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An investigation on burnout, test anxiety, test motivation, and test attitude of prospective mathematics teachers in Turkey

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ABSTRACT

Student burnout can lead to lower motivation to do required coursework and higher absenteeism. The purpose of the study was to examine whether a significant correlation exists between burnout, test anxiety, test attitude, and test motivation of prospective mathematics teachers studying at mathematics teacher program in an education faculty of a state university in Turkey. This study also sought to examine whether there is a significant difference between burnout, test anxiety, test attitude, and test motivation of prospective mathematics teachers, according to gender and grade level. Data were collected from 340 students. We found a significant positive correlation between test attitude and test motivation, between burnout and test anxiety; also the results of ANOVA showed that there was a statistically significant difference in prospective mathematics teachers' burnout and test anxiety, according to grade level. These findings support prospective mathematics teachers' test attitude had a significant positive correlation with test motivation, their burnout had a significant positive correlation with test anxiety and there was a significant difference between burnout and test anxiety, according to grade levels.

Keywords: Burnout, test anxiety, test motivation, test attitude, mathematics teachers, anxiety.

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INTRODUCTION

All students in Turkey have difficulties in mathematics, and their mathematics achievement is low on national and international exams (Boyraz and Güçlü, 2018). Math is one of the school subjects that students perceive to be the most challenging, complex, and abstract (Schwartz, 2000). This is also a growing problem among prospective mathematics teachers. Students' negative emotional reactions towards mathematics cause them to avoid and careers that require them to use math skills (Betz, 2006; Betz and Hackett, 1983). In order to improve their mathematics achievement, students need to attend classes, complete course homework on time, and actively participate in class activities. Students must be happy while doing these tasks and responsibilities; otherwise, these tasks and responsibilities could lead prospective mathematics teachers to burn out.

Student burnout

In literature, there are many definitions of burnout. Burnout is generally considered to be a result of stress and an inadequate support system (Gold, 1984). It is a syndrome that usually occurs among people who help professionals (Maslach, 1978; Maslach and Pines, 1977); therefore, it is generally defined as a syndrome characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment in professionals (Golembiewski, Sun, Lin and Boudreau, 1995; Firth et al., 1985; Jackson, Schwab and Schuler, 1986; Lahoz and Mason, 1989; Maslach, 1978; Maslach and Pines, 1977; Schaufeli et al., 2009; Schwab and Iwanicki, 1982). According to Maslach and Leiter (1997), major factors of burnout include work overload, lack of control, lack of

reward, lack of community, value conflict, and lack of fairness, which are obvious indications that a person and a job are mismatched (Yang, 2004). Studies have shown that burnout can lead to lower commitment, higher turnover, absenteeism, reduced productivity, low morale, and lower consideration of others (Cordes and Dougherty, 1993; Maslach, 1978; Maslach and Pines, 1977).

Burnout is a growing problem among undergraduate students, and student burnout is characterized by exhaustion and disengagement, owing to prolonged stressful experiences in school (Chandan and Sherkhane, 2017; Ezeudu et al., 2019; Fernando and Samaranayake, 2018; Galdino et al., 2016). Yang (2004) defined student burnout as emotional exhaustion, depersonalization tendencies, and a low sense of personal accomplishment, due to course stress, a high course load, and other psychological factors. Research shows that burnout is common in college students. For instance, Pines et al. (1981) examined burnout in undergraduate students and found that student burnout ranked in the middle to upper levels (Yang, 2004). Balkıs (2013) found a significant negative relationship between undergraduate students' academic achievement and their levels of burnout. In addition, Tansel (2015) investigated the level of burnout among university students within a framework of demographic variables and found that the burnout scores of university students differ from each other in terms of variables of gender and grade level.

The above research shows that the level of stress among university students is significant. Burnout caused by stress may lead to mental distress in the form of anxiety, depression, frustration, hostility, or fear (Yang, 2004). Furthermore, student burnout can lead to higher absenteeism, lower motivation to do required coursework, and a higher percentage of student dropouts (Meier and Schmeck, 1985; Ramist, 1981). Student burnout may also affect test anxiety, attitudes towards tests, and motivation to perform on tests, all of which are associated with test success. Chang (1986) stated that test anxiety negatively affects students' success in tests, their opinions and thoughts about tests, the length of time it takes them to complete a test, and their understanding of test questions. At the same time, this negative emotion also generally negatively affects their attitude and motivation towards tests; low test anxiety causes students to improve their attitudes towards tests and to become more motivated (Carraway, 1987; Taylor and Walton, 1997; Vattanapath and Jaiprayoon, 1999).

