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Association between clusters of anxiety and psychosomatic disorder with lifestyle habits in children and adolescents: the CASPIAN-V study

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Abstract

Background: Anxiety and psychosomatic disorders are the most common mental health problems among children and adolescents. Such disorders could have negative effects on lifestyle habits.

Objective: To examines the clustering of anxiety and psychosomatic disorders in Iranian children and adolescents, and its association with their lifestyles.

Methods: This cross-sectional survey was conducted as the fifth survey of a national school-based program in Iran in 2015. Participants were 14,400 students, aged 7 to 18 years old, who were selected by a multi-stage cluster random sampling method, from 30 provinces across the country. Data were obtained from a World Health Organization–Global Student Health Survey questionnaire (WHO-GSHS). A two-step cluster analysis was performed and clusters of anxiety and psychosomatic disorder were identified. The logistic regression model was applied to predict the association between identified clusters and lifestyle variables including dietary habits, sedentary behavior, and sleep duration. The reference category of this model was considered as clusters including students with low anxiety and low psychosomatic disorder symptoms. In order to determine the relation between demographic characteristics and other variables with lifestyle habits in identified clusters, one-way analysis of variance (ANOVA) and Pearson Chi-square tests were used. Analyses were performed in SPSS v 18 (PASW Statistics for Windows). The statistical significance level was set at $p<0.05$.

Results: The mean (SD) of the age of the participants was 12.29 (3.15). The prevalence of high anxiety with recurrent mental disorders was 20.4%. This group of students had a higher frequency of sadness than other students did (43.8% vs. 25.8%, $p<0.001$). They had a higher frequency of prolonged screen time (>2 hr/day) (OR: 2.00, 95% CI: 1.79 2.24), skipping breakfast (OR: 1.83; 95% CI:1.59-2.11), as well as daily consumption of

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candy (OR: 1.15; 95% CI: 1.001-1.31), salty snacks (OR: 1.81, 95% CI: 1.52-2.16), and soft drinks (OR: 6.68, 95% CI: 4.86-9.18). Moreover, they had a lower frequency of consuming fruits/vegetables (OR: 0.79, 95% CI: 0.69-0.88) and milk (OR: 0.76, 95% CI: 0.69-0.84) than their counterparts.
Conclusion: This study showed that risk of unhealthy lifestyle behaviors in children and adolescents with high anxiety and psychosomatic disorders higher than others, should be considered in health promoting programs.
Keywords: Psychophysiological disorders; Anxiety; Lifestyle; Child; Adolescent

1. Introduction

Mental health disorder is one of the most common problems in adolescents worldwide (1). The prevalence of psychological disorders that usually initiates in adolescence is around 10-20% in children and adolescents. The onset of half of the mental illness is at 14 years old and 75% of them begin in the middle of the second decade of life (1, 2). Likewise, a study in Tehran showed that 19.5% of adolescents suffer from mental disorders (3). The most common mental health problems in adolescents are different kinds of pain, tiredness, irritability, nervousness, and sleep disorders that are sometimes related to anxiety and depression (4). These symptoms are often not due to somatic conditions, but related to unidentified psychological disorders (5). Prevalence of pain and fatigue was reported between 30-38% in young people (6). Abdominal pain as well as headache in children without any physical problems were observed following anxiety, depression, feelings of sadness and school stress (7). On the other hand, lifestyle behaviors such as physical inactivity, unhealthy diet and obesity are associated with the development of non-communicable diseases (8). Lifestyle habits are established during childhood and adolescence and persist throughout life, and may influence disease risks in adulthood (9-11). These habits are also associated with mental health status in early adulthood (7). Furthermore, changing childhood habits would be difficult during adulthood (11). Different studies have shown the relationship between lifestyle and mental health, stating that health behaviors such as drug use and the lack of physical activity are significantly associated to psychosocial health problems (12). In addition, association between sleep hours' disorders, skipping breakfast, and fruit and vegetable consumption with depressive symptoms was shown (5, 8, 13). Use of fruits and vegetables and healthy diet can significantly improve the mental health status (13), while unhealthy diet may increase mental health disorders (14). The risk of later non-affective psychosis was also shown to be elevated with lower physical activity and sleep quality (16, 17). Some other studies reported that prolonged screen time might increase anxiety in children and adolescents (15, 16). Some studies have separately determined the relationship between some lifestyle dimension and mental health; indicating that unhealthy dietary patterns and physical inactivity have important roles in the progress of various mental and physical health problems in adolescents (9-11) which can lead to unhealthy lifestyle habits at adulthood (17). To the best of our knowledge, there is no survey related to the association between mental health and lifestyle among Iranian children and adolescents. The current study, initially attempts to identify clusters of psychosomatic symptoms and anxiety level. Furthermore, this study explored the relationship between these clusters and lifestyle habits (unhealthy diet, screen time, and tobacco use) among a nationwide sample of Iranian children and adolescents.

