



Test anxiety in written and oral examinations

Jörn R. Sparfeldt^{a,*}, Detlef H. Rost^{b,1}, Ulrike M. Baumeister^{b,1}, Oliver Christ^{b,1}

^a Saarland University, Department of Educational Science, Campus A 5.4, D-66123 Saarbrücken, Germany

^b Philipps-Universität, Marburg, Germany, Fachbereich Psychologie, Gutenbergstraße 18, 35032 Marburg, Germany

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ABSTRACT

The distinction of different test anxiety reactions (e.g., worry, emotionality) is well established. Recently, additional relevance has been given to school-subject-specific test anxiety factors. The present study explored a further aspect concerning the structure of test anxiety experiences, specifically oral versus written examination modes. A questionnaire was administered to 682 high school students (grades 9 to 10) in which three aspects were systematically combined: different test anxiety factors (worry, emotionality), school-subjects (mathematics, German), and examination modes (written, oral). Confirmatory factor analyses supported a structure with eight school-subject-specific and examination-mode-specific test anxiety factors. Differential relationships revealed evidence for convergent and discriminant validity of these eight specific test anxiety factors with two test anxiety initiating conditions (recitation situations, lack of knowledge).

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1. Introduction

Test anxiety (TA) is a frequently researched topic (Cizek & Burg, 2006) with ample evidence for its multidimensionality (Zeidner, 1998). Whereas TA was usually assessed without referencing the corresponding content area, recently school-subject-specific assessments have been emphasized (e.g., Marsh & Yeung, 1996; Sparfeldt, Schilling, Rost, Stelzl, & Peipert, 2005). One important differentiation—focusing on examination modes—has been neglected. Therefore, the present study investigates school-subject-specific TA-factors in written (TA-written) and oral (TA-oral) examinations.

Liebert and Morris (1967) distinguished *worry* (ruminating about self-threatening consequences of failure) from *emotionality* (perceived physiological stress reactions). This two-dimensional TA-structure has repeatedly been shown with correlations of $.55 \leq r \leq .76$ (cf., Keith, Hodapp, Schermelleh-Engel, & Moosbrugger, 2003). Nevertheless, worry and emotionality are phenomenologically distinct, correlate differentially with achievement, and display differential growth-patterns depending on the examination's temporal distance (Hembree, 1988; Seipp & Schwarzer, 1991). Additional TA-dimensions (e.g., self-preoccupation, interference) were suggested, not denying the distinction and usefulness of these two factors (cf. Zeidner, 1998, 2007).

TA has been usually assessed without referencing a specific content. Recently different school-subject-related TA were analyzed simultaneously (e.g., Goetz, Frenzel, Pekrun, Hall, & Lüdtke, 2007;

Marsh, 1988; Marsh & Yeung, 1996). Most of these studies display problems: They assessed *general anxiety* instead of TA, and/or measured TA with only *one* item, and/or did not take the *multidimensionality* of TA into account. As an exception Sparfeldt et al. (2005) assessed three TA-factors in four school-subjects: worry, emotionality, and TA-tied impairments of information processing. Model comparisons documented the importance of considering both aspects (TA-factor, school-subject) simultaneously. Differential relationships between school-subject-specific TA-factors and grades evidenced convergent/discriminant validity. The various school-subjects comprise classes of situations requiring partially different competencies; these differences seem to structure the TA-experience. Moreover, at least some antecedents and correlates of TA are tied to school-subjects (as competence beliefs; e.g., Marsh & Yeung, 1996), others are structured more general (e.g., maladaptive coping). Focusing on TA-assessment Zeidner (1998, p. 122) suggested a combination of—among others—response modes (TA-factors) and evaluation situations (examination modes). Written examinations and oral examinations are widespread examination modes, not yet systematically considered in TA-research. Despite different subtypes, oral examinations in schools are usually more adaptive, more communicative, less restricted, and with a stronger reference to the individual examinee than written examinations (Jäger, 2004). From the examinee's perspective, oral examinations are characterized by the potential evaluation of an audience (at least one examiner).

Some studies have investigated different aspects, correlates and coping modes of TA-oral (e.g., Buchwald & Schwarzer, 2003; Huwe, Hennig, & Netter, 1998; Krumpholz, 1993), but not considering TA-written and TA-oral. Only Lukesch (1982) combined these two examination modes and three school-subjects systematically, but with only *one* item per school-subject-specific and examination-mode-

* Corresponding author. Tel.: +49 681 30257490; fax: +49 681 30257488.

E-mail addresses: j.sparfeldt@mx.uni-saarland.de (J.R. Sparfeldt),

rost@staff.uni-marburg.de (D.H. Rost).

¹ Tel.: +49 6421 2821727; fax: +49 6421 2823910.

specific TA-reaction, not considering different TA-factors. Unfortunately, the corresponding intercorrelations were not reported. Czeschlik (2008) focused on the relative frequencies in fourth-graders with 81% being “not test-anxious”, 5% “anxious in written”, 5% “in oral”, and 9% “in written and oral examinations”. In a high school sample, TA-oral and TA-written correlated $r = .58$.

