Original Article

The relationship between exam anxiety levels and sleep quality of senior high school students

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Abstract

Objectives: This study used a descriptive, cross-sectional and correlational research design to determine the relationship between exam anxiety levels and sleep quality of senior high school students.

Methods: Research data were collected in a high school in Istanbul, Turkey between January 1–31, 2017. 104 high school students volunteered to participate in the research for a sample size (n=104). The rate of return is 86.6%. Data were collected using the Information Form, the Exam Anxiety Inventory and the Pittsburgh Sleep Quality Index. SPSS statistical software program was used to evaluate the data.

Results: 55.8% of the students were female and their mean age was 17.27 years. 77.9% of the students stated that the university entrance exam was very important, and 74.8% stated that they did not have a sleep problem before they started to prepare for the university entrance exam. There was a weak positive relationship between the subjective sleep quality of students and the Delusion sub-dimension of the Exam Anxiety Inventory (r=0.258; p<0.01), a weak positive relationship between Affectivity sub-dimension (r=0.259; p<0.01) and a weak positive relationship between the total score of exam anxiety (r=0.272; p<0.01). There was a weak positive relationship between sleep disorder and the Delusion sub-dimension (r=0.210; p<0.05), a weak positive relationship between Affectivity sub-dimension (r=0.291; p<0.01) and a weak positive relationship between the total score of exam anxiety (r=0.273; p<0.01). The levels of both the Delusional dimension (p>0.05) and the Affectivity dimension (p>0.05) of the students did not affect subjective sleep quality. While the students' Delusion level did not affect the level of sleep disorder (p=0.701 >0.05), their Affectivity level increased the level of sleep disorder (ß=0.028).

Conclusion: Research data illustrated that senior high school students had exam anxieties which negatively affected their sleep quality.

Keywords: Adolescent; sleep quality; test anxiety.

Anxiety is a universal feeling individuals can experience at any given time. This feeling can seriously affect adults and is often encountered in adolescents. Anxiety can affect the normal life of adolescents often causing feelings of unease and contributing to conflicting behavior.[1] According to Baltaş (2002),[2] anxiety is one of the variables which is often seen in studies on education. The period when adolescents experience anxiety the most intense is during their exam pe-

riods. Exam anxiety is defined as fear which causes poor performance on exams, tests and other formal assessment skills. Exam anxiety, a specific kind of anxiety, is a feeling of uneasiness combined with fear felt when the assessment of an individual's skills is in question.[3,4] Exam anxiety, most commonly encountered in students, is a feeling that starts before exams. This reaction along with physical and psychological changes affects the performance and academic achievement of stu-

dents during exams. This serious problem can hinder students from developing to their full potential.[5]

As in many parts of the world, exam results in Turkey impact the future of individuals' lives. Decisions are made regarding their future based on achievement results in exams. Decisions on entry, placement, and maintaining existing status or transition from one grade or program or school to another are made based on exam results. This affects students' career choices. Consequently, students perceive exams as threatening and experience anxiety. Added to exam anxiety are parental pressure, school environment, and expectations about competency which affects academic achievement of students.[6]

Previous studies reported that anxiety levels of students preparing for university entrance exam were higher than that of general surgery patients. Students commented that they "cannot sleep", "are ruined if they cannot pass the exam", "cannot eat " and "cannot really enjoy life".[7]

Exam anxiety has two sub-dimensions: Delusion and Affectivity. Delusion refers to mental perceptions about an individuals' performance during exam, while the Affectivity sub-dimension consists of physiological problems such as blushing, yellowish discoloration of skin, rapid heartrate, upset stomach, nervousness, sweating, and feeling tense.