2. Material and Methods

2.1. Study type, population and sampling method

This cross-sectional study was conducted as a part of the fifth survey of the school-based surveillance system entitled "Childhood and Adolescence Surveillance and Prevention of Adult Non-Communicable Disease" (CASPIAN-V) study in 2015. The details of the CASPIAN-V study method is explained previously (18). In brief, the study population consisted of students aged between 7-18 years old studying in primary and secondary schools in urban and rural areas across the country selected by using a multi-staged cluster sampling method (48 clusters of 10 people in each province). The optimal sample size for achieving a good estimate of all risk factors of interest was 14440 students at national level.

2.2. Selection criteria

2.2.1. Inclusion criteria

All 6 to 18-year-old school students with Iranian nationality (having an Iranian Identity card) were eligible to participate in this study.

2.2.2. Exclusion criteria

Students with a history of chronic disease, history of chronic medication consumption and following a special diet were excluded from this study. Moreover, subjects missing full data were excluded.

2.3. Instruments

Data were gathered by asking students and their guardians to simultaneously fill two questionnaires that were both based on the Persian version of the World Health Organization–Global Student Health Survey (WHO-GSHS) questionnaire. Validity and reliability of both questionnaires has been previously confirmed (19).

2.3.1. Demographic information

Age, number of close friends, number of family members, family structure, body image, place of residence and advice sought from parents were determined based on the questions present in student and guardian versions of the questionnaire. Weight (wearing light clothes), and height (without shoes) of the students were measured based on standard protocols. Life satisfaction (LS) was measured with the question "How do you feel about your current life?" which was scored from 0 to 10 from lowest to highest amount of life satisfaction.

2.3.2. Anxiety and symptoms of psychosomatic disorders

Anxiety in students was measured using the question "In the last 12 months, how many times were you so worried, you could not sleep?" The answers varied from never to always. For analysis, anxiety level of students was divided into two categories of low (never, rarely) and high (sometimes, often, always) anxiety. The symptoms of psychosomatic disorders were evaluated using suitable questions. Z-score measure was used in order to evaluate the score of each question based on its standardized value.

2.3.3. Lifestyle habits

The frequency of eating breakfast was investigated using the question "How often do you eat breakfast in weekdays/weekends?" Answers varied from not eating breakfast to eating on all seven days of the week. The answers were divided into two categories of 5-7 days eating breakfast (No Skipper) and 4 days or less (Skipper). Use of healthy foods (milk, fruits and vegetables) and unhealthy food products (candy, salty foods, soft drinks) in students' daily diets was evaluated using suitable questions in the students' version of the questionnaire. The answers varied from never to daily use and were divided into two categories of daily use and non-daily use. The sedentary behavior's time in students was evaluated using questions about the average number of hours per day spent watching TV, using the computer, electronic game, internet and using mobile phones in weekdays and weekends. The answers were divided into two categories of low activity (2 hours or more per day) and high activity (less than 2 hours per day). In order to evaluate the socio-economic status (SES), principle component analysis method was used on questions about parents' education level, parents' employment, home ownership status (home owner, tenant), type of school (public/private), car ownership and having a personal computer. This analysis summarized these factors in the general component of SES of families, which is divided into three categories of low, middle and high SES.

2.4. Research ethics

The Research and Ethics Council of Isfahan University of Medical Sciences approved the study (Project number: 194049) and after explaining the goals of the study, written consent and oral consent were obtained from parents and students respectively.

