.                                                                 | .27      | .59                 | .13                |
| 21. I worry about how hard the test is.                                          | .67      | .43                 | .07                |
| 22. I try to finish up fast.                                                     | .09      | -.03                | .44                |
| 23. My hand shakes.                                                              | .41      | .47                 | .14                |
| 24. I think about what will happen if I fail.                                     | .76      | .36                 | .23                |
| 25. I have to go to the bathroom.                                                | .09      | .04                 | .24                |
| 26. I tap my feet.                                                               | .20      | .21                 | .30                |
| 27. I think about how poorly I am doing.                                         | .76      | .23                 | .17                |
| 28. I feel scared.                                                               | .49      | .47                 | .05                |
| 29. I worry about what my parents will say.                                      | .63      | .23                 | .13                |
| 30. I stare.                                                                    | .40      | -.05                | .49                |
## Appendix A. Factor loadings for the exploratory factor analyses with a 3-factor structure

| Items (19 items)                                                                 | Thoughts | Autonomic Reactions | Off-Task Behaviours |
|----------------------------------------------------------------------------------|----------|---------------------|---------------------|
| 2. My heart beats fast.                                                          | .36      | .62                 | .01                 |
| 3. I look around the room.                                                        | .15      | .14                 | .54                 |
| 4. I feel nervous.                                                                | .47      | .69                 | .05                 |
| 5. I think I am going to get a bad grade.                                        | .78      | .47                 | .13                 |
| 6. It is hard for me to remember the answers.                                    | .47      | .31                 | .05                 |
| 7. I play with my pencil.                                                         | .21      | .07                 | .51                 |
| 9. I worry about failing.                                                         | .79      | .79                 | -.09                |
| 11. I worry about doing something wrong.                                          | .72      | .76                 | .04                 |
| 12. I check the time.                                                             | .16      | .13                 | .45                 |
| 13. I think about what my grade will be.                                          | .45      | .52                 | .06                 |
| 15. I wonder if my answers are right.                                             | .35      | .34                 | .05                 |
| 18. I look at other people.                                                       | .06      | .02                 | .60                 |
| 19. I think most of my answers are wrong.                                         | .81      | .33                 | .12                 |
| 20. I feel warm.                                                                 | .24      | .41                 | -.02                |
| 21. I worry about how hard the test is.                                           | .63      | .61                 | .03                 |
| 22. I try to finish up fast.                                                      | .11      | .01                 | .39                 |
| 24. I think about what will happen if I fail.                                      | .74      | .57                 | .10                 |
| 27. I think about how poorly I am doing.                                          | .76      | .47                 | .04                 |
| 29. I worry about what my parents will say.                                       | .62      | .43                 | .02                 |