



# The Epidemiology of Depression, Anxiety, Stress and Anger in Turkish High School Students

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## Authors' contributions

*This work was carried out in collaboration between both authors. Author N. Bayram designed the study, wrote the protocol and performed the statistical analyses. Author N. Bilgel managed the literature search, analyses of the study and wrote the first draft of the manuscript. Both authors read and approved the final manuscript.*

Original Research Article

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## ABSTRACT

**Aims:** Depression, anxiety, stress and outward anger expression are important global public health problems of today. These issues are also important in school health.

**Study Design:** Cross-sectional, descriptive.

**Place and Duration of Study:** Urban area, public high schools. Duration of the study was 6 months

**Methodology:** In this study which was based on self-reporting we wanted to evaluate the different dimensions of anger and symptoms of depression, anxiety and stress in a group of Turkish students in grades 9-12. Participation to the study was voluntarily and anonymously. Data regarding socio-demographic characteristics were collected by questionnaires. Depression-Anxiety and Stress Scale-42 (DASS-42) and Multi Dimensional Anger Scale (MDAS) were used.

**Results:** Students had mild depression, anxiety and stress levels in general. Female students' depression, anxiety and stress levels were found to be higher than male students. Female students reported more anger symptoms. Being belittled, transgressed

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against and criticized were found to be important anger eliciting situations. Among male students, aggressive behaviors were higher than females whereas calm and anxious behaviors were higher among female students. In terms of interpersonal anger passive-aggressive and inwards directed reactions were found to be higher among female students. There was no significant difference according to gender for being revengeful and being indifferent.

**Conclusion:** Programs of anger management are needed together with those of reducing depression, anxiety and stress.

*Keywords: Depression; anxiety; stress; anger; Turkish students.*

## 1. INTRODUCTION

Anger is an emotional state typically accompanied by psychological and biological changes, and can vary from minor annoyance to rage [1]. There are many definitions of anger in the literature. Kassinove and Sukhodolsky defined anger as a negative, phenomenological or internal feeling state [2]. According to Lewis and Golden anger is a basic emotion and response to distress related to environmental obstacles, whose function is to provide the organism with motivated capacities to overcome obstacles [3,4]. Novaco, defined anger as having four distinct components: physiological, affective, behavioral and cognitive [5]. Spielberger, identified two aspects of anger: (a) State anger in which the individual responds emotionally to circumstances and (b) Trait anger which is a more pervasive response [6]. Modern psychologists view anger as a primary, natural, and mature emotion experienced by all humans at times, and as something that has functional value for survival. Parker-Hall conceptualizes controlled anger as a positive, pure and constructive emotion that is always respectful of others; only ever utilized to protect the self in physical, emotional, intellectual and spiritual dimensions in relationships [7]. On the other hand uncontrolled anger can be a significant problem and can result in depression, suicidal tendencies, substance abuse, hostility, rage, violence and crime [8-11].

Depression which could be sometimes a consequence of uncontrolled anger is an important school health problem and major depression which is uncommon before puberty could increase in adolescence [12]. The increase of depression in adolescence is two to three times higher for girls than for boys [13,14]. A study among high-school students aged 16-17 years in a Swedish town found the prevalence of major depression as 5.8% [15]. The prevalence of major depression in interview studies of adolescents in different western countries is 2-5% [16-20]. Studies from eastern countries showed higher rates of anxiety and depression than those from the western countries [21,22]. A study among Vietnamese high school students revealed the prevalence of anxiety and depression as 22.8% and 41.1%, respectively [21]. Analysis of epidemiological studies has led to the conclusion that depression in young age groups is increasing [23-24].

According to the U.S. National Institute of Mental Health 8% of teens aged 13–18 have an anxiety disorder and anxiety is one of the most common forms of mental health disorders in adolescents [25]. Anxiety disorders are said to be universal and recent studies have found relatively high prevalence rates in different countries [26,27].

Some studies revealed associations between depression, anxiety, stress and anger expression [28-33]. Goodwin, analyzed data from a health behavior survey of US school-

aged children and noted that outward anger expression was associated with an almost 3-fold increased risk of feelings of depression among boys [28]. Orpinas, Basen-Engquist, Grunbaum and Parcel noted that students exhibiting violent behaviors in schools were more likely to have symptoms of depression than students not exhibiting such behaviors [33].

Available data, although scarce, from studies conducted in Turkey, suggest high frequencies of outward anger expression among high school students [34-38]. Studies about depression, anxiety and stress among students also revealed high frequencies [39,40]. To date, few studies have evaluated associations of anger and symptoms of depression, anxiety and stress among Turkish youth. In this study we wanted to evaluate anger and symptoms of depression, anxiety and stress among high school students who were living in an urban area.