2.5. Statistical analysis

Analyses were performed in SPSS version 18 (PASW Statistics for Windows, SPSS, Inc., Chicago, Illinois, USA). Continuous variables are reported as mean (SD) and categorical variables as frequency (percentage). Clusters related to anxiety and psychosomatic disorder symptoms were identified using two-step clustering algorithm in SPSS software. Two-step clustering algorithm is an exploratory tool for identifying intrinsic and natural clusters hidden in the dataset that would otherwise not be apparent. This algorithm has several desirable features that differentiate it from other clustering techniques such as the effectiveness of this method to analyze large datasets, and its ability to determine the appropriate number of clusters based on categorical and continuous variables. In the first step of clustering analysis, initial clusters are formed as small clusters. In the second step, using hierarchical clustering algorithm, initial clusters are added together to identify the main clusters for analysis. If one or more categorized variables are used along continuous variables, clustering analysis would use Log-likelihood distance measure to assign observations in different clusters (20-22). In this study, anxiety was considered as a categorized variable, i.e. high/low; while other variables were analyzed as continuous variables based on their Z-score value. In both steps of clustering analysis, observations were assigned into clusters based on their Log-likelihood distance measures. The logistic regression model was applied to predict the relation of identified clusters with lifestyle variables including dietary habits, sedentary behavior, and sleep duration. The reference category of this model was considered as clusters including students with low anxiety and psychosomatic disorder symptoms. The odds ratio for all predictive variables was presented based on a crude model and three models that are adjusted for potential confounding variables. In order to determine the relation between demographic characteristics and other variables of lifestyle

habits in identified clusters, the one-way analysis of variance (ANOVA) and Pearson Chi-square tests were used. The statistical significance level was set at $p<0.05$.

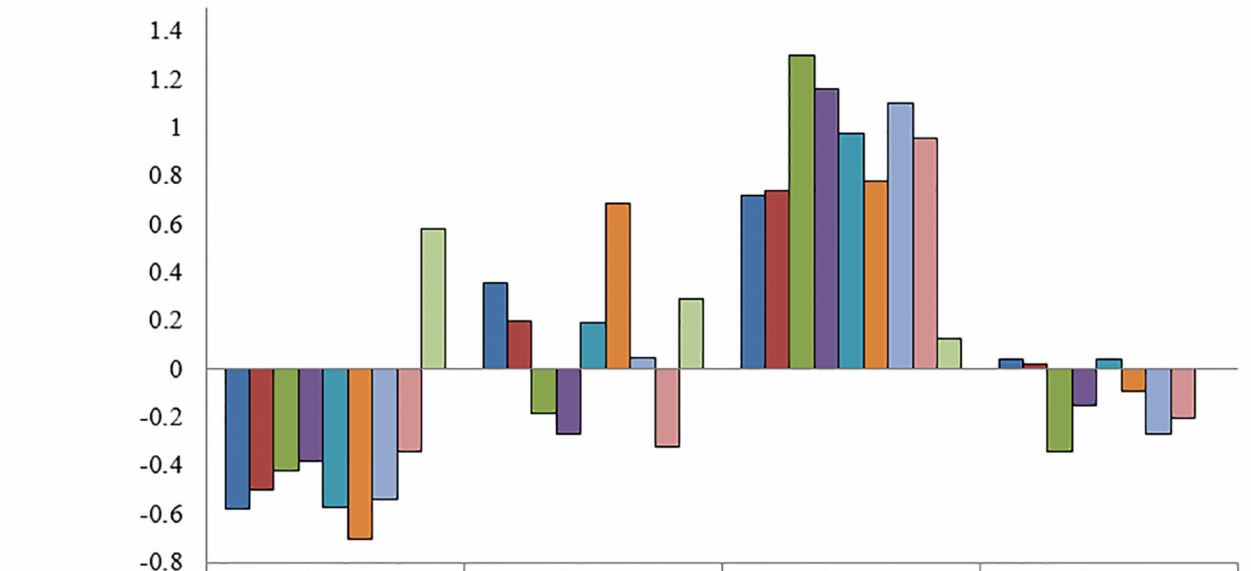
3. Results

Overall, 14,274 students and one of their respective parents (out of 14,440) completed the survey (participation rate: 99%). Base on inclusion criteria of two-step clustering method, data of 13,632 students (95.5%) were included in the current study (642 of students excluded from any identified cluster). The mean (SD) age of participants was 12.29 (3.15) years, of whom 50.7% were boys, and 71.2% urban residents. Four different clusters were identified by two-step clustering using highest log-likelihood distance measures (ratio of distance, measure =2.51) based on similar patterns of anxiety (high/low) and psychosomatic symptoms (Figure 1). Overall, 41.8% (n=5686) of participants were categorized in the first cluster, 21.3% (n=2897) in the second cluster, 20.4% (n=2785) in the third cluster, and 16.6% (n=2264) in the fourth cluster. The demographic characteristics of participants are presented in Table 1.