Test anxiety

Tests are one of the most common assessment methods used in most education systems and academic institutions worldwide. At the college level, tests generally carry the highest weight towards a student's total grade. As long as tests are widely used to evaluate academic performance, all efforts to ensure that students can be successful on them are important. For this reason, it is important to examine the factors that affect students' success in tests. Various factors impact students' performance on tests (Hambleton et al., 1991). Test anxiety is one of these factors. Test anxiety was defined by Suinn (1968) as the difficulty in reading and understanding simple sentences on a test and in remembering knowledge studied or in integrating ideas (Lufi and Darliuk, 2005). In addition, test anxiety has been defined as the tension that prevents a person from transferring what they know to the test (Austin et al., 1995). According to Chang (1986), test anxiety negatively affects an individual's concentration, his success, his ideas, and his thoughts on a test, during the duration of the test (Dodeen, 2009).

Research shows that test anxiety is a common problem among university students. For example, Hembree (1988) reported that more than 20 percent of university students had test anxiety. Mwamwenda (1994) showed a statistically significant difference between students' test anxiety levels and their academic achievement. Adigwe (1997) reported a negative correlation between test anxiety and students' achievement in science. Similarly, Idaka et al. (2011) found that prospective teachers' test anxiety was negatively correlated with their achievement in educational tests and measurements. Additionally, Devine et al. (2013), measured pre-university students' mathematics performance and their levels of mathematics anxiety. The findings of that study showed a positive correlation between mathematics anxiety and test anxiety, but mathematics anxiety was negatively correlated with performance in mathematics. Conversely, Seng (2015) and Yousefi et al. (2010) indicated that mathematics test anxiety and mathematics anxiety was positively correlated with mathematics achievement.

Test attitude

Attitudes are an emotional concept that affects every stage of human life (Lemon, 1973). Attitudes have been conceptualized as having three components: cognitive, affective, and behavioral components (Triandis, 1971). According to Zimbardo and Leippe (1991), attitudes are formed by direct experiences, as well as through implicit learning, and may reflect one's personality. Shavitt and Brock (1994) indicated that attitudes are functional in as much as they simplify complex subjects, express fundamental values and beliefs, and mediate or guide behavior. In this context, a student's attitude towards tests is indicative of his approach towards tests during the education and training process. A positive attitude towards tests suggests that he wants to take a test and desires to improve his academic performance, knowing that education is one of the ways to get ahead in life.

Negative emotions towards tests may also affect attitudes towards learning in general, academic performance, and tests, specifically. Therefore, students' attitudes towards tests provide important information about their behavior in tests (Dodeen, 2009). For instance, seeing tests as useful learning experiences or as a way to evaluate learning, and to organize studying helps students to develop positive attitudes towards tests. As a result, those attitudes will have a positive effect on students' learning and achievement. There are few studies regarding the effect of attitude on tests. Imasuen (2016) indicated that the overall mean of attitudes of public and private school students towards test-taking was positive. Similarly, Saleh and Ibnian (2017) noted that the attitudes of students towards test-taking were positive. Additionally, Owan et al. (2020) found that the level of students' attitudes towards test-taking in secondary schools was significantly high. Matotek (2017) showed that there was a statistically significant difference in attitudes towards mathematics regarding students' achievement on mathematics tests.

Test motivation

Motivation is a complex psychological structure that tries to explain the behavior and effort shown in different activities (Watters and Ginns, 2000). It is a theoretical concept used to explain the initiation, direction, intensity, and determination of goal-oriented behavior (Brophy, 1998). There are different definitions of the concept of motivation. Deci and Ryan (2000) defined motivation as a sense of acting to do something for an individual (Aydın et al., 2014). Martin and Briggs (1986) defined it as a structure that includes all internal and external conditions that affect the awakening, maintenance, and control of behavior (Warren, 2000). Schunk (2009) defined motivation as the process that drives targeted activities, while Martin (2004) defined academic motivation as the power that enables students to reveal their academic performance and activate their studies (Akar and Aydın, 2016). The academic motivation of students has been conceptualized in two different ways: field and situation-specific motivation. Field-specific motivation refers to the success motivation in a particular field (e.g. math and science). Situation-specific motivation expresses the motivation of success in order to perform well in a particular situation or on a particular test (Eklöf, 2007; Penk et al., 2014). Schunk et al. (2008) stated that test motivation is a specific type of achievement motivation. Test motivation is assigned to the situation-specific motivation construct because taking a test is a specific situation for students. Baumert and Demmrich (2001) define this type of motivation as "the willingness to engage in working on test items and to invest effort and persistence in this undertaking" (Penk et al., 2014). Studies showed that positive motivation towards an exam is necessary for success on that exam (Eklöf, 2007; Robitaille and Garden, 1996).