The present study addresses the following questions:

Do different dimensions of anger among high school students vary between different grades of education and are there gender differences?

How prevalent is depression, anxiety and stress among high school students, with respect to grades and gender?

Are there some correlations between different dimensions of anger and depression, anxiety and stress?

## **2. MATERIALS AND METHODS**

### **2.1 Study Design**

This study was a cross-sectional, descriptive study which depends on self-reporting. Data was collected anonymously. Participation to the study was based on volunteerism. Both the parents and students were informed about the study by printed leaflets. Permission for participation to the study for the students who were under the age of 18 was asked from their parents. Students who were 18 years of age and over gave their own consent. Those who did not want to participate and students whose parents did not permit their child to take part into the study were excluded.

### **2.2 Study Participants**

We took all the enrolled high school students from grade 9 to grade 12 from all public high schools (6 schools, 4 of them were vocational high schools) of the corresponding city into our study. During the time of the study there were 1681 enrolled students. We could not get consent for 38 students and they were excluded from the study. For the remaining 1643 students permission for the study participation was given and we distributed 1643 questionnaires and collected back 1503 questionnaires.

### **2.3 Study Instruments**

In this study we used two instruments.

1. The Multi-dimensional Anger Scale (MDAS), developed by Balkaya & Şahin-Hisli is a five point Likert type self report scale where 1 = Never and 5 = Always [41]. This instrument measures one's anger in terms of five dimensions: bodily symptoms;

anger related situations; anger related cognitions; anger related behaviors; and interpersonal anger. Each dimension except the bodily symptoms is composed of several factor-based subscales. The anger related situations dimension has 42 items clustered in 3 subscales: being transgressed against (17 items); being criticized (5 items); and being belittled (20 items). The anger related cognition dimension has 30 items clustered in 4 subscales: regarding anger (9 items); regarding others (9 items); regarding him or herself (7 items); and regarding the whole world (5 items). The anger related behaviors dimension has 26 items clustered in 3 subscales: aggressive behaviors (12 items); calm behaviors (10 items); and anxious behaviors (4 items). The interpersonal anger dimension has 47 items clustered in 4 subscales: being revengeful (24 items); passive-aggressive reactions (10 items); inwards directed reactions (10 items); and being indifferent (3 items). Psychometric analysis of the scale performed by Balkaya & Şahin-Hisli showed that it possessed adequate internal consistency (alpha coefficients between 0.64 and 0.95) [41].

2. The DASS-42 scale was developed by Lovibond & Lovibond for measuring depression, anxiety and stress [42]. This is a 42 item self reported instrument measuring current (within the past week) symptoms of depression, anxiety and stress. Each of the three scales consists of 14 items that are answered by using a 0–3 scale, where 0 = did not apply to me at all, and 3 = applied to me very much or most of the time (range of possible scores for each scale is 0–42). Scores considered in the normal range are 0–9 for depression, 0–7 for anxiety and 0–14 for stress. Scores above these ranges indicate the degree of problem from mild to extreme. The Turkish version of this scale was constructed by Uncu, Bayram & Bilgel [43]. The reliability coefficients (Cronbach's alpha) of the Turkish version of DASS-42 were found for depression, anxiety and stress to be 0.89, 0.82 and 0.85, respectively [44]. In addition to these two instruments, a separate questionnaire for socio-demographic data was filled out by the participants.

## **2.4 Procedure**

All the questionnaires were distributed to the participants in closed envelopes and collected back in the same manner. Participants were asked to fill out the questionnaires without any identifying marks. Distribution and collection of the questionnaires lasted about two weeks in each school. For this process a period outside of the exam period was preferred. A total of 1643 questionnaires were distributed and 1503 questionnaires were collected back. The response ratio was 91.5%.

## **2.5 Data Analyses**

Data analyses were done by using the SPSS version 17.0 package program. Beside descriptive statistics, correlation analysis, Mann Whitney U test and Kruskal Wallis Variance analysis were performed.

## **3. RESULTS**

Most of the participating students were female (63.7%). They were between ages 14-19 years. Nearly half of the total participants defined their families' economic situation as good. Demographic characteristics of the students are shown in Table 1.