3.1. Identified clusters

3.1.1. First cluster (Low anxiety and low psychosomatic symptoms)

In all, 57.9% of the students with low levels of anxiety were categorized in this cluster. They had the lowest prevalence of pains in head, stomach, shoulder and back areas. The frequency of psychosomatic disorders such as feeling of worthlessness, sleep problems, anger and irritation, worrying and feeling of confusion was very low in this cluster.



	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Headace	-0.58	0.36	0.72	0.04
Stomachache	-0.5	0.2	0.74	0.02
Backache	-0.42	-0.18	1.3	-0.34
Worthlessnes	-0.38	-0.27	1.16	-0.15
Anger	-0.57	0.19	0.98	0.04
Worry	-0.7	0.69	0.78	-0.09
Insomnia	-0.54	0.05	1.1	-0.27
Confusion	-0.34	-0.32	0.96	-0.2
Low Anxiety	57.90%	29.50%	12.50%	0%

Figure 1. Cluster description and mean Z-score of psychosomatic symptom

Table1. Characteristics of study participants according to identified Clusters: the CASPIAN-V Study

Variables		Total participants; Mean ± SD / n (%)
Age (year)		12.29±3.15
BMI (Kg/m^2)		18.52±4.73
Life Satisfaction score		8.06±2.26
Gender	Female	6726 (49.3)
	Male	6906 (50.7)
Close Friend	≤ 2 friends	6676 (49.1)
	≥ 3 friends	6929 (50.9)
Household members	≤ 4 Persons	6463 (48.1)
	> 4 Person	6975 (51.9)
Family Structure	Both parents	12736 (93.4)
	Single parent	629 (4.6)
	Other	267 (2)
Socioeconomic status	Low	4302 (33.1)
	Moderate	4362 (33.5)
	High	4341 (33.4)
Self-perception of body weight	Normal	5546 (41)
	Underweight	4071 (30.1)
	Overweight	3902 (28.9)
Talking with father when facing problems	No	5540 (43)
	Yes	7358 (57)
Talking with mother when facing problems	No	1118 (8.3)
	Yes	12278 (91.7)
Life satisfaction	Poor	2543 (18.8)
	Good	10997 (81.2)
Sadness	No	9249 (59.2)
	Yes	2216 (25.8)
	Not remembering	2073 (15.1)
Living area	Urban	9707 (71.2)
	Rural	3925 (28.8)

3.1.2. *Second cluster (Low anxiety and moderate psychosomatic symptoms)*

The perceived anxiety of students in this cluster was at a low level and 29.5% of participants with low anxiety levels were categorized in this cluster. The prevalence of some of psychosomatic symptoms such as headache, stomachache and also anger and irritation, worry and insomnia in this cluster was higher compared to the first and fourth clusters, but lower that the third cluster.

3.1.3. *Third cluster (High anxiety and high psychosomatic symptoms)*

A total of 40.7% of students with high anxiety levels were categorized in this cluster. The frequency of all of psychosomatic symptoms was very high in this cluster.

3.1.4. *Fourth cluster (High anxiety)*

The most important characteristic of students in this cluster was their high level of anxiety; 59.3% of students with high anxiety were categorized in this cluster. The experiences of psychosomatic disorders of people in this cluster were higher compared to the first cluster but lower than second and third clusters. Therefore, this cluster was evaluated based only on the high anxiety characteristics.

3.2. Associations between identified clusters and lifestyle habits

The comparison of the amount of time spent using mobile phones, internet, and sleep duration of students in four identified clusters is shown in Table 2.

3.2.1. *Sleep duration and use of mobile phones*

The sleep duration of students with high anxiety and psychosomatic symptoms (third cluster) was significantly lower (8 hours and 18 minutes) than other clusters (P-value of Post-Hoc test <0.001). These students had significantly higher use of mobile phones (15.33 minutes) and internet (38.62 minutes) than the students with low anxiety and psychosomatic symptoms (P-Value of Post-Hoc test= 0.03).

