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## Test Anxiety: Do Gender and School-Level Matter?

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**Abstract:** The study investigated differences in students' reported overall test anxiety before, during, or after test taking among two school-levels and gender. Differences among three test anxiety components (thoughts, off-task behaviors, and autonomic reactions) were also examined. Participants were 725 primary (349 females, 376 males) and 375 middle (180 females, 195 males) school students from a metropolitan city in Turkey. Turkish students' reported overall test anxiety declined from primary to middle school, with females showing higher test anxiety throughout school years. Whereas students rated thoughts high, autonomic reactions were rated low; followed by off-task behaviors. Female and male students did not differ in thoughts and autonomic reactions. School-level differences were found in off-task behaviors and autonomic reactions. The pattern of Turkish students' overall test anxiety derived as a combination of thoughts, off-task behaviors, and autonomic reactions was discussed, and educational implications were offered.

**Keywords:** *Test anxiety, gender differences, school year levels, primary school, middle school.*

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### Introduction

Test anxiety has become a serious problem in contemporary society (Peleg, 2002) because of the ongoing importance of tests as part of assessments in education (Peleg, Deutch, & Dan 2016). In relation to the fact that potential advancement in modern society frequently depends on test performance (Peleg, 2004), test anxiety is a negative emotional response to current or prospective situation involving an evaluation. Overwhelmingly, many students in school (11%-30%) report being test-anxious (Weiner & Carton, 2012) both in written or oral examinations (Sparfeldt, Rost, Baumeister, & Christ, 2013). The effects of test anxiety are therefore educationally debilitating; students who suffer from test anxiety perform low, endorse poor competence beliefs, have strong failure appraisals and may even drop out of school altogether (Hembree, 1990). Yet, researchers have acknowledged that test anxiety mediated the influence of student emotions (e.g., negative affect, positive affect) on test performance (Chin, Williams, Taylor, & Harvey, 2017). Nevertheless, the majority of studies have investigated test anxiety in terms of differences associated with gender (e.g., Everson, Millsap, & Rodriguez, 1991; Wigfield & Eccles, 1989); test anxiety research employing age and/or grade level differences that in a sense mirror the differences associated with school-level remains surprisingly sparse (see Hembree, 1988). Questions remain regarding test anxiety amongst students in different years of schooling (i.e., primary, middle, and high school) and it is unclear whether the test anxiety/test anxiety components link seen in younger primary school students also present in the older middle school-level. A further question centers on the specificity of test anxiety components that are differentially manifested by females and males in primary and middle school-levels.

In response to these research gaps, here I had two objectives. (1) mapping the patterns in test anxiety and its components across gender and school-level and (2) examining gender and school-level differences in in test anxiety and its components.

### Literature Review

#### *Test Anxiety*

Test anxiety is "a set of cognitive, physiological, and behavioral responses related to concerns about possible failure or a poor performance on a test or a similar evaluative situation" (Bodas, Ollendick, & Sovani, 2008, p. 387), referring to individual differences in the extent to which evaluative situations are appraised as threatening and further debilitating

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(Spielberger & Vagg, 1995). Accordingly, it is widely considered to be a multidimensional construct (Liebert & Morris, 1967) including *worry* (ruminating about self-threatening consequences of failure) and *emotionality* (perceived physiological stress reactions). Not denying the distinction and usefulness of these two dimensions, additional test anxiety dimensions (e.g., poor self-evaluation, somatic signs of anxiety) were suggested (cf. Zeidner, 2007).

The present study adopted the three-factor model of Wren and Benson (2004), consisting of distinct but interrelated cognitive, behavioral, and physiological dimensions. The cognitive component "*thoughts*" involves worrisome and test-irrelevant thoughts. It centers on individuals' self-critical concerns such as comparing self-performance to peers, feeling unprepared for evaluative situations, and causing sorrow for parents. The behavioral component "*off-task behaviors*" mirrors inattentive and distracted behaviors. It focuses on nervous habits such as auto-manipulation (e.g., playing with hair), object manipulation (e.g., biting pencils), and inattentive behaviors (e.g., looking around the classroom). The physiological component "*autonomic reactions*" displays physiological arousal and somatic signs of anxiety. It embodies manifestations such as perspiring, increased galvanic skin response, and dizziness.