Table 1. Some demographic characteristics of the study group

Demographic Characteristics	N	%	Demographic Characteristics	N	%
<b>Gender</b>			<b>Economic situation (student's perception)</b>		
Female	958	63.7	Good	686	45.6
Male	545	36.3	Moderate	724	48.2
<b>Age</b>			<b>Bad</b>	<b>93</b>	<b>6.2</b>
14	20	1.3	Mother's occupation		
15	389	25.9	Housewife	1249	83.1
16	390	25.9	Blue collar worker	91	6.1
17	436	29.0	Civil servant	62	4.1
18	243	16.2	Professional	15	1.0
19	25	1.7	Other	86	5.7
<b>Grade</b>			<b>Father's occupation</b>		
9. grade	460	30.6	Unemployed	27	1.8
10. grade	352	23.4	Blue collar worker	422	28.1
11. grade	400	26.6	Civil servant	178	11.8
12. grade	291	19.4	Professional	48	3.2
<b>Mother's education</b>			<b>Other</b>	<b>828</b>	<b>55.1</b>
Illiterate	43	2.9	Sisters/brothers		
Primary	974	64.8	None	134	8.9
Secondary	199	13.2	1	789	52.5
High	197	13.1	2	379	25.2
University and more	90	6.0	3 and more	201	13.4
<b>Father's education</b>			<b>Satisfaction with current education</b>		
Illiterate	16	1.1	Yes	984	65.5
Primary	714	47.5	No	113	7.5
Secondary	264	17.6	Don't know	406	27.0
High	297	19.8			
University and more	212	14.1			

Most of the students' parents were alive (95.9%) and still married (94.2%).

The mean (mean  $\pm$  SD) depression, anxiety and stress scores were  $9.51 \pm 8.22$ ,  $8.59 \pm 6.59$  and  $16.01 \pm 8.07$  respectively which means there was a mild depression, mild anxiety and mild stress state for the study group. As shown in Table 2, we found positive correlations between different dimensions of anger and depression, anxiety and stress except being indifferent subscale of interpersonal anger. Anger symptoms were strongly correlated with depression anxiety and stress. The correlations among anger eliciting situations and depression, anxiety, stress were weak. Anger related cognitions had strong correlations with depression, anxiety and stress. Among behaviors related to anger, aggressive and anxious behaviors had moderate correlations to depression, anxiety and stress whereas calm behaviors had weak correlations. In terms of interpersonal anger being revengeful, passive-aggressive reactions and inwards directed reactions had moderate correlations to depression, anxiety and stress whereas being indifferent had no correlations.

**Table 2. Correlations between MDAS and DASS-42**

	<b>D</b>	<b>A</b>	<b>S</b>
<b>Anger symptoms</b>	<b>.569**</b>	<b>.627**</b>	<b>.649**</b>
<b>Anger eliciting situations</b>			
Being belittled	.241**	.245**	.321**
Being transgressed	.129**	.161**	.272**
Being criticized	.276**	.272**	.382**
<b>Anger related cognitions</b>			
Regarding anger	.552**	.520**	.687**
Regarding others	.562**	.522**	.560**
Regarding him or herself	.619**	.542**	.559**
Regarding the whole world	.658**	.568**	.590**
<b>Behaviors related to anger</b>			
Aggressive behaviors	.384**	.360**	.474**
Calm behaviors	.071**	.147**	.096**
Anxious behaviors	.375**	.393**	.469**
<b>Interpersonal anger</b>			
Being revengeful	.384**	.381**	.489**
Passive-aggressive	.290**	.344**	.457**
Inwards directed	.346**	.380**	.376**
Being indifferent	.017	.013	.012

\*\* Correlation is significant at the 0.01 level D= Depression; A= Anxiety; S= Stress