Table 2. Prevalence of lifestyle habits by identified clusters: the CASPIAN Study

Variable	Cluster	Mean (95% CI)	p-value
Mobile use (minutes)	Low anxiety and psychosomatic symptom (1st cluster)	13.06 (12.14-13.98)	0.012*
	Low anxiety; moderate psychosomatic symptom (2nd cluster)	14.7 (13.44-15.96)	
	High anxiety and psychosomatic symptom (3rd cluster)	15.33 (13.95-16.71)	
	High anxiety (4th cluster)	12.87 (11.55-14.19)	
	Total	13.84 (13.26-14.43)	
Surfing (minutes)	Low anxiety and psychosomatic symptom (1st cluster)	31.83 (29.93-33.74)	0.001*
	Low anxiety; moderate psychosomatic symptom (2nd cluster)	34.28 (31.67-36.89)	
	High anxiety and psychosomatic symptom (3rd cluster)	38.62 (35.79-41.45)	
	High anxiety (4th cluster)	32.70 (29.80-35.60)	
	Total	33.89 (32.67-35.12)	
Sleep duration (hours)	Low anxiety and psychosomatic symptom (1st cluster)	8.67 (8.63-8.70)	<0.001*
	Low anxiety; moderate psychosomatic symptom (2nd cluster)	8.49 (8.45-8.54)	
	High anxiety and psychosomatic symptom (3rd cluster)	8.18 (8.13-8.23)	
	High anxiety (4th cluster)	8.98 (8.94-9.03)	
	Total	8.58 (8.56-8.60)	

*p≤0.05 considered statistically significant

Table 3. Association between identified clusters and lifestyle habits: the CASPIAN-V Study

Models	Variable (cluster no.)	Breakfast (No skipper) #	Candy (Non-daily) #	Salty snake (Non-daily) #	Carbonated beverages (Non-daily) #	Fruit /Vegetable (Non-daily) #	Milk (Non-daily) #
		Skipper; OR (95% CI)	Daily; OR (95% CI)	Daily; OR (95% CI)	Daily; OR (95% CI)	Daily; OR (95% CI)	Daily; OR (95% CI)
1	1	1	1	1	1	1	1
	2	2.59 (2.29-2.92)*	0.89 (0.78-1.03)	0.62 (0.50-0.78)*	4.13 (3.02-5.64)*	0.87 (0.77-0.97)*	0.61 (0.55-0.67)*
	3	1.44 (1.441.88)*	1.22 (1.08-1.39)*	1.61 (1.36-1.91)*	7.06 (5.27-9.47)*	0.81 (0.72-0.91)*	0.73 (0.67-0.81)*
	4	0.79 (0.67-0.97)*	1.12 (0.97-1.29)	0.85 (0.68-1.06)	1.77 (1.19-2.64)*	0.54 (0.48-0.60)*	1.11 (1.001-1.22)*
2	1	1	1	1	1	1	1
	2	2.57 (2.27-2.91)*	0.89 (0.78-1.03)	0.62 (0.50-0.78)*	4.13 (3.02-5.65)*	0.88 (0.78-0.98)*	0.62 (0.56-0.68)*
	3	1.63 (1.42-1.86)*	1.23 (1.08-1.39)*	1.62 (1.36-1.92)*	7.07 (5.26-9.48)*	0.82 (0.73-0.92)*	0.75 (0.68-0.83)*
	4	0.79 (0.66-0.94)*	1.12 (0.97-1.29)	0.84 (0.68-1.05)	1.78 (1.20-2.65)*	0.53 (0.48-0.60)*	1.12 (1.01-1.23)*
3	1	1	1	1	1	1	1
	2	2.94 (2.58-3.34)*	0.91 (0.79-1.05)	0.69 (0.55-0.87)*	4.43 (3.18-6.17)*	0.86 (0.76-0.97)*	0.60 (0.54-0.66)*
	3	1.85 (1.60-2.13)*	1.15 (1.002-1.32)*	1.82 (1.52-2.18)*	6.71 (4.88-9.23)*	0.79 (0.70-0.89)*	0.77 (0.69-0.85)*
	4	0.98 (0.82-1.17)	1.29 (1.12- 1.49)*	1.01 (0.81-1.28)	2.22 (1.47-3.35)*	0.49 (0.44-0.55)*	1.07 (0.01-1.19)
4	1	1	1	1	1	1	1
	2	2.91 (2.56-3.32)*	0.91 (0.78-1.04)	0.70 (0.55-0.88)*	4.42 (3.17-6.17)*	0.86 (0.76-0.97)*	0.60 (0.54-0.66)*
	3	1.83 (1.59-2.11)*	1.15 (1.001-1.31)*	1.81 (1.51-2.16)*	6.68 (4.86-9.18)*	0.79 (0.70-0.89)*	0.76 (0.69-0.84)*
	4	0.98 (0.81-1.17)	1.29 (1.12-1.50)*	1.02 (0.81-1.28)	2.16 (1.43-3.27)*	0.49 (0.44-0.55)*	1.07 (0.01-1.19)