While the extant literature has established how test anxiety and performance are related (e.g., Rouxel, 1999) and how this interrelationship is linked to the two major components-worry and emotionality (e.g., Shadach & Ganor-Miller, 2013; Spielberger & Vagg, 1995), research has yet to examine how the thoughts, off-task behaviors, and autonomic reactions components may interact in predicting individual differences in test anxiety. Collectively, the literature on developmental changes in test anxiety suggests that test anxiety interferes with learning and functioning in school (Peleg et al., 2016), beginning when students are first introduced into the education system in primary school and typically rising in later years of high school and university (Spielberger & Vagg, 1995; Trifoni & Shahini 2011), when classroom examinations and high-stakes tests become a pertinent part of student records and strongly impact their educational and professional future (Segool, Carlson, Goforth, von der Embse, & Barterian, 2013). Previous studies focusing on gender differences, indeed, revealed that females typically have higher levels of test anxiety, mostly in the emotionality component (for a review, see Zeidner, 1998). It has also been found that females typically tend to find testing situations threatening, while males regard a testing situation as a challenge and, therefore, suffer less from test anxiety (Putwain & Daniels, 2010).

#### *Gender and School-Level Differences*

The effects of gender and school-level on test anxiety and relevant components of test anxiety are poorly understood. However, previous empirical and cross-cultural findings provide some insights to guide further examination of differences in test anxiety associated with gender and school-level.

Turning first to gender differences, a fairly consistent finding is that females report higher levels of overall test anxiety than males (Bandalos, Yates, & Thorndike-Christ, 1995; Hembree, 1988; Lowe & Lee, 2008; Putwain, 2007; Putwain & Daly, 2014; Segool et al., 2013; Volkmer & Feather, 1991; Wren & Benson 2004; Zeidner, 1990, 1998). These gender differences may be explained by socialization practices and parental expectations. For instance, females are encouraged to express their emotions more openly and males are to exhibit defensiveness about admitting their emotions (Bodas et al., 2008; Zeidner, 1998). Besides, parents put more excessive pressure on females to achieve and thus trigger females' sensitivity about social approval from adults than do males (Wigfield & Eccles, 1989). Females also tend to report higher anxiety levels in worry and emotionality (Cassady & Johnson, 2002; Everson et al., 1991; Putwain, 2008) in specific curriculum areas (Everson, Tobias, Hartman, & Gourgey, 1993). Due to gender stereotyping in education (Andre, Whigham, Hendrickson, & Chambers, 1999), it is likely that different school subjects such as mathematics and science may elicit different kinds of reactions (i.e., worry and emotionality) in females and males (see Jacklin, 1989).

The evidence for gender differences in thoughts, off-task behaviors, and autonomic relations is considerably more extensive and conclusive among results of instrument development and validation (e.g., Wren & Benson, 2004), moderation (e.g., Putwain & Daniels, 2010) or cultural comparison (Nyroos et al., 2015) studies. Some studies have demonstrated a female advantage in thoughts and autonomic reactions, whereas no significant differences were found in off-task behaviors (Wren & Benson, 2004). Some others showed that females reported higher levels of autonomic reactions than males did, while no significant differences were found in thoughts and off-task behaviors (Nyroos et al., 2015). Interestingly, however, the similar line of research also documented that there were no significant gender differences in none of the thoughts, off-task behaviors, and autonomic reactions dimensions of test anxiety (Putwain & Daniels, 2010).

Similarly, findings of the very few studies that attempted to investigate gender differences in Turkish students' test anxiety are mixed. The majority of national research attempted to ascertain the influence of gender on test anxiety with reference to anxiety towards a particular subject such as mathematics (Oksal, Durmaz, & Akin, 2013; Yenilmez & Ozabaci, 2003; Yenilmez & Ozbey, 2006). Findings revealed either a typically stronger test anxiety in females (e.g., Bacanlı & Surucu, 2006; Oksal et al., 2013) or no significant gender differences (e.g., Yenilmez & Ozabaci, 2003; Yenilmez & Ozbey, 2006).