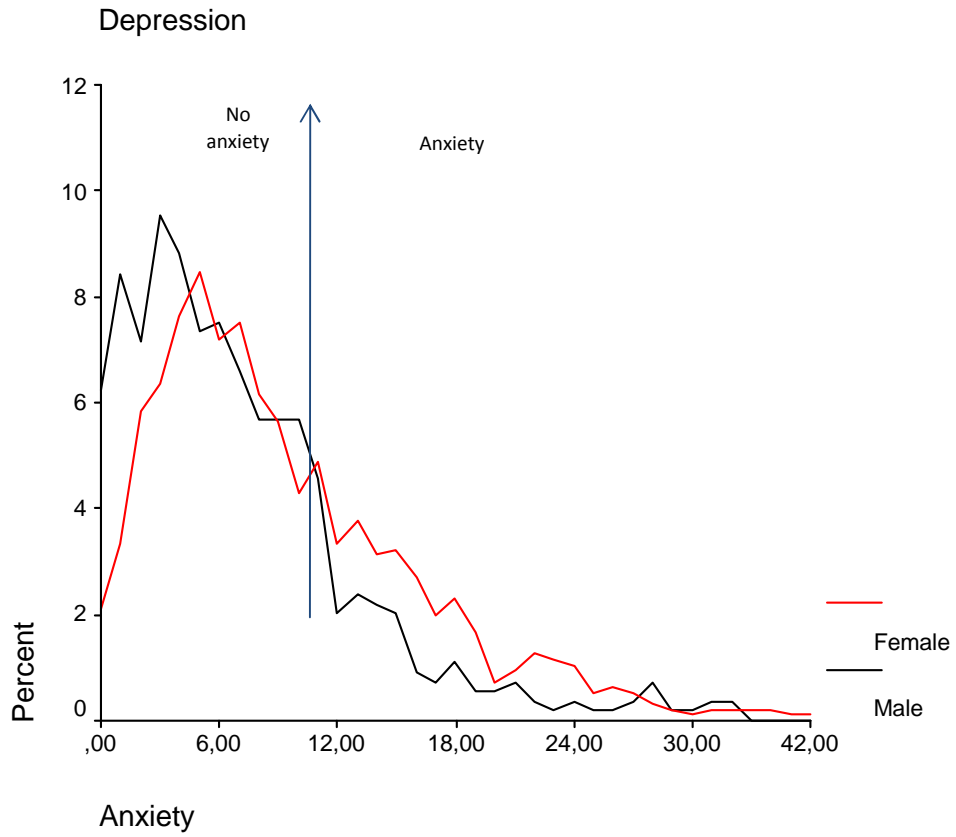
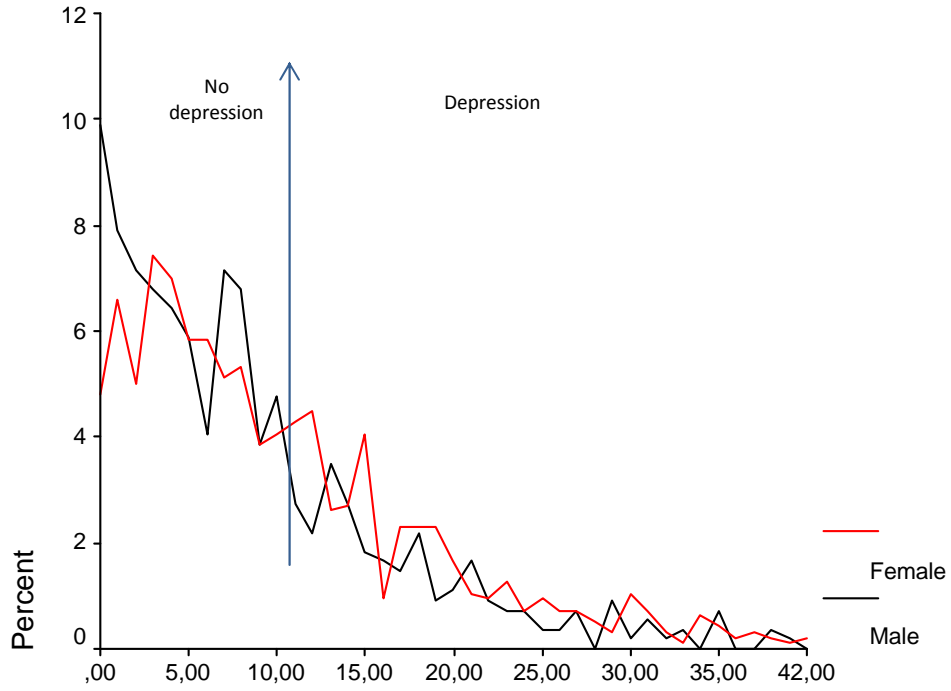
Percent distribution of the study group according to gender and total depression, anxiety and stress scores is shown in Fig. 1.

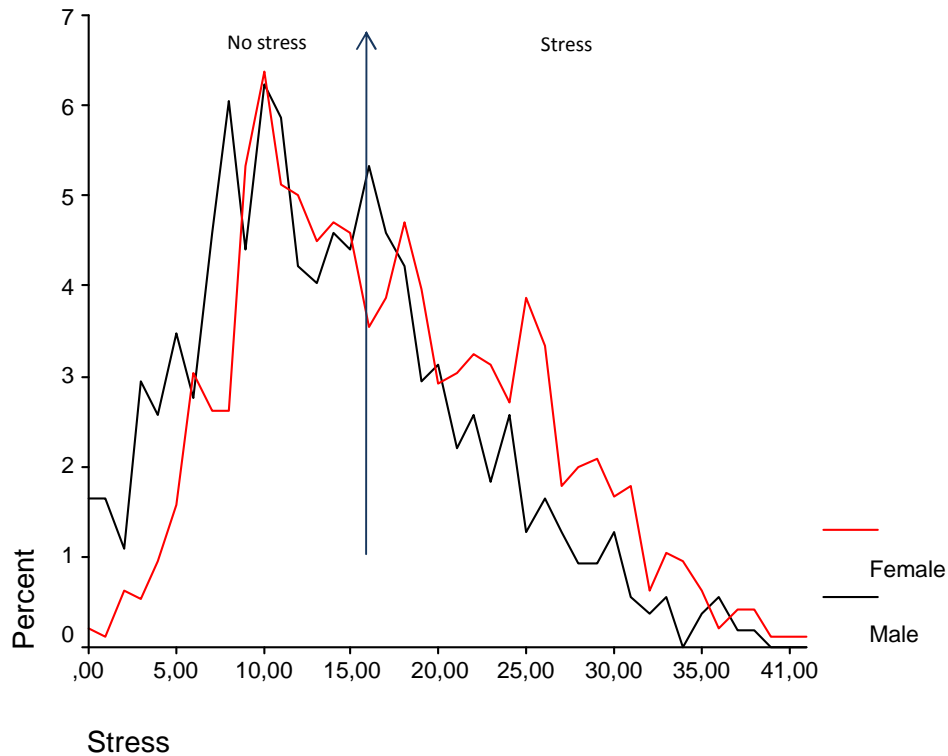
Male students got lower scores for depression, anxiety and stress more than female students.