High levels of exam anxiety may have negative effects on an individual's health and may cause serious psychosomatic and physiological symptoms. Studies show that students with sleep problems can have heart palpitations, sweating, muscle fatigue, and headaches. Sleep problems include difficulty falling asleep, frequent awakening, nightmares and insomnia. Students feel physically and mentally tired from staying up late into the night. Additionally, their usage of sleeping pills and antianxiety agents increases.[8]

Preoccupation about failing the exam leads to sleep-related problems and impaired quality of sleep. Sleep is a temporary state of unconsciousness which helps the body relax and an active process of regeneration that energizes the entire body. [9] As one of the fundamental needs of people, sleep is important for all age groups to maintain health and quality of life. [3] Sleep quality is one's perception that they feel fit, active and ready for a new day after waking up. It helps individuals promote their mental and physical health and enhances their quality of life. Sleep quality is also important for an individuals' safety.[10,11]

Previous studies have shown that anxiety affects sleep quality and that sleep-related anxiety problems are commonly observed in society.[3,4] Exam anxiety experienced by students diminishes their sleep quality. Decreased sleep quality and sleep deprivation increases anxiety levels of individuals and promotes negative outcomes. In other words, there is a bilateral relationship between sleep quality and anxiety. Therefore, studies which can demonstrate this relationship between anxiety levels and sleep quality in adolescents are needed. The Transition to Higher Education exams constitute an important source of stress for millions of students, most of whom are se-

nior high school students in Turkey. The sleep quality of these students is impaired.

This study aims to determine the relationship between exam anxiety levels and sleep quality of senior high school students.

Based on the study aims, answers were sought for the following questions:

• What are the exam anxiety levels of students?

• What are the sleep quality levels of students?

• Is there a relationship between the exam anxiety levels of students and their sleep quality?

The dependent variable of the study was the Pittsburgh Sleep Quality Index (PSQI) scores and the independent variable was the Exam Anxiety Inventory (EAI) scores.

Materials and Method

Type of the Study

A descriptive, cross-sectional and correlational research design was used in this study.

Place and Time of the Study

This study was conducted at a high school in İstanbul between January 1–31, 2017.

Population and Sample of the Study

This study consisted of 120 senior students at a high school in İstanbul. Sample selection was not performed, and all of the students who agreed to participate were included in the study (n=104). The rate of return was 86.6%.

Data Collection Tools

Data were collected using the Information Form, the Exam Anxiety Inventory (EAI) and the Pittsburgh Sleep Quality Index (PSQI).

Information Form: This form was developed by researchers in accordance with the literature and includes 28 questions, 15 of which are related to the sociodemographic characteristics of students and 13 of which are related to exam anxiety and sleep.[12,13]

Exam Anxiety Inventory: The Exam Anxiety Inventory (EAI) was developed by Spielberger and a group of doctoral students in 1987. It is a psychometric scale based on the self--assessment of individuals. EAI used a four-point Likert-type scale. The total score obtained from the scale varies between 20 and 80. The high scores obtained from the EAI indicate high levels of exam anxiety. The validity and reliability study of the scale for Turkish society was conducted by Öner[14] (1990). Descriptive and confirmatory factor analyses were conducted for the EAI. These analyses showed that the EAI consists of two sub-dimensions: Delusion and Affectivity. The scale consists of a total of 20 items, including 12 for the Delusion subdi-

mension and 8 for the Affectivity subdimension. The score obtained from all 20 items of the EAI measures the total exam anxiety level. The scores obtained from the Delusion subdimension and from the Affectivity subdimension measure the Exam Anxiety Delusion level and the Exam Anxiety Affectivity level, respectively. The reliability of Cronbach's Alpha coefficients of the Turkish version EAI was found to be 0.93 and 0.94. The present study found the Cronbach's Alpha coefficient of the EAI to be 0.88.

Pittsburgh Sleep Quality Index (PSQI): PSQI, which was developed by Buysse et al. (1989), assesses sleep quality and disturbances over a 1-month time frame. Of 24 questions included in the PSQI, 19 are self-rated questions. Five questions are rated by the spouse or roommate and used for clinic information and are not included in the scoring. The Index has 18 questions for scoring including these 7 components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disorders, use of sleeping pills and daytime dysfunction. Each component is assessed from 0-3 points and a total scale score is calculated. The total score obtained from the scale varies between 0 and 21. A total score greater than 5 indicates poor sleep quality. The validity and reliability study of the scale for Turkish society was conducted by Ağargün et al.[15] (1996). The Cronbach's Alpha reliability coefficient of the scale was calculated as 0.80. The Cronbach's alpha coefficient of PSQI was found to be 0.70 in the present study.