Although teacher burnout has been a focus of educational concern and research for decades, fewer empirical studies have focused on burnout among college students. Most previous research regarding college student burnout has involved descriptive and demographic analyses, and results of this research indicate that students and their teachers may burn out when they expect that the environment offers them no valuable rewards or opportunities (Balkıs, 2013; Balogun, Hoeberlein, Schneider and Katz, 1996; Chang, Rand and Strunk, 2000; Ezeudu et al., 2019; Hu and Schaufeli, 2009; Meier and Schmeck, 1985; Schaufeli et al., 2002a; Schaufeli and Salanova, 2007; Schaufeli et al., 2002b; Yang, 2004; Yang and Cheng, 2005; Wang, Zhang, Gan, and Zhang, 2005). In this context, the level of stress among prospective mathematics teachers is significant and related to the intense level of training within the faculty of education. This stress level may also affect prospective mathematics teachers' burnout, test anxiety, test attitude, and test motivation. Therefore, unlike previous research, we investigated whether a significant correlation exists between burnout, test anxiety, test attitude, and test motivation of prospective mathematics teachers. Additionally, this study sought to determine whether there is a statistically significant difference between burnout, test anxiety, test attitude, and test motivation of prospective mathematics teachers studying at mathematics teacher program in an education faculty of a state university, according to gender and grade level.

METHODS

Participants and procedure

This study was carried out using a correlational research design. The sample consisted of 340 (144 male and 196 female) prospective mathematics teachers studying at mathematics teacher program in an education faculty of a state university in Turkey. Their ages ranged from 18 to 23 years. Data were collected before (scales of test anxiety, test attitude, and burnout) mathematics tests and test motivation scale was used after mathematics tests. All of the participants were informed as to the purpose of the study prior to completing the data collection instruments.

Instruments

Data collection tools used in this study are the Maslach Burnout Inventory-Student Scale (MBI-SS), the Revised Test Anxiety Scale (RTA), the Test Attitude Scale (TAS), and the Test Motivation Scale (TMS).

MBI-SS: In order to determine burnout levels of prospective mathematics teachers, the MBI-SS was used. This scale was designed by Schaufeli et al. (2002b) and translated into Turkish by Çapri et al. (2011). The scale consists of 13 items and Cronbach's alpha coefficient was calculated as 0.79.

RTA: In order to determine test anxiety levels of prospective mathematics teachers, the Revised Test Anxiety Scale (RTA) was used. It was developed by Benson and El-Zahar (1994), and translated into Turkish by Akın and Demirci (2012). The RTA is a 20-item, four-point Likert rating scale, ranging from 1 (almost never) to 4 (almost always). The scale consists of 20-items and the Cronbach's alpha coefficient was calculated as 0.88.

TAS: In order to determine test attitude levels of prospective mathematics teachers, the TAS was used. It was developed by Spielberger (1980) and translated into Turkish by Öner (1990). The TAS is a 20-item, four-point Likert rating scale, ranging from 1 (never) to 4 (always). The scale consists of 20 items and Cronbach's alpha coefficient was calculated as 0.73.

TMS: In order to determine the test motivations of prospective mathematics teachers, the Student Opinion Scale (SOS) was used. It was developed by Wolf and Smith (1993) and designed by Sundre and Finney (2002). The scale was translated into Turkish by Kurbanoğlu and Takunyacı (2017). A five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used. The scale consists of 10 items and Cronbach's alpha coefficient was calculated as 0.74.

Data analysis

The normality values of the data were first examined for the analysis of the research problem. Parametric test techniques were used since the distribution of the data was within the limits of normality. Therefore, Pearson correlation analysis, independent samples T-tests, ANOVA, and Tukey's HSD tests were used to analyze the data.