Model 1: Crude OR, Model 2: Adjusted for age, gender and region, Model 3: Additional adjusted for SES; family size; close friend; family structure, Model 4: Additional adjustment for BMI. Cluster 1: Low anxiety; Low psychosomatic symptom. Cluster 2: Low anxiety; Moderate psychosomatic symptom. Cluster 3: High anxiety; High psychosomatic symptom. Cluster 4: High anxiety. *p≤0.05 considered statistically significant, # Reference category for each column shown in the parentheses

3.2.2. *Skipping breakfast and daily use of candy or salty foods*

The relation between the four identified clusters and lifestyle habits based on the logistic regression model is shown in Tables 3 and 4. According to Table 3, the risk of skipping breakfast and daily use of candy or salty foods, and soft drinks in students with high anxiety and psychosomatic symptoms was significantly higher than in students with low anxiety and psychosomatic symptoms. The odds of skipping breakfast in students with high anxiety and psychosomatic symptoms was 83% higher (OR: 1.83; 95% CI: 1.59-2.11). Furthermore, the risk of daily use of candy 15% (OR: 1.15; 95% CI: 1.00-1.31), and the risk of daily use of salty foods were 81% higher (OR: 1.81; 95% CI: 0.69-0.88) than in students with low anxiety and psychosomatic symptoms. On the other hand, among the third cluster, use of fruits and vegetables was 21% lower (OR: 0.79; 95% CI: 0.69-0.88). Milk consumption was also 24% lower (OR: 0.76; 95% CI: 0.69-0.84) than in the first cluster.

3.2.3. *Use of computers (2 or more than 2 hours), use of tobacco and smoking*

According to Table 4, the risk of prolonged use of computers (2 or more hours), use of tobacco and smoking in students of the third cluster was significantly higher than the first cluster. In students with high anxiety and psychosomatic symptoms (third cluster), the odds of extended computer use (2 or more hours per day) was 28% (OR: 1.28; 95% CI: 1.07-1.53), while smoking and tobacco use was 46% higher (OR: 1.46; 95% CI: 1.31-1.63) than the first cluster. In students with high anxiety and psychosomatic symptoms, the odds of extended use of television (2 or more hours per day) was 42% (OR: 1.42; 95% CI: 1.28-1.58) while the odds of extended computer use was 40% higher (OR: 1.40; 95% CI: 1.15-1.70) than the first cluster. The odds of high screen time (2 or more hours per day) was 26% higher (OR: 1.26; 95% CI: 1.10-1.43) than in the first cluster.

Table 4. Association between identified clusters and unhealthy lifestyle habits: the CASPIAN-V Study