Ethical consideration

An ethical approval dated December 22, 2016 and numbered 10840098/604 was received from the Ethics Committee of Non-Invasive Researches. Written permission was obtained from the institution where the study was conducted. The students who agreed to participate were informed about the study and their written and verbal consents were received.

Data Analysis

Data were analyzed using SPSS 21.0 software (SPSS Inc. Released 2007.SPSS for Windows, Version 21.0 Chicago, IL, USA Statistical Package for the Social Sciences) by appropriate statistical analysis methods according to parametric or nonparametric distribution. For the descriptive statistical analyses; frequency distribution, percentage, mean, and standard deviation were used. Pearson Correlation Analysis was performed to determine the relationships between the scales, and Linear Regression analysis was used to examine the effects of independent variables on the dependent variable. The results were evaluated at 95% confidence interval and at a significance level of $p < 0.05$.

Results

The sociodemographic characteristics of students are presented in Table 1. Of the students, 55.8% were female, and

Table 1. Sociodemographic characteristics of students

	n	%
Age (year), Mean±SD	17.27±0.47	
Gender		
Female	58	55.8
Male	46	44.2
Family type		
Nuclear	93	89.4
Extended	11	10.6
Current place of residence		
Family	102	98.1
Dormitory/relative	2	1.9
Mother's educational level		
Illiterate	2	1.9
Literate-Primary school	43	41.3
High school	45	43.3
University	14	13.5
Father's educational level		
Illiterate	2	1.9
Literate-Primary school	28	27.2
High school	43	41.7
University	30	29.1
Mother's profession		
Civil servant/laborer	23	22.1
Tradesperson/self-employed	23	22.1
Retired	11	10.6
Housewife	47	45.2
Father's profession		
Civil servant/laborer	49	48.0
Tradesperson/self-employed	34	33.3
Retired	19	18.6
Your family's attitude towards you		
Democratic	95	91.3
Authoritative	9	8.7
Income level		
Low	22	41.5
Moderate	18	34.0
High	13	24.5
Participating in private preparatory courses		
Yes	96	92.3
No	8	7.7
Presence of his/her own room at home		
Yes	93	89.4
No	11	10.6
Total	104	100.0

SD: Standard deviation.

the mean age of the participants was 17.27±0.47 years. In this study, 89.4% of the students stated that they live in nuclear families and 98.1% live mostly in a district or city. Additional sociodemographic characteristics of students noted that 43.3%

of mothers and 41.7% of fathers were high school graduates, 45.2% of mothers were housewives, and 48% of fathers were civil servants or laborers. The families of 91.3% were found to have a democratic attitude toward the students. Of the stu-

dents, 92.3% were found to participate in private preparatory courses, and 89.4% had their own rooms at home.

The distribution of students' achievement levels, study order and sleep levels are presented in Table 2. It was found that of the students, 64.4% had a good performance in school, 43.3% had a regular study program, 77.9% were aware of the importance of the university exam. Additionally, 71% experienced exam anxiety while preparing for the university exam, and 61.2% of the families thought that their children should pass the university exam. 74.8% of the students had not experienced any sleeping problem before preparing for the university exam and 37.0% of those with sleeping problems had difficulty waking up in the mornings. Furthermore, 51% had irregular sleeping habits and 85.6% were sleeping for 5–10 hours before preparing for the university exam.

Table 3 shows the relationship between students' exam anxiety and sleep quality. A weak and positive relationship was found between subjective sleep quality and delusion (r=0.258, p<0.01); a weak and positive relationship was found between subjective sleep quality and affectivity (r=0.259; p<0.01); and a weak and positive relationship was found between subjective sleep quality and total score of exam anxiety (r=0.272; p<0.01).