FINDINGS

Research question 1: Are there any significant correlations between prospective mathematics teachers' burnout, test anxiety, test motivation, and test attitude?

A significant correlation was observed between prospective mathematics teachers' test attitude and test motivation, and between prospective mathematics teachers' burnout and test anxiety, as shown in Figure 1. The results revealed a low, significant positive correlation between test attitude and test motivation (r = 0.24, p < 0.01), and a high, significant positive correlation between prospective mathematics teachers' burnout and test anxiety (r = 0.59, p < 0.01). However, there is no significant correlation was observed between prospective mathematics teachers' test attitude and test anxiety, between test motivation and test anxiety, between test attitude and burnout, between test motivation and test attitude.

Research question 2: Is there any significant difference in prospective mathematics teachers' scores of burnout, test anxiety, test motivation, and test attitude, according to gender?

Table 1 shows comparisons of the gender differences in prospective mathematics teachers' burnout, test anxiety, test motivation, and test attitude, according to gender. Table 1 shows no significant differences between the scores of males and females.

Research question 3: Is there any significant difference in prospective mathematics teachers' burnouts, test anxiety, test motivation, and test attitude according to grade levels?

The ANOVA results for prospective mathematics teachers' burnout, test anxiety, test motivation, and test attitude scores are shown in Table 2. The results of ANOVA showed a statistically significant difference in prospective mathematics teachers' burnout and test anxiety, according to grade level (respectively, $F_{(3\text{-}336)}$= 5,52; $F_{(3\text{-}336)}$= 6,94). Tukey's HSD tests revealed a significant difference in scores of prospective mathematics teachers' burnout and test anxiety between freshman and sophomores, between freshman and juniors, and between freshman and seniors. These results are in favor of freshmen.

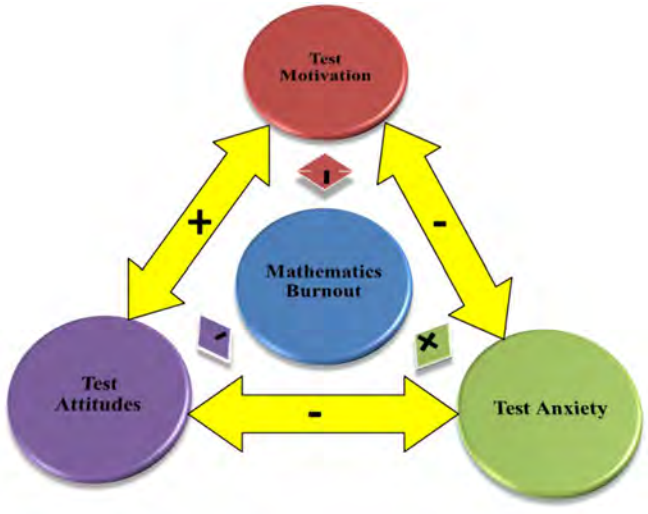

Figure 1. Results of the correlations between the variables.

Table 1. Means, standard deviations, *T* and *P* values for prospective mathematics teachers' scores of burnout, test anxiety, test motivation, and test attitude, according to gender.

Variables \ Gender	Males N=144		Females N=196		t	p
	M	SD	M	SD		
Burnout	27.53	4.68	27.08	3.96	.95	.34
Test anxiety	39.35	10.70	38.66	9.63	.62	.54
Test motivation	37.57	4.83	38.15	4.58	-1.13	.26
Test attitude	70.90	7.54	69.92	6.39	1.28	.20

**p < .01.

Table 2. The ANOVA results for prospective mathematics teachers' burnouts, test anxiety, test motivation, and test attitudes scores according to grade levels.

	Grade levels	Mean		Sum of squares	df	Mean square	F	p	Tukey
Burnout	I	25.86	Between Groups	291.63	3	97.21	5.52	.00**	I-II
	II	28.12	Within Groups	5913.48	336	17.60			I-III
	III	27.60	Total	6205.10	339				I-IV
	IV	27.71							
Test anxiety	I	35.51	Between Groups	2012.57	3	670.86	6.94	.00**	I-II
	II	39.27	Within Groups	32478.66	336	96.66			I-III
	III	40.28	Total	34491.24	339				I-IV
	IV	42.27							
Test motivation	I	38.19	Between Groups	35.914	3	11.97	.54	.65	
	II	37.44	Within Groups	7423.07	336	22.09			
	III	37.93	Total	7458.99	339				
	IV	38.19							
Test attitude	I	71.31	Between Groups	189.48	3	63.16	1.33	.26	
	II	70.37	Within Groups	15994.30	336	47.60			
	III	69.97	Total	16183.78	339				
	IV	69.17							