Fig. 2 shows the percent distribution of the study group according to gender and the mean scores of anger symptoms

Scores for anger symptoms were lower among male students than of female students.

The mean scores for the total study group and mean scores according to gender for every dimension of MDAS and its subscales are shown in Table 3.





**Fig. 1. Distribution of the study group by gender and total depression, anxiety and stress scores**

We found statistically significant differences among male and female students in terms of depression, anxiety and stress. The mean scores of female students were higher than those of male students. Anger symptoms were reported more by female students than by males. Female students were more prone to anger eliciting situations like as being belittled, transgressed and being criticized. Anger related cognitions regarding one self and regarding whole world were mostly reported by female students. Aggressive behaviors related to anger were mostly mentioned by male students whereas female students mostly reported calm and anxious behaviors. In terms of interpersonal anger passive-aggressive and inwards directed reactions were addressed by female students more than by male students.

The mean scores according to grades for DASS-42 and for every dimension of MDAS and its subscales are shown in Table 4.



**Table 3. Mean DASS-42 and MDAS scores for the total group and according to gender**

<b>Variables</b>	<b>Female Mean±SD</b>	<b>Male Mean±SD</b>	<b>Total Mean±SD</b>	<b>Mann Whitney U Test</b>	<b>Z</b>	<b>p</b>
Depression	10.09±8.38	8.49±7.84	9.51±8.22	228463.000	-4.034	.000
Anxiety	9.42±6.75	7.14±6.04	8.59±6.59	203796.500	-7.090	.000
Stress	17.18±8.02	13.95±7.75	16.01±8.07	202100.000	-7.293	.000
<b>Anger symptoms</b>	2.59±0.84	2.38±0.86	2.52±0.85	221074.500	-4.944	.000
<b>Anger eliciting situations</b>						
Being belittled	3.83±0.78	3.42±0.88	3.68±0.84	184811.000	-9.426	.000
Being transgressed	4.32±0.67	3.97±0.80	4.19±0.74	189151.500	-8.890	.000
Being criticized	3.61±0.80	3.34±0.85	3.51±0.83	186724.500	-9.196	.000
<b>Anger related cognitions</b>						
Regarding anger	2.58±1.07	2.51±1.02	2.55±1.05	253467.000	-.939	.348
Regarding others	2.56±0.87	2.48±0.91	2.53±0.88	247136.500	-1.722	.085
Regarding him or herself	2.41±0.85	2.30±0.85	2.37±0.85	240304.500	-2.569	.010
Regarding whole world	2.34±1.05	2.21±1.02	2.29±1.04	242636.000	-2.283	.022
<b>Behaviors related to anger</b>						
Aggressive behaviors	2.60±0.91	2.80±0.90	2.67±0.91	225093.500	-4.447	.000
Calm behaviors	2.98±0.80	2.85±0.87	2.93±0.83	235953.500	-3.105	.002
Anxious behaviors	3.34±0.94	3.08±0.99	3.24±0.97	221006.500	-4.965	.000
<b>Interpersonal anger</b>						
Being revengeful	2.88±0.98	2.86±0.97	2.87±0.98	257355.000	-.457	.647
Passive-aggressive	3.49±0.89	3.16±0.92	3.37±0.92	205857.500	-6.827	.000
Inwards directed	3.10±0.79	2.75±0.85	2.97±0.83	197344.500	-7.881	.000
Being indifferent	2.83±1.11	2.80±1.12	2.82±1.11	256903.000	-.516	.606

The highest depression, anxiety and stress scores were obtained from the students in 12<sup>th</sup> grade. We performed Kruskal-Wallis Test and found significant differences in terms of different dimensions of MDAS. All MDAS scores increased with the increasing grades of the students. Twelfth grade students got the highest and 9<sup>th</sup> grade students the lowest scores.