Comparatively, a weak and positive relationship was found between sleep disorder and delusion (r=0.210, p<0.05); a weak and positive relationship was found between sleep disorder and affectivity (r=0.291, p<0.01); and a weak and positive relationship was found between sleep disorder and total score of exam anxiety (r=0.273; p<0.01).

Table 4 shows the effects of test anxiety subscales on subjective sleep quality, sleep latency, sleep duration and habitual sleep efficiency. Accordingly, a statistically significant difference was found between subjective sleep quality, delusion and affectivity (F=4.005, p<0.05). A weak relationship (explanatory power) was found between delusion and affectivity, as the determinants of the level of subjective sleep quality (R^2=0.055). Both delusion (p>0.05) and affectivity (p>0.05) did not affect subjective sleep quality.

Table 2. Distribution of students' achievement, study order and sleep levels

	n	%
High school grade point average		
70 and lower (poor)	27	26.0
70-80 (moderate)	10	9.6
80 and higher (good)	67	64.4
Do you follow a regular study program?		
Yes	45	43.3
No	59	56.7
What do you think about the importance of university exam?		
Very important	81	77.9
It is important but I have other choices for the future	21	20.2
It is not important, I just want to take a chance	2	1.9
What does your family think about the university exam?		
They think that I should definitely pass the exam	63	61.2
They believe that the exam is important, but not the only option	38	36.9
They do not care about whether I pass the exam	2	1.9
What is the most common obstacle that you encounter while preparing for university exam?		
Financial difficulties	5	5.1
Family pressure	4	4.1
Exam anxiety	70	71.4
Negative impacts of friends	19	19.4
Did you have a sleeping problem before you started preparing for the university exam?		
Yes	26	25.2
No	77	74.8
If yes, what were your sleep problems?		
I could not sleep at all	1	3.7
I had difficulty falling asleep	5	18.5
I frequently woke up during the night	4	14.8
I had difficulty waking up	10	37.0
Other	7	25.9
Did your sleep habit change during the period while preparing for the exam?		
Yes	53	51.0
No	51	49.0
How many hours did you sleep before starting to prepare for the exam?		
5 hours and less	4	3.8
5–10 hours	89	85.6
10 hours and more	11	10.6

Table 3. Relationship between the exam anxiety levels and sleep quality of students

		Delusion	Affective	Exam anxiety total
Subjective sleep quality	r	0.258**	0.259**	0.272**
Sleep latency	r	0.170	0.121	0.147
Sleep duration	r	-0.094	0.033	-0.016
Habitual sleep efficiency	r	-0.064	-0.019	-0.038
Sleep disorder	r	0.210*	0.291**	0.273**
Use of sleeping pills	r	0.039	0.060	0.055
Daytime sleep dysfunction	r	0.145	0.165	0.166

*p<0.05; **p<0.01.

Table 4. Effects of exam anxiety subdimensions on sleep quality, sleep latency, sleep duration and habitual sleep efficiency

Dependent variable	Independent variable	ß	t	p	F	Model (p)	R²
Subjective Sleep Quality	Fixed	0.611	2.536	0.013	4.005	0.021	0.056
	Delusion	0.023	0.874	0.384			
	Affective	0.015	0.918	0.361			
Sleep Latency	Fixed	0.871	2.480	0.015	1.530	0.222	0.010
	Delusion	0.047	1.241	0.217			
	Affective	-0.006	-0.252	0.802			
Sleep Duration	Fixed	1.578	5.759	0.000	2.169	0.120	0.022
	Delusion	-0.061	-2.055	0.043			
	Affective	0.034	1.847	0.068			
Habitual Sleep Efficiency	Fixed	1.005	4.176	0.000	0.360	0.699	-0.013
	Delusion	-0.021	-0.827	0.410			
	Affective	0.009	0.546	0.586			