Models	Variable (cluster no.)	Screen time (<2h per day) #	TV watching (<2h per day) #	Computer using (<2h per day) #	Sedentary behavior (Low) #	Past Smoking (No) #	Past Hookah (No) #
		≥2 h; OR (95% CI)	≥2 h; OR (95% CI)	≥2 h; OR (95% CI)	High; OR (95% CI)	Yes; OR (95% CI)	Yes; OR (95% CI)
1	1	1	1	1	1	1	1
	2	1.53 (1.37-1.70)*	1.53 (1.40-1.68)*	3 (2.59-3.48)*	1.51 (1.35-1.69)*	1.83 (1.66-2.02)*	1.19 (1.05-1.34)*
	3	1.12 (1.01-1.24)*	0.89 (0.82-0.98)*	1.30 (1.09-1.55)*	2.04 (1.83-2.27)*	1.42 (1.28-1.57)*	2.35 (2.10-2.62)*
	4	1.15 (1.03-1.28)*	1.25 (1.13-1.38)*	1.34 (1.12- 1.62)*	1.82 (1.62-2.04)*	1.88 (1.69-2.09)*	2.96 (2.64-3.32)*
2	1	1	1	1	1	1	1
	2	1.50 (1.34-1.66)*	1.53 (1.39-1.67)*	2.94 (2.54-3.41)*	1.49 (1.33-1.66)*	1.83 (1.66-2.02)*	1.19 (1.05-1.34)*
	3	1.06 (0.95-1.17)	0.89 (0.81-0.97)*	1.24 (1.04-1.48)*	1.98 (1.77-2.20)*	1.42 (1.28-1.57)*	2.34 (2.09-2.61)*
	4	1.13 (1.01-1.26)*	1.25 (1.13-1.38)*	1.32 (1.10-1.59)*	1.80 (1.60-2.02)*	1.88 (1.69-2.09)*	2.95 (2.64-3.31)*
3	1	1	1	1	1	1	1
	2	1.53 (1.37-1.71)*	1.55 (1.41-1.71)*	3.11 (2.68-3.62)*	1.52 (1.36-1.71)*	1.93 (1.75-2.14)*	1.23 (1.09-1.40)*
	3	1.05 (0.94-1.17)	0.87 (0.79-0.95)*	1.27 (1.06-1.52)*	2 (1.79-2.24)*	1.45 (1.30-1.61)*	2.50 (2.23-2.81)*
	4	1.14 (1.02-1.28)*	1.41 (1.27-1.57)*	1.40 (1.16-1.70)*	1.84 (1.63-2.06)*	2.07 (1.85-2.31)*	3.34 (2.97-3.76)*
4	1	1	1	1	1	1	1
	2	1.53 (1.37-1.71)*	1.56 (1.42-1.71)*	3.14 (2.70-3.65)*	1.52 (1.36- 1.71)*	1.95 (1.76-2.16)*	1.23 (1.08-1.39)*
	3	1.04 (0.94-1.16)	0.87 (0.79-0.95)*	1.28 (1.07-1.53)*	2.00 (1.79-2.24)*	1.46 (1.31-1.63)*	2.50 (2.23-2.81)*
	4	1.14 (1.02-1.28)*	1.42 (1.28-1.58)*	1.40 (1.15-1.70)*	1.83 (1.63-2.06)*	2.08 (1.86-2.32)*	3.33 (2.96-3.75)*

Model 1: Crude OR, Model 2: Adjusted for age, gender and region, Model 3: Additional adjustment for SES; family size; close friend; family structure, Model 4: Additional adjustment for BMI. Cluster 1: Low anxiety; Low psychosomatic symptom; Cluster 2: Low anxiety; Moderate psychosomatic symptom; Cluster 3: High anxiety; High psychosomatic symptom; Cluster 4: High anxiety. *p≤0.05 considered statistically significant; # Reference category for each column shown in the parentheses

4. Discussion

According to the findings of this study, unhealthy behaviors such as daily use of soft drinks, candy, salty foods, screen time and smoking are associated with higher anxiety and psychosomatic symptoms. Skipping breakfast was also more common in students with high anxiety and psychosomatic symptoms. In addition, the present study showed that the recurrence of psychosomatic disorders was more frequent among female students with higher BMI. Those with higher anxiety and worry also showed a lower duration of sleep time and higher duration of mobile phone use compared to those with low psychosomatic disorders. In the current study, high level of anxiety and psychosomatic symptoms were seen in around 20% of the students. Our finding is consistent with the study of Kieling et al., among children and adolescents in low-income and middle-income countries (1). Due to the high number of young people in our country and the relatively high prevalence of mental disorders in this group, mental health as a preventable issue should be considered.