The mean DASS-42 and MDAS scores according to economic situation are shown in Table 5.

**Table 4. Mean DASS-42 and MDAS scores according to grades**

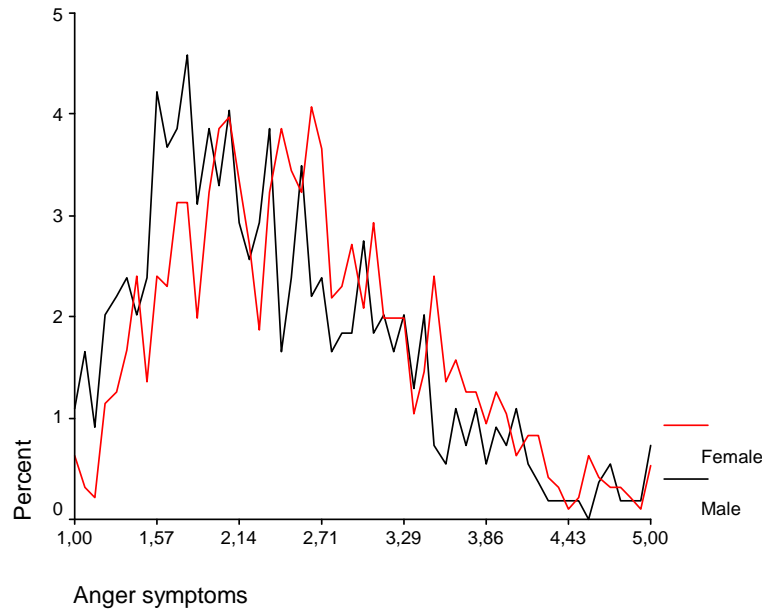
<b>Variables</b>	<b>Grade 9</b>	<b>Grade10</b>	<b>Grade11</b>	<b>Grade12</b>	<b>Kruskal Wallis test</b>	<b>p</b>
Depression	9.15±8.36	9.32±7.76	9.03±7.81	10.98±8.93	12.162	.007
Anxiety	8.23±6.31	9.21±6.97	7.83±6.05	9.46±7.09	12.655	.005
Stress	15.42±8.17	16.36±8.02	15.61±7.82	17.0±8.22	9.468	.024
<b>Anger symptoms</b>	2.39±0.83	2.53±0.87	2.53±0.82	2.66±0.88	17.794	.000
<b>Anger eliciting situations</b>						
Being belittled	3.65±0.80	3.79±0.76	3.65±0.84	3.65±0.97	6.923	.074
Being transgressed	4.16±0.66	4.29±0.60	4.24±0.72	4.06±0.97	11.179	.011
Being criticized	3.53±0.83	3.56±0.83	3.47±0.82	3.48±0.85	2.130	.546
<b>Anger related cognitions</b>						
Regarding anger	2.49±1.03	2.55±1.07	2.45±1.03	2.79±1.03	22.803	.000
Regarding others	2.44±0.88	2.45±0.84	2.50±0.84	2.80±0.95	31.307	.000
Regarding him or herself	2.32±0.85	2.36±0.81	2.33±0.84	2.54±0.89	13.713	.003
Regarding whole world	2.22±1.03	2.22±1.02	2.25±1.02	2.54±1.09	21.425	.000
<b>Behaviors related to anger</b>						
Aggressive behaviors	2.60±0.90	2.61±0.85	2.61±0.90	2.94±0.97	28.929	.000
Calm behaviors	2.76±0.83	2.94±0.79	2.98±0.79	3.14±0.86	40.564	.000
Anxious behaviors	3.05±0.96	3.26±0.96	3.30±0.93	3.47±0.96	36.179	.000
<b>Interpersonal anger</b>						
Being revengeful	2.84±1.00	2.85±0.95	2.81±0.93	3.05±1.02	10.224	.017
Passive-aggressive	3.21±0.97	3.35±0.88	3.43±0.84	3.56±0.94	25.001	.000
Inwards directed	2.85±0.85	3.01±0.79	2.94±0.78	3.17±0.87	25.749	.000
Being indifferent	2.75±1.14	2.88±1.16	2.79±1.04	2.89±1.09	4.826	.185

Students who were in good economic situation had the lowest mean scores for depression, anxiety and stress and students in bad economic situation the highest. Anger related cognitions regarding anger, regarding others and regarding the whole world were highest among students in a bad economic situation. Students in bad economic situation reported also more anxious behaviors related to anger compared to students in good and moderate economic situation.

The mean DASS-42 and MDAS scores according to satisfaction with the current education are shown in Table 6.