Table 5. Effects of exam anxiety subdimensions on sleep disorder, use of sleeping pills and daytime sleep dysfunction

Dependent variable	Independent variable	ß	t	p	F	Model (p)	R²
Sleep Disorder	Fixed	0.688	3.523	0.001	4.740	0.011	0.068
	Delusion	-0.008	-0.384	0.701			
	Affective	0.028	2.143	0.035			
Use of Sleeping Pills	Fixed	0.003	0.021	0.983	0.192	0.825	-0.016
	Delusion	-0.002	-0.146	0.884			
	Affective	0.004	0.479	0.633			
Daytime Sleep Dysfunction	Fixed	0.663	1.881	0.063	1.441	0.242	0.008
	Delusion	0.009	0.226	0.821			
	Affective	0.020	0.830	0.409			

Table 5 shows the effects of exam anxiety subscales on sleep disorder, use of sleeping pills and daytime sleep dysfunction. A statistically significant difference was found between delusion, affectivity and sleep disorder (F=4.740, p<0.05). A weak relationship (explanatory power) was found between delusion and affectivity, as the determinants of the level of subjective sleep quality (R²=0.068). Delusion did not affect subjective sleep quality (p>0.05), whereas affectivity increased sleep disorder severity (p>0.05).

Discussion

Students in Turkey are educated in an exam-centered system, so entering a university becomes their most important goal in life. The higher education examination is a central focus of a high school students' future. Anxiety associated with this exam can influence eating habits and sleep quality which will impact daily life.[16–18] In this study, a majority of the participants were female and the students' mean age was 17.27 years. A majority of the students live in a nuclear family and almost half of their parents graduated from high school. Most of their mothers were housewives while their fathers were officers or workers. In the study conducted by Tekeli[19] (2009) of

the evaluation of sleep qualities and exam anxiety in senior high school students, 50.9% of the students were female and the students' mean age was 17.48 years. In a survey conducted by Lazaratou et al.[20] (2013) in Greece using 696 students to determine the relationship between their anxiety levels and affecting factors, 56.2% were female, 81.4% were living with their families, 59.9% had mothers with a moderate education and 22.1% had fathers with a moderate education. According to the results of 2015, the proportion of the households composed of nuclear families in our country is 66.9%.[21]

Most of the senior high school students stated that they had good performance at school and regularly received private tutoring. They also stated that they utilized a regular study program, the university exam was very important for them, and their families have democratic attitudes. Similar to the present study results, more than half of the student participants in the study of Adana et al.[12] (2002) reported that they had good performance at school. Tekeli[19] (2009) stated that 57.5% of the students (n=200) had a secondary education achievement mean score of 79.87. In the same study, 73.5% of the students (n=255) stated that their families were supportive and democratic towards them.

The majority of the students in the present study group stated

that they suffered from exam anxiety the most while preparing for the university exam. A high level of success expectancy from their parents puts pressure on students starting as early as primary school. This anxiety is reported to arise from the fact that the decision on students' future is solely dependent on their university examination results.[22]

It was determined that of the students, 85.6% were sleeping for 5–10 hours before preparing for the university exam, 74.8% had not experienced any sleeping problem before preparing for the university exam, 37.0% of those who had sleeping problems had difficulty in waking up in the mornings, and 51.0% had irregular sleeping habits. Dağ and Kutlu[23] (2017) conducted a study on adolescents aged 16–19 years, and found their PSQI mean scores as 5.15±3.07 (0–16), and also reported that 61.6% of them had good sleep quality whereas 38.4% had poor sleep quality. Meltzer et al.[24] (2006) stated that the need for daily sleep in adolescents was between 8.5 and 9.5 hours. Bruni et al.[13] (2008) report that 1073 Italian children and adolescents sleep an average of 7 hours on weekdays and 9.5 hours at the weekend.