Moving to the school-level differences, little is known about developmental differences in test anxiety throughout primary, middle, and high school and the following university years. However, studies employing primary, middle, and high school (e.g., Bodas et al., 2008; Wigfield & Eccles, 1989), and undergraduate/graduate (e.g., Hembree, 1988)

student populations generally emphasized a declining trend towards the later school years (e.g., Bodas et al., 2008; Lowe et al., 2008). Research that adopts test anxiety components (e.g., Bodas et al., 2008) highlighted that these declining trends are associated with a conflict in developmental changes and metacognitive affordances. For example, students in lower grade levels are found to be less aware of their cognitions and emotions (Harter, 1983), and thus tend to have higher test anxiety in terms of their thoughts, off-task behaviors, and autonomic reactions (Lowe et al., 2008) or their worry and emotionality (Bodas et al., 2008). Findings relating to the development of test anxiety components are, however, less clear-cut than those focusing simply on overall test anxiety. Lowe, Grumbein, and Raad (2011) found that students in lower grades endorse similar levels of cognitive interference and worry, resulting in nonsignificant differences. Similarly, Wren and Benson (2004) indicated that students' test anxiety regarding the thoughts, off-task behaviors, and autonomic reactions components tends to be stable as they progress through primary to middle school.

Regarding national research on school-level differences in test anxiety (Yenilmez & Ozbey, 2006), a fairly consistent finding is that students in primary school tend to be more test anxious compared to students in middle school. However, there is also evidence that no significant differences exist in test anxiety among middle and high school students (Oksal et al., 2013; Yenilmez & Ozabaci, 2003).

Evidently, the findings related to the individual and developmental differences in test anxiety and its components lack consistency. However, the relevance of the findings is that some kind of gender and school-level disparity is present and the study of these differences in test anxiety based on the thoughts, off-task behaviors, and autonomic reactions dimensions has assumed an increasing importance (Wren & Benson, 2004) not only because it has many implications for the appraisal of assessments but also several contributions for the learning and achievement of students (Putwain & Daniels, 2010).

### *The Present Study*

In studying student test anxiety, researchers have been overly focused on the overall test anxiety level, while neglecting the potential role that different components of the construct might play. In addition, although the gender disparity in test anxiety has been quite well documented, school-level differences in overall test anxiety as well as its components are under-researched. This study aims to address these gaps. Specifically, I aim to contribute to the literature by investigating the cognitive, behavioral, and physiological facets of test anxiety (thoughts, off-task behaviors, and autonomic reactions, respectively) and to show possible gender and developmental trends in the adoption of these three kinds of test anxiety.

## **Methodology**

### *Research Goal*

On the basis of the literature, the following hypotheses were tested: (1) gender differences tend to be small, favoring females in overall test anxiety; (2) overall test anxiety scores tend to be higher in primary school-level; (3) females tend to report higher levels of test anxiety at the three components of test anxiety (thoughts, off-task behaviors, and autonomic reactions), and (4) the scores for thoughts, off-task behaviors, and autonomic reactions tend to be higher in primary school-level. No specific hypotheses were given a priori for the interaction effects between gender and school-level due to the lack of research.

The study also attempted to answer the following research questions, which had not been thoroughly elucidated in previous research: (1) Are gender and school-level differences, if any, consistent in the overall test anxiety?; (2) Are gender and school-level differences, if any, consistent in the three components of test anxiety?, and further (3) Are there gender and school-level differences in students' overall test anxiety?; and (4) Are there gender and school-level differences in the three components of test anxiety?

### *Sample and Data Collection*

Participants were from three public schools in Istanbul, which is a major metropolitan city in Turkey. The three schools were similar in size, socioeconomic status and academic achievement. In 2012-2013 academic year, the Turkish Ministry of Education launched a new education system called 4 + 4 + 4 (four-year primary school; four-year middle school; four-year high school) with primary school-level including Grades 1 to 4, whereas middle school-level involving Grades 5 to 8. Regarding this new education system, students attending to Grades 1-4 do not take in-class examinations. However, they take scores on the projects, class participation, performance tasks, and portfolios. Students attending to Grades 5-8, on the other hand, take in-class examinations and complete projects, performance tasks etc. In terms of the measurement and evaluation processes in the middle school, at least three in-class examinations are administered per semester for each school subject. The second of these in-class examinations is a national exam called the Transition from Primary to Secondary Education Exam (TEOG) which has six main subtests (Turkish, Mathematics, Science and Technology, English, Religious Culture and Morals, and History) including 20 multiple-choice items for each subtest. For instance, Mathematics has three examinations in a semester and TEOG is considered in the second of these, and the content of the subtest is comprised of all the objectives gained until the examination day.