In our study, the daily use of candy, salty food, fried/fatty foods, unhealthy confectionaries and soft drinks were significantly higher in students with high anxiety and psychosomatic symptoms (third cluster) and students with only high anxiety (fourth cluster) than in students with good mental health (first cluster). Consumption of healthy foods (milk, fruits and vegetables) was also significantly higher in students with good mental health than in those of other clusters. A few studies indicate a significant relationship between mental health disorders with use of unhealthy foods in children and teenagers (15, 16, 20). Generally, results of other studies are consistent with the current study that negative emotions can increase consumption of candy and high-calorie foods. Depression and mental disorders also increase the use of high calorie foods and decrease use of fruits and vegetables (13, 14, 23-26). Although the real reason for increased use of unhealthy food is unknown, the sudden change in attitude due to use of unhealthy food tends to support this conclusion (27). A study on Norwegian adolescents showed that the likelihood of psychological disorders and ADHD were significantly lower in those with a more varied healthy diet (including fruits, vegetables, cereals and fish in regular meals). Also, consumption of meals irregularly and use of more unhealthy foods increased risk of behavioral disorders (28). Probability of psychological disorder symptoms were also more than 50% at the highest quintile of unhealthy diet score (29). There are some biological reasons for the effect of diet on mental health. Nutritionists believe that low-quality diet affects the brain and mental health (14). Diets rich in fruits and vegetables with micronutrients such as iron, calcium and magnesium are also necessary for proper function of the brain and the prevention of psychosomatic disorder (30). Furthermore, skipping breakfast was more common in students with high anxiety and psychosomatic symptoms. The findings of other studies are similar to our results. Therefore, the risk of stress and mental disorders increases significantly by skipping breakfast (29-33). Breakfast creates a quick increase of energy and provides necessary nutrients for brain cells after waking up (34, 35).

According to our findings, the odds of watching TV and computer use for more than two hours per day is significantly higher in students with high anxiety (cluster 4) and those with recurrent headache, stomachache, anger and irritation and worrying (cluster 2) than students with good mental health. The results of Monique et al. are concordant with our results indicating that, adolescents with low activity (screen time > 2h per day) have generally lower mental health compared to their peers (9). The results of other studies reported a significant increase in psychological disorders and depression due to increased use of computers, TV and internet in children and adolescents (16, 31). In the current study, use of the internet and mobile phones in students with high anxiety and psychosomatic symptoms was significantly higher than of other students, which is also confirmed in the results presented by Katharina et al. (36). In fact, sedentary behavior among young people is accompanied by psychosomatic disorders.

In this study, risk of inactivity (considering screen time and time spent on homework) was significantly higher in students with psychosomatic symptoms and high anxiety (second, third and fourth clusters) than in students in the first cluster. These results are congruent with the study by Suchert et al. that show children and adolescents with low mental health are more inactive during the day (37). Lack of motivation for physical activity in adolescents with mental disorders might cause them to prefer watching TV or using computers in order to overcome their negative emotions. As a result, the positive and protective effect of physical activity on psychological disorders will be neglected (38).

We found that, tobacco use was significantly higher in students with recurrent psychosomatic symptoms than in students with good mental health. A study by Takeo et al. showed that the risk of smoking for more than once a month is higher in adolescents with mental disorders (32). This finding has been also confirmed by previous studies

(1, 20, 31). The feeling of satisfaction due to nicotine might lead to increased smoking. It has also been shown that psychosomatic disorders in youth has an essential role in smoking in adulthood (39). In our study, the average sleep duration of students with high anxiety and psychosomatic symptoms was significantly lower than in other students. Similarly the study of Tanihata et al. showed that adolescents with mental health disorders are at a higher risk of sleeping problems or insomnia (32). Other studies pointed to the positive association between sleep quality and high level of depressive/anxiety symptoms too (40). Designing a mental health program among adolescents can improve sleep quality, creating a better academic performance, and further encourage healthy lifestyles.

5. Limitations and strengths

There were some limitations and strengths in the current study that should be taken under consideration. The most important strength of this study was the large sample size at the national level. This study is also one of the first studies to investigate the behavioral habits in children and adolescents based on their mental health condition in Iran. The cross-sectional nature of the study is the most important limitation because causality of relationship cannot be determined.

6. Conclusions

The risk of an unhealthy lifestyle (low use of milk, fruits and vegetables, lack of physical activity, high use of candy, salty foods, soft drinks and smoking) was significantly higher in children and adolescents with high anxiety and psychosomatic symptoms compared to the others. Given the cross-sectional design of this study, we cannot identify the causal relationship between study variables, and it is important to consider that observed association between lifestyle and psychosomatic disorders may be a bidirectional relationship. Psychosomatic disorders lead to behavioral changes and unhealthy behaviors such as smoking or increased use of candy among adolescence. On the other hand, unhealthy lifestyle habits consequently increase severity of anxiety and psychosomatic disorders. The current findings provide a starting point for designing an interventions program for improving children and adolescents' lifestyle with the aim of achieving better outcomes for the development and promotion of good mental health.

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Conflict of Interest:

There is no conflict of interest to be declared.

Authors' contributions:

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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