**Table 5. Mean DASS-42 and MDAS scores according to economic situation**

Variables	Economic Situation			Kruskal Wallis test	p
	Good	Moderate	Bad		
Depression	8.49±7.75	10.03±8.21	12.86±10.34	26.451	.000
Anxiety	7.86±6.19	8.98±6.71	11.02±7.58	22.616	.000
Stress	15.37±7.72	16.36±8.25	17.76±8.71	8.096	.017
<b>Anger symptoms</b>	2.46±0.84	2.52±0.85	2.73±0.91	8.647	.013
<b>Anger eliciting situations</b>					
Being belittled	3.72±0.83	3.63±0.84	3.72±0.82	4.440	.109
Being transgressed	4.23±0.72	4.13±0.76	4.29±0.59	5.667	.059
Being criticized	3.53±0.83	3.48±0.82	3.54±0.84	1.096	.578
<b>Anger related cognitions</b>					
Regarding anger	2.50±1.02	2.55±1.04	2.86±1.18	6.945	.031
Regarding others	2.43±0.86	2.57±0.87	2.89±0.97	23.682	.000
Regarding him or herself	2.33±0.82	2.39±0.84	2.56±1.01	4.365	.113
Regarding the whole world	2.14±0.98	2.35±1.04	2.83±1.21	34.109	.000
<b>Behaviors related to anger</b>					
Aggressive behaviors	2.67±0.92	2.63±0.89	2.86±0.94	5.505	.064
Calm behaviors	2.89±0.82	2.98±0.81	2.90±0.89	4.577	.101
Anxious behaviors	3.18±0.96	3.27±0.95	3.46±1.02	8.310	.016
<b>Interpersonal anger</b>					
Being revengeful	2.89±0.96	2.83±0.98	3.05±1.00	4.572	.102
Passive-aggressive	3.40±0.90	3.32±0.92	3.51±0.89	4.226	.121
Inwards directed	2.92±0.82	2.99±0.81	3.13±0.94	5.006	.082
Being indifferent	2.88±1.12	2.74±1.06	2.91±1.27	5.977	.050



**Fig. 2. Distribution of the study group by gender and mean scores of anger symptoms**

**Table 6. Mean DASS-42 and MDAS scores according to educational satisfaction**

	Satisfaction with education		Mann Whitney U test	Z	p
	Yes	No *			
Depression	8.12±7.40	12.13±9.01	184031.00	-8.926	.000
Anxiety	7.88±6.21	9.92±7.06	210020.50	-5.675	.000
Stress	15.07±7.79	17.77±8.27	205699.50	-6.210	.000
<b>Anger symptoms</b>	2.39±0.82	2.74±0.85	192212.50	-7.894	.000
<b>Anger eliciting situations</b>					
Being belittled	3.61±0.84	3.81±0.81	219512.00	-4.480	.000
Being transgressed	4.16±0.73	4.24±0.73	233280.50	-2.761	.006
Being criticized	3.44±0.84	3.63±0.79	221860.50	-4.196	.000
<b>Anger related cognitions</b>					
Regarding anger	2.39±0.99	2.85±1.07	191092.50	-8.036	.000
Regarding others	2.39±0.84	2.77±0.89	191514.50	-7.984	.000
Regarding him or herself	2.27±0.81	2.56±0.88	206551.00	-6.108	.000
Regarding the whole world	2.12±0.98	2.61±1.06	185048.50	-8.809	.000
<b>Behaviors related to anger</b>					
Aggressive behaviors	2.52±0.87	2.94±0.91	187220.50	-8.519	.000
Calm behaviors	2.91±0.82	2.97±0.83	24352.00	-1.000	.317
Anxious behaviors	3.14±0.95	3.43±0.95	20997.50	-5.684	.000
<b>Interpersonal anger</b>					
Being revengeful	2.72±0.94	3.16±0.96	190130.50	-8.152	.000
Passive-aggressive	3.26±0.89	3.56±0.92	206634.00	-6.092	.000
Inwards directed	2.92±0.80	3.05±0.86	233415.00	-2.743	.006
Being indifferent	2.80±1.11	2.84±1.11	248527.00	-8.856	.392

\* Students answered don't know are included

Students who were not satisfied with their current education had received higher scores for depression, anxiety and stress and for all different dimensions of MDAS except calm behaviors related to anger and being indifferent in terms of interpersonal anger.