With 49 participating classes, 1185 students were the initial sample. Preliminary analysis of the completed surveys revealed that for the demographic variables, the average percentage of missing data was 0.35% ranging from 0% to 0.7%. There were no missing data on the grade level. For the survey items, the average percentage of missing data was 0.16% ranging from 1% to 3.8%. Viewed together, for the complete data set of demographic and outcome variables the average percentage of missing data was 0.09% ranging from 0% to 3.8%. Following that, I conducted Little's MCAR test (Little, 1988) to examine the item non-response in the data set by using PASW Statistics 18. Results revealed that the data were missing completely at random (MCAR) ( $p = .456$ ,  $p > .05$ ). Given the low percentage of overall nonresponse rate (0.09%) of the data and that, the data are MCAR; I opted for the listwise deletion procedure that would give unbiased estimates (Cohen, Cohen, West, and Aiken, 2003). In this regard, 35 from Grade 3, 27 from Grade 4, 13 from Grade 5 and 10 from Grade 6 were eliminated due to showing insincerity in their responses (e.g., all "1"s or all "5"s), not completing the survey, multivariate outliers (5 cases), or missing demographic information (e.g., gender not specified). This process left 1100 students as 311 third (144 girls and 167 boys) and 414 fourth (205 girls and 209 boys) graders with a total of 725 primary school students; 174 fifth (80 girls and 94 boys) and 201 sixth (100 girls and 101 boys) graders with a total of 375 middle school students. The mean age of the primary school students was 8.5 whereas the mean age of the middle school students was 10.5.

*Children's Test Anxiety Scale (CTAS)*. Overall test anxiety and the relevant three components, *thoughts*, *off-task behaviors*, and *autonomic reactions*, were measured by the CTAS. The instrument was originally developed by Wren and Benson (2004). The CTAS has been shown to be valid in previous research among Turkish primary (Grades 3 and 4) and middle (Grades 5 and 6) school students (see Aydin & Bulgan, 2017, in press). The cross-cultural validation involved two studies regarding the recommendations of the Standards for Educational and Psychological Testing (AERA, APA and NCME, 1999). Study 1 involved two phases: translation of the CTAS into Turkish and piloting of the instrument. Study 2 involved four phases to test the applicability of the CTAS: test administration, confirmatory factor analyses, reliability analysis, and subgroup validity analysis. In brief, the results from the adaptation process confirmed that the underlying structure of the CTAS is formed by three factors that assess thoughts, off-task behaviors, and autonomic reactions. In terms of internal consistency of scores on the CTAS, the Cronbach's alpha coefficients proved satisfactory for thoughts ( $\alpha = .82$ ), off-task behaviors ( $\alpha = .72$ ), and autonomic reactions ( $\alpha = .75$ ). The Cronbach's alpha coefficient for the total instrument was  $\alpha = .88$ . All these estimates were acceptable indicating satisfactory reliability ( $> .60$ ; Tabachnick & Fidell, 2007) for both the whole instrument and its components and that, scores on the CTAS provide consistent information with regard to students' test anxiety.

The CTAS consisted of 30 items: "While I am taking tests I wonder if I will pass." (*thoughts*; 13 items), "While I am taking tests I play with my pencil." (*off-task behaviors*; 8 items), and "While I am taking tests I feel scared." (*autonomic reactions*; 9 items). Participants rated themselves on the 4-point scale: (1) *almost never*, (2) *some of the time*, (3) *most of the time*, and (4) *almost always*. The possible scores on the CTAS ranged from 30 to 120.

During 2014/2015 academic year, the CTAS was administered to students within one class period (40 min). Each student received a copy of the 30-item instrument, which included demographic questions (i.e., school, class affiliation, grade level, and gender) and a sample item for practice (i.e., each question is responded with a stem "While I am taking a test..."). All administrations were completed in the students' classrooms during regular school hours. Some teachers, who were willing to provide assistance for the data collection (i.e., take care of the students' needs), were also present at the class. School administrators, teachers, and students were assured of confidentiality.

#### Analyzing of Data

A 2 x 2 multivariate analysis of variance (MANOVA) was conducted to examine the mean differences in terms of test anxiety for females and males and for those of different school-levels. To simplify the analysis for the purpose of the present study, Grade 3 and Grade 4 students were aggregated and were referred to as primary school students. The Grade 5 and Grade 6 students were aggregated and referred to as middle school students. The three components of test anxiety (thoughts, off-task behaviors, and automatic reactions) were the dependent variables. The two independent variables were gender (female and male) and school-level (primary school and middle school).