Öner and Lecompte[25] (1998) conducted a study of five primary school students of different socio-economic levels, and found that Turkish students had higher levels of anxiety than American and British students in the same age groups and classes. A survey on two hundred and seventy-six high school students found a positive relationship between the perceived psychological pressure from parents and persistent anxiety and a negative relationship between genuine sincerity perceived from parents and persistent anxiety.[26] Students feel pressure because of their families' expectations for a successful future, so they see the university exam as the determining factor in their future. This increases their existing anxiety even further.[27]

A positive and significant relationship was found between delusion, affectivity, exam anxiety total score and subjective sleep quality. It was determined that as the test anxiety scores increase, sleep quality decreases. Moalla et al.[28] (2016) report that students in medical faculties experienced anxiety during exam periods, which negatively affected sleep quality of 53.3% of them.

Delusion, the cognition-related subscale of the exam anxiety involves individuals' internal perceptions such as thinking about the consequences of failure and doubt about their ability to achieve. Affectivity is the emotional reaction emerging under exam pressure. It has been observed that delusion is more influential on success. Difficulty in sleeping, frequent awakening, early awakening and insomnia due to exam anxiety causes greater problems and panic in students. Consequently, this leads them to believe that sleep is compelling and necessary and if they sleep for less than 8 hours they will fail the exam. This situation increases anxiety and the resulting anxiety also increases sleep problems.[1,24]

A positive and significant relationship was found between delusion, affectivity, exam anxiety total score and sleep disorder, and it was determined that as the test anxiety scores increase,

the sleep disorder scores also increases. Eller et al.[3] (2006) conducted a study to investigate sleep problems and symptoms of anxiety and depression in medical students. It was found that they had difficulty in falling asleep the night before the exam.

No significant relationship was found between sleep duration and exam anxiety. However, Lazaratou et al.[20] (2013) found a negative correlation between sleep duration and exam anxiety scores. This study results are not similar to those of Lazaratou et al. (2013). This study result suggests that anxiety negatively affects sleep quality rather than sleep duration.

No significant relationship was found between exam anxiety total score and use of sleeping pills. This finding may reflect prejudices about the use of anti-anxiety/tranquilizing medication in Turkey, and it may also suggest that students can solve sleeping problems with their own coping skills.

No significant difference was found between the factors affecting test anxiety scores in terms of gender. Similar to this study result; Bacanlı and Sürücü[29] (2006), Cassedy and Johnson[30] (2002) and Ciucci[27] (2007) also reported that exam anxiety scores did not differ in gender.

A statistically significant difference was found between subjective sleep quality, delusion and affectivity. A weak relationship (explanatory power) was determined between delusion and affectivity, as the determinants of the level of subjective sleep quality. It was found that the level of delusion in senior high school students did not affect subjective sleep quality, whereas the level of their affectivity increased subjective sleep quality. Delusion, the cognition-related subscale of the exam anxiety, involves individuals' internal perceptions about the consequences of failure and doubts about their ability to achieve. The subscale of affectivity includes physiological reactions such as rapid heart rate, sweating, flushing, and nausea related to anxiety in the examination environment. This suggests that affectivity is more likely to cause sleep disturbances.[1,31]

Limitations

The study results are limited to the data obtained from twelfth grade high school students affiliated with the Ministry of National Education in Istanbul. The exam anxiety level measured in the study is limited to the measurements obtained using the "Exam Anxiety Scale" developed by Öner (1986), while the level of sleep quality is limited to the measurements obtained using the "Pittsburgh Sleep Quality Index" developed by Ağargün (1996).

Conclusion

The study showed that senior high school students had exam anxieties which negatively affected their sleep quality. No statistically significant relationship was found between delusion, affectivity, exam anxiety total score, sleep latency, sleep duration and habitual sleep efficiency. A weak and positive correlation was found between delusion, affectivity and sleep disor-

der, and also a weak and positive relationship was established between exam anxiety total score and sleep disorder.

The following is recommended based on the research data:

- Provide guidance and counseling services for students during this period to reduce exam anxiety, increase sleep quality and decrease negative perceptions.

- Provide guidance and counseling services for senior high school students together with their families for enhanced support during the examination process.

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