**p< .01 I: Freshman II: Sophomore III: Junior IV: Senior

RESULTS AND DISCUSSION

This study investigated whether a significant correlation exists between burnout, test anxiety, test attitude, and test motivation of prospective mathematics teachers and whether there is a statistically significant difference between burnout, test anxiety, test attitude, and test motivation of prospective mathematics teachers, according to gender and grade level.

The first finding of this study indicated that test attitude had a significant positive relationship with test motivation and burnout had a significant positive relationship with test anxiety for prospective mathematics teachers. Connecting these concepts to existing literature, research showed that these four variables play a significant role in students' academic performance (Adigwe, 1997; Carraway, 1987; Dodeen et al., 2014; Dodeen and Abdelmabood, 2005; Famogbiyele, 2017; Durán, Extremera, Rey, Fernández-Berrocal and Montalbán, 2006; Fortier et al., 1995; Hembree, 1990; Idaka et al., 2011; Imasuen, 2016; Mwamwenda, 1994; Owan et al., 2020; Radojevic, 2009; Schaufeli et al., 2002a; Saleh and Ibnian, 2017; Seng, 2015; Sheffield and Hunt, 2006; Wang, 2008; Yang, 2004; Zhang et al., 2013). The results of these studies showed that test attitudes and test motivation of students had positive correlations with academic performance. Also, studies indicated that test anxiety and student burnout had negative correlations with academic performance (Garden, 1991 McCarthy, Pretty and

Catano, 1990; Nowack and Hanson, 1983; Stewart et al., 1999).

The second finding of this study indicated that there were no significant differences between prospective mathematics teachers' burnout, test anxiety, test motivation, and test attitude scores, according to gender. When analyzing the existing literature, there were no studies about gender differences in burnout, test anxiety, test attitude, and test motivation. However, some studies investigated gender differences in mathematics anxiety, performance, and achievement. Some of these studies reported a significant difference between math anxiety, performance, and achievement, according to gender (Devine et al., 2012; Hembree, 1990; Miller and Bichsel, 2004; Ma and Xu, 2004). On the other hand, some studies obtained results similar to the findings of this study (Else-Quest et al., 2010; Guiso, Monte, Sapienza and Zingales, 2008; Ma, 1999; Meece, Wigfield and Eccles, 1990; Spelke, 2005). In addition, some studies indicated that there were significant differences in students' burnout, based on gender (Acar and Çakır, 2015; Backović et al., 2012; Gündüz, Çapri, and Gökçakan, 2012; Özdemir, 2015; Tansel, 2015; Yeni Palabıyık, 2014).

Finally, this study showed that there was a statistically significant difference in scores of prospective mathematics teachers' burnout and test anxiety between freshman and sophomores, freshman and juniors, and freshman and seniors. In this context, as student grade levels increased, their burnout and exam anxiety increased. This may be because the burden on freshmen has been relieved since they just completed intensive studies and examinations in order to be placed in higher education programs. In addition, higher-grade students' heavier course loads and more intense exams may increase their burnout and exam anxiety. In other words, as studies intensify, expectations of placement in an institution may be the reason that upper-class students experience more burnout. This result is in line with the findings that students experience more burnout as their grade level (Gündüz, Çapri and Gökçakan, 2012; Keklik and Erdem Keklik, 2012; Bekir Şimşek, Şahin and Şanlı, 2012; Tansel, 2015) and age increase (Ören and Türkoğlu, 2006).

From the results of this study, the following conclusions were made. First, there was a positive relationship between test attitude and test motivation and between burnout and test anxiety of prospective mathematics teachers. Also, there were no significant differences between prospective mathematics teachers' burnout, test anxiety, test motivation, and test attitude scores, based on gender. In addition, there were statistically significant differences in scores of prospective mathematics teachers' burnout and test anxiety, according to grade level. It is recommended that colleges include activities that will improve students' test attitudes and test motivation in mathematics lessons. In addition, it may also be suggested that the number of courses and exams be reduced.

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