Based on previous research, I expected small gender differences showing relatively higher scores for females (i.e., hypothesis 1), but statistically significant main effects of school-level, showing lower scores in the middle school-level (i.e., hypothesis 2). I also expected gender and school-level related differences in each of the three components of test anxiety, showing higher scores for females in thoughts, off-task behaviors, and autonomic reactions (i.e., hypothesis 3), and displaying lower scores in the higher middle school-level (i.e., hypothesis 4). However, extant literature does not seem to provide any indication of whether the tendency of lower overall test anxiety scores in the higher middle school-levels would be different for females and males, hence whether the interaction effects would be significant was unclear (i.e., research question 1). It is also unclear whether this tendency would be different for the thoughts, off-task behaviors, and autonomic reactions components of test anxiety (i.e., research question 2). The analysis therefore addressed also these questions.

Preliminary assumption testing on multivariate normality and homogeneity of variance matrices (i.e., Levene's test,  $p > .05$ ) was conducted and no violations were detected. Accordingly, the Wilks' Lambda criterion was applied using the

significance level .05 for the interpretation of the multivariate results. To present the effect size partial eta squared ( $\eta_p^2$ ) was calculated separately. When interactions were significant, simple effects were tested. Otherwise, main effects were tested followed by univariate tests using analysis of variance (ANOVA) approaches for multiple-comparisons. All the analyses were conducted by using PASW Statistics 18 (Statistical Package for the Social Sciences Inc., 2010).

### Findings / Results

#### *Gender and School-level Patterns in Overall Test Anxiety and the Three Components (Research Question 1 and Research Question 2)*

The scores of items for each component and the test anxiety were summed to obtain a total score for females and males in the primary and middle school-levels separately. The means and standard deviations were presented by gender and school-level in Table 1.

*Table 1. Means and standard deviations of thoughts, off-task behaviors, autonomic reactions scores, and overall test anxiety scores by gender and school-level.*

		Primary			Middle		
		<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Thoughts <sup>a</sup>	F	33.26	8.32	349	32.79	8.02	180
	M	33.18	7.63	376	32.55	7.17	195
	T	32.89	7.98	725	33.00	7.58	375
Off-task behaviors <sup>b</sup>	F	15.68	4.58	349	14.78	4.58	180
	M	14.82	4.68	376	14.02	4.68	195
	T	15.26	4.65	725	14.42	4.60	375
Autonomic reactions <sup>c</sup>	F	19.28	5.43	349	17.84	5.13	180
	M	18.57	5.48	376	17.43	5.17	195
	T	18.91	5.47	725	17.63	5.15	375
Overall Test Anxiety <sup>d</sup>	F	67.36	15.44	529	65.40	15.15	529
	M	66.80	14.93	571	64.65	14.16	571
	T	67.07	15.17	1100	65.04	14.63	1100

*Note.* *N* = 1100 with Overall test anxiety; Female (F) = 529; Male (M) = 571; Primary = 725; Middle = 375. T stands for Total. <sup>a</sup>Possible scores range from 13 to 52. <sup>b</sup>Possible scores range from 8 to 32. <sup>c</sup>Possible scores range from 9 to 36. <sup>d</sup>Possible scores range from 30 to 120.

In general, the overall test anxiety scores were higher in primary school, and test anxiety seemed more apparent in female students. Furthermore, the pattern for the components of test anxiety was consistent. The results showed that for each of the three test anxiety components, the primary students tended to have a higher mean score than the middle school students. This pattern was consistent for females and males. That is females in the primary school had consistently higher scores in the three components (*Ms* = 33.26, 15.68, and 19.28, for thoughts, off-task behaviors, and autonomic reactions, respectively) than females in the middle school (*Ms* = 32.79, 14.78, and 17.84); and males in the primary also had consistently higher scores (*Ms* = 32.55, 14.82, and 18.91) than males in the middle school (*Ms* = 32.55, 14.02, and 17.43, respectively).

Correlations among three test anxiety components ranged from .47 to .59 in primary school and .44 to .64 in middle school. Except for one correlation, middle school students' coefficients were higher than those of primary school students, with the highest correlation between thoughts and autonomic reactions (see Table 2).

*Table 2. Variable correlations for primary (upper triangle) and middle (lower triangle) school-level and internal consistency estimates (alpha).*

	<b>1</b>	<b>2</b>	<b>3</b>	<b>α (Primary)</b>
1. Thoughts	-	.47	.59	.82
2. Off-task behaviors	.44	-	.54	.66
3. Autonomic reactions	.64	.57	-	.74
<b>α (Middle)</b>	.83	.73	.76	-

*Note.* All correlation coefficients are statistically significant, *ps* < .01. Primary: *n* = 725; Middle: *n* = 375.