#### 4. DISCUSSION

This study showed that depression, anxiety and stress are common among Turkish high school students. Female students, students in bad economic situation and students who are not satisfied with their current education are more under the risk of depression, anxiety and stress. With increasing grades the levels of depression, anxiety and stress are increasing. The last year students (12<sup>th</sup> grade) had the highest depression, anxiety and stress scores and this could be explained with the exam they should to take at the end of the 12<sup>th</sup> grade in order to continue their university education. A recent study among 444 Turkish last year high school students found that 2/3 of students had higher anxiety levels and 1/3 had higher levels of depression [39]. Another study among 805 high school students in Turkey found that 17.5% of students were depressive [40]. Compared to the self-reported studies from the western literature the rates of depression, anxiety and stress are higher in our study [16-20, 25]. On the other side they are similar to those of the eastern literature [21,22,27]. Therefore it can be said that cultural differences could have an impact on developing depression anxiety and stress but these issues needs to be further studied.

In this study we found some gender differences in terms of different dimensions of anger. Being belittled, transgressed against and criticized were more important among female students than among male students as anger related situations. Boman, found in his study regarding school anger that two items involved "spreading a rumor" and "having a best friend make fun of one's hair or clothing" did significantly differentiate between males and females and these items were more relevant to the female experience of anger [45].

Studies involving adolescents and children have mainly reported no differences between boys and girls on the experience of anger [45, 46]. However these studies and others have reported significant gender differences in the expression of anger [47-49]. In these studies boys were more likely than girls to use physical expression of their anger. In contrast to these results, Swaffer and Epps, in their study of male and female adolescents, found no significant differences in either the experience or expression of anger [50]. In our study female students were more likely than male students to express their anger by showing anxious behaviors which reflect the fact that female students tended to use more internalized means for coping with anger than did males; namely suppression and control. This finding was similar to those of Cox, Stabb, and Hulgus [47]. Some studies in Turkey showed that females were more affected by the anger eliciting situations, but they did not express their anger as aggressive behaviors [34,38,41]. This study showed that, anxious behaviors were seen more among female students as an expression of anger. Our findings regarding interpersonal anger revealed a difference between male and female students. Passive-aggressive and calm reactions were more frequently among females. On the other hand, there were no differences for being revengeful and indifferent. These differences and their causes should be further studied.

We found that anger symptoms of students increased with increasing grade. Expression of anger as calm and anxious reactions also seems to increase with grade. Similar findings were obtained from the study of Balkaya and Şahin-Hisli for the expression of anger as a calm reaction which may reflect personal maturity and could be accepted as a sign of positive coping with anger with increasing age [41]. Similar tendencies were found for interpersonal anger in terms of passive-aggressive and inwards directed reactions.

The current study suggested some relations between different dimensions of anger and depression, anxiety and stress. Although the cross-sectional nature of the data does not allow causal assumptions regarding the relation between different dimensions of anger and depression, anger and stress. Studies that investigate these associations with longitudinal epidemiological data are needed next.

## **5. CONCLUSION**

There are few studies in Turkey regarding anger in high school students and therefore we were not able to make proper comparisons. Our study suggests a need for anger management programs as well as effective initiatives for reducing depression, anxiety and stress in high schools. Unfortunately in Turkey, there are not special units for school health. Obviously there is a need for special focus on the adolescent population and their mental health. Hence adolescence is an important period of life. In order to meet the needs of this period school health units with special emphasis on mental health are necessary. Educational institutions need to identify the prevalence of negative mental health states among the students, and especially those at high risk. Teachers and counsellors could work together with these school mental health units and could organize preventive interventions

for depression by targeting behaviors for promoting health, establishing and maintaining social support, and arranging activities that promote high self-esteem. The teachers could change the climate of the school environment in a positive manner. Cooperation with the parents, visiting the homes of the students who are under the risk, social activities out of the class-room could enhance the student- teacher relationship which could be a key stone for diminishing depression, stress and anger in the school environment.

Some key points of this study could be summarized as follows:

1. Depression, anxiety, stress and anger are relevant among high school students.
2. Female students were more depressive, anxious and stressed than male students
3. Students who were satisfied with their education had lower depression, anxiety and stress scores than those who were not satisfied.
4. Students with bad economic condition had higher depression, anxiety and stress scores than students with moderate or good.
5. Anger symptoms were found to be higher among female students.
6. Being belittled, transgressed against and criticized are important anger eliciting situations for female students.
7. Male students showed aggressive behaviors as anger related behaviors more than female students.
8. Female students showed anxious and calm behaviors as anger related behaviors more than male students.
9. Revengeful reactions were similar among male and female students.
10. Students with bad economic condition revealed more anger related cognitions regarding others and the whole world.
11. Educational satisfaction is found as an important factor in developing depression, stress, anxiety and anger.

## **6. LIMITATIONS**

The cross-sectional, descriptive nature of the study and in particular, the self-reporting assessment of anger, depression, anxiety and stress should be mentioned as a relevant shortcoming of the study.

Results of this study are limited to the study group concerned and cannot be generalized.

## **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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