Rost and Schermer (1992, 2007) differentiated classes of situations that initiate TA in many students. *Lack of knowledge* refers to TA as “caused by the realization that achievement demands cannot be met” (Rost & Schermer, 1989, p. 42), being closely related to academic self-beliefs as self-concept and self-efficacy, thereby being tied to specific context areas and potentially to examination modes. Lack of knowledge correlated $r = .51$ with worry and $r = .48$ with emotionality (Rost & Schermer, 2007, p. 92). *Recitation situations* refer to TA-initiating situations with a social focus, specifically the experience of TA as a “consequence when the achievement has to be presented to other people and when reactions which pose a threat to self-esteem are anticipated” (Rost & Schermer, 1989, p. 43). Recitation situations correlated differentially with worry ($r = .18$) and emotionality ($r = .34$; Rost & Schermer, 2007, p. 92). The formulations of the corresponding items refer to oral presentations/contributions/talks in class. Therefore, particularly oral examinations with a stronger social component (compared to written examinations) represent such TA-initiating situations.

The multidimensionality and the content-specificity of TA are well documented, yet examination modes have been neglected. Therefore, studies that analyze systematically school-subject-specific TA-factors in oral and written examinations are needed. This study pursues this approach:

(1) *Factorial validity*. Is it possible to separate the two central and sample-selected TA-factors (worry, emotionality) in mathematics and German (native language) related to oral and written examinations using confirmatory factor analyses (CFA)? We expected an adequate model fit with eight different TA-factors resulting from a systematic combination of two TA-factors, two school-subjects, and two examination modes. This model should fit better than more parsimonious models. The correlations of the school-subject-specific and examination-mode-specific TA-factors are expected to be numerically higher if two of the three dimensions of the corresponding factors are identical (e.g., *worry in mathematics in written examinations* and *worry in mathematics in oral examinations* refer to the identical TA-factor and the same school-subject, but to different examination modes) than if only one of the three dimensions is identical; the correlations should also be numerically higher if one rather than none of these dimensions is identical. According to Sparfeldt et al. (2005), the correlations of the worry-factors should be similar or slightly higher than those of the emotionality-factors. For the other two dimensions (school-subject, examination-mode), no such deduction can be made.

(2) *Criterion-related validity*. Are there differential relationships to be found among school-subject-specific and examination-mode-specific TA-factors with specific TA-initiating conditions (*recitation situations*,

lack of knowledge)? Recitation situations refer particularly to oral examinations. We expected higher correlations in recitation situations with TA-oral than TA-written factors. Furthermore, recitation situations should correlate higher with emotionality than with worry. Regarding the correlation pattern of the lack of knowledge factors and the recitation situations factors with the TA-factors, we expected numerically higher correlations if the two factors referred to an identical examination-mode and/or school-subject than if one or both of these aspects differed.

2. Method

2.1. Participants and Sampling

Participants were German academic-tracked high school ninth and tenth graders (*Gymnasium*: prep school for university) attending 29 classes in five schools. Only 0.5% of the parents did not allow their child to participate; 14.5% of the students were absent due to reasons unrelated to the study (e.g., illness). Data from $N = 682$ participants (mean age: 15.4 years, $SD = 0.71$; 406 female) were collected in April 2008 during regular lessons by a trained experimenter.

2.2. Instruments

Emotionality and worry in written examinations were measured with a German adaptation (TAI-G; Hodapp, 1991) of the well-established Test-Anxiety-Inventory (Spielberger, 1980). Each item was complemented by a specification of the school-subjects “mathematics” (numerical domain) and “German” (verbal domain; native language) that differed in demands on learners, didactics, and testing methods. The items were arranged in a table form (grid). Each item formed one row and was presented with a placeholder (...) for the school-subject specification. Each school-subject formed one column. The students were expected to fill out the placeholder (...) mentally with the school-subject from the corresponding column. Regarding the presentation mode, an experimental study revealed very similar psychometric properties of a multidimensional academic self-concept inventory with the items presented (a) in a grid and (b) in the usual questionnaire presentation mode (Sparfeldt, Schilling, Rost, & Thiel, 2006). TA-oral was assessed with identical items presented on a separate page in an analogue manner. Thereby, each participant answered each item of each TA-factor separately for both school-subjects and both examination-modes (Table 1). The use of identical item stems minimized variance due to different operationalizations.

The items to assess TA-initiating conditions were taken from another well-established German TA-inventory (DAI; Rost & Schermer, 2007) and adapted to measure TA-initiating conditions in mathematics and German. They were also presented in a grid. Regarding recitation situations, the questionnaire contained the eight slightly adapted items of the DAI-short form which explicitly formulate different types of oral presentations and examinations. Regarding lack of knowledge, oral and written examinations in mathematics and German could refer

Table 1

Instruments used to assess school-subject-specific and examination mode-specific test anxiety in oral and written examinations.

	Written examinations	Oral examinations
Introductory phrase	“In written examinations in the school subject ... [Mathematics]/[German] ...”	“In oral examinations in the school subject ... [Mathematics]/[German] ...”
Worry: item examples (item number); source	“... I worry about my results”, “... I find myself thinking about the consequences of failing” (7 items) ^a ; TAI-G (Hodapp, 1991)	
Emotionality: item examples (item number); source	“... I feel uneasy”, “... my muscles are very tight” (8 items); TAI-G (Hodapp, 1991)	

Notes. All items were answered on a six-point scale ranging from 1 (*not at all true*) to 6 (*perfectly true*). Pilot studies had shown that six-point scales were appropriate.

^a In accordance with the greater heterogeneity of worry (e.g., Hodapp, 1991), preliminary analyses with the ten more general worry items from the TAI-G revealed that three items showed inconsistent loadings and were therefore dropped.

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