More specifically, in terms of internal consistency of primary school students' scores on the CTAS, the Cronbach's alpha coefficients proved satisfactory for thoughts ( $\alpha$  = .81), off-task behaviors ( $\alpha$  = .75), and autonomic reactions ( $\alpha$  = .70). Regarding the primary school sample, the Cronbach's alpha coefficient for the total instrument was  $\alpha$  = .82. On the other hand, in terms of internal consistency of middle school students' scores on the CTAS, the Cronbach's alpha coefficients proved satisfactory for thoughts ( $\alpha$  = .83), off-task behaviors ( $\alpha$  = .76), and autonomic reactions ( $\alpha$  = .73). Regarding the

middle school sample, the Cronbach’s alpha coefficient for the total instrument was  $\alpha = .87$ . Viewed together, all these estimates were acceptable indicating satisfactory reliability ( $> .60$ ; Tabachnick & Fidell, 2007) for both the whole instrument and its components, and that scores on the CTAS provide consistent information with regard to students’ test anxiety attending to different levels of schooling.

Apart from gender differences, there seemed to be school-level differences as well, although such differences may be small. MANOVA results showed main effects of gender and school-level, but no gender x school-level effects. These were discussed further with respect to the research questions, as described below. Table 3 presents the results of the significance tests.

*Gender and School-Level Effects in Overall Test Anxiety (Research Question 3)*

There was a statistically significant difference between females and males on the overall test anxiety,  $F(3, 1094) = 7.53, p = .00$ ; Wilks’ Lambda = .98;  $\eta_p^2 = .020$ , a small effect size; indicating that females tended to feel more anxious before, during, or after a test. There was also a statistically significant difference between primary and middle school students on the overall test anxiety,  $F(3, 1094) = 8.83, p = .00$ ; Wilks’ Lambda = .97;  $\eta_p^2 = .024$ , a small effect size; indicating that students in primary school found testing situations more threatening. The gender x school-level interaction,  $F(3, 1094) = .59, p = .61$ ; Wilks’ Lambda = .99;  $\eta_p^2 = .002$ , was not statistically significant. This indicated that the interaction effect between gender and school-level was trivial and the pattern of gender differences associated with school-level was very similar.

*Gender and School-Level Effects in Test Anxiety Components (Research Question 4)*

The results for the three test anxiety components were considered separately to examine the mean differences in the thoughts, off-task behaviors, and autonomic reactions in terms of gender and school-level (see Table 3).

For thoughts, neither the main effects of gender,  $F(1, 1096) = .10, p = .75$ ;  $\eta_p^2 = .000$ , and school-level  $F(1, 1096) = .02, p = .86$ ;  $\eta_p^2 = .000$ , nor the gender x school-level interaction,  $F(1, 1096) = 1.20, p = .27$ ;  $\eta_p^2 = .001$ , was statistically significant. That is for thoughts, both gender and school-level differences were trivial, and the pattern of these differences was very similar.

For off-task behaviors, the main effect of gender was statistically significant,  $F(1, 1096) = 7.69, p = .00$ ;  $\eta_p^2 = .007$ , indicating that females reported to show inattentive or distracted actions (i.e., looking around classroom, not focused on the test) more often. The main effect of school-level was also statistically significant,  $F(1, 1096) = 8.31, p = .00$ ;  $\eta_p^2 = .008$ , indicating that students in primary school tended to exhibit object manipulation (i.e., biting pencils during a test) more frequently. However, the small effect sizes suggested that these differences related to gender and school-level might be trivial.

Table 3. Descriptive statistics and 2 (Gender) x 2 (School-level) MANOVA results for the three components of test anxiety.

Factor	Primary (n = 725)		Middle (n = 375)			
	Females (n = 349)	Males (n = 376)	Females (n = 180)	Males (n = 195)		
	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)		
Thoughts	33.26(8.32)	32.55(7.63)	32.79(8.02)	33.18(7.17)		
Off-task	14.32(4.58)	15.68(4.68)	14.02(4.49)	14.78(4.68)		
Autonomic	19.28(5.43)	18.57(5.48)	17.84(5.13)	17.43(5.17)		
Effects	Gender (G)		School-level (S)		G x S	
Factor	F(1,1096)	$\eta_p^2$	F(1,1096)	$\eta_p^2$	F(1,1096)	$\eta_p^2$
Thoughts	0.10	.000	0.02	.000	1.20	.001
Off-task	7.69*	.007	8.31*	.008	0.02	.000
Autonomic	2.69	.002	14.28*	.013	0.19	.000

Note. N = 1100. Off-task = off-task behaviors. Autonomic = autonomic reactions. Students responded to the CTAS items on a 4-point scale with higher scores reflecting higher levels of test anxiety at the three components. Mean Square Error for each of the three components = 61.62, 21.35, and 28.74, respectively.

\*  $p < .05$

Indeed, the gender x school-level interaction,  $F(1, 1096) = .27, p = .87$ ;  $\eta_p^2 = .000$ , was not statistically significant. That is, students tended to exhibit off-task behaviors more often in primary school years, and this pattern is consistent between females and males although females’ scores on off-task behaviors may be even slightly higher.

For autonomic reactions, the main effect of school-level,  $F(1, 1096) = .27, p = .87; \eta_p^2 = .000$ , was statistically significant, indicating that students in primary school reported to display somatic responses (e.g., shaking legs, blushing face) to test-related stress more often. Neither the main effect of gender,  $F(1, 1096) = 2.69, p = .10; \eta_p^2 = .002$ , nor the gender x school-level interaction,  $F(1, 1096) = .19, p = .65; \eta_p^2 = .000$ , was statistically significant. That is, for autonomic reactions, both females and males reported to show somatic symptoms (i.e., stomachache) frequently at the primary school-level, gender difference was trivial and the pattern school-level difference was very similar.

Because the analysis revealed some different patterns for the three test anxiety components (thoughts, off-task behaviors, and autonomic reactions), a univariate approach to ANOVA was used. Accordingly, a series of Two-Way ANOVAs was conducted separately for each of these components. Follow-up univariate ANOVAs using thoughts, off-task behaviors, and autonomic reactions as dependent variables found the same pattern for the main effects of gender and school-level and the gender x school-level interaction effects (data not reported).

### Discussion and Conclusion

The overarching goal of the present study was to examine gender and school-level differences of Turkish students in primary and middle schools. Four hypotheses were tested: (1) gender differences in overall test anxiety would be small, with females showing higher scores than did males; (2) students in primary school would display higher scores in overall test anxiety; (3) gender differences in thoughts, off-task behaviors, and autonomic reactions would be small, favoring females; and (4) students in primary school would exhibit higher scores in thoughts, off-task behaviors, and autonomic reactions.

Overall, the analysis found support for hypothesis 1 that gender differences in overall test anxiety were small. Females had comparatively higher scores than males, but the effect size was small. For hypothesis 2, there was support that students in primary school tend to report higher levels of overall test anxiety than did students in middle school. For hypothesis 3, there was support that gender differences were small. Males had comparatively higher scores than females in off-task behaviors, but the effect size was small whereas gender differences in thoughts and autonomic reactions were trivial (not significant). In the same vein, for hypothesis 4, school-level differences were significant except for thoughts. Students in primary school tend to report higher scores in off-task behaviors and autonomic reactions, with small to moderate effect sizes. For the research questions, the analysis found that: (1) Females and males had very similar patterns showing higher overall test anxiety in early primary years of schooling; (2) Gender and school-level differences were fairly consistent across the three components of test anxiety indicating that the tendency of heightened thoughts, off-task behaviors, and autonomic reactions in primary school for both females and males; and (3) Among the three components, both females and males in primary and middle school tended to report highest scores for thoughts whereas they tended to report autonomic reactions lowest. Nevertheless, the difference in thoughts scores for females and males across primary and middle school-levels was trivial (see Table 3).

These findings replicate previous studies with females endorsing higher levels of test anxiety than males (Lowe & Lee, 2008; Zeidner, 1998). Indeed, previous studies reflecting the individual differences in test anxiety (Hembree, 1988) reported higher scores for females than males on test anxiety at each level of schooling (i.e., primary, secondary, and postsecondary). The results are also consistent with previous research suggesting that students tend to have reduced test anxiety (e.g., Wren & Benson, 2004) and lowered worry and emotionality (e.g., Bodas et al., 2008) as they mature. More importantly, consistent with previous research (e.g., Wren & Benson, 2004), there was evidence from this Turkish sample suggesting that reduced test anxiety may occur irrespective of gender. Consistent with the upward developmental trend found in other comprehensive reviews, the higher scores in early primary school-level call for serious attention. Because both test anxiety and relevant thoughts, off-task behaviors, and autonomic reactions tend to have significant influences on academic achievement and motivation (see Hancock, 2001; McDonald, 2001), the facilitating potentials of these cognitive, behavioral, and physiological components need to be capitalized in the early years of schooling. The tendency of rising test anxiety over primary years implies that there may be something wrong in the school environment that needs attention with respect to the evaluative contexts.

A range of alternative explanations may be possible for the unfavorable trend found on the part of females and primary school students in this study, and in some other studies. First, it is possible that students become more aware of their own capabilities as they move through school such that their sense of test anxiety gradually becomes less resistant (Wigfield & Eccles, 1989), even in some important subjects (e.g., Mathematics and Science) that they exhibit higher levels of anxiety (Ma, 1999; Udo, Ramsey, & Mallow, 2004). If this is the case, then it may not be a cause for concern for teachers and parents. However, a second possibility is that students in primary school may be re-evaluating their academic status in their social comparisons with peers (Cole & Cole, 1993). As they may not yet be familiar with evaluative situations as much as students in middle school, they may report higher test anxiety. Simply put, in many Turkish school settings competition is emphasized and those students in primary school who do not do as well as their peers may develop less favorable self-reports on test anxiety. To teachers and parents, the consequence of increased test anxiety can be a serious concern.

Finally, it is possible that students, at the beginning of school years, are less likely to query the value of academic outcomes resulting from their performance on tests (Wigfield & Eccles, 1989). This is not surprising with respect to the

fact that as students grow up, they gradually learn to put value in the importance of education (Wigfield & Eccles, 2000), and hence schooling (Yeung, 2011). It is therefore possible that students in primary school may find the tests and testing situations getting more and more important as they proceed to middle school (see Lowe et al., 2011), as increasing emphasis is placed on the classroom examinations as well as national standardized tests.

The present study has a number of limitations. The major limitation concerns the cross-sectional nature of data used to make an inference on the developmental trend. Interpreting data from a single time point, such as the data presented in this study, needs caution. Future research should attempt to collect longitudinal data (e.g., at two time points: before and after a test), use repeated-measures designs, and/or test growth models in order to fully answer the research questions. In fact, the students' self-reported test anxiety could be overestimated or underestimated, especially the primary school students. For this, teachers' ratings on, for instance, students' behavioral and emotional reactions during a test, may be helpful in future studies. Future investigations may also consider including different types of school (e.g., public vs. private) to examine the generalizability of findings, as different school types may have different structures, treatments, or expectations that may influence student reactions to test taking.

Whereas the developmental patterns of overall test anxiety and the three components tended to be very similar for females and males, there were some subtle gender differences that may have important implications. First, the differences between females and males were larger in the primary school-level than later years of middle school-level (e.g.,  $M = 15.68$  for females' off-task behaviors in primary school vs.  $M = 14.82$  for males). Although the differences were not large (e.g.,  $\eta_p^2 = .007$  for this comparison), educators may ask: Is it the curriculum content (e.g., mathematics program) or the pedagogy (e.g., teacher oriented classrooms) that has led to the females' relatively higher test anxiety in primary school? Can something be done to the primary school curriculum to make testing situations more facilitating to females? Research based on the prevalence of test anxiety has shown that effective intervention programs can reduce test anxiety in K-12 student (e.g., von der Embse, Barterian, & Segool 2013). As suggested by Ergene (2003) test anxiety intervention programs can be designed specifically for primary, middle, and high school students. Also, the perceptions of females arising from their heightened self-doubt put forth evaluative situations as a threat (Sarason, 1984). Educators may go about using cognitive-behavioral methods (Sapp & Farrell, 1994) or implement skill-building interventions (Gregor, 2005) to reduce test anxiety in females. Taken together, these gender and school-level issues need to be further investigated in future research.

Overall, the results are consistent with the declining patterns of test anxiety in later years of schooling found in previous international and national research (e.g., Wren & Benson 2004), the small gender differences (e.g., Oksal et al., 2013; Segool et al. 2013), and also the school-level differences found in Lowe et al. (2008) and Yenilmez and Ozbey (2006). However, these gender and school-level related differences need to be replicated in different samples for generalization, and the reasons for such patterns need further exploration. It is also noteworthy that the results of the present study should be interpreted in caution regarding, to some extent, large difference in the sample size of the primary ( $n = 725$ ) and middle ( $n = 375$ ) school students.

To conclude, the current study sheds light on several important issues related to individual differences in test anxiety. Since test anxiety has important influences on academic outcomes it is hoped that this preliminary work with a Turkish sample of students will serve as a foundation for further research in cross-cultural research more broadly